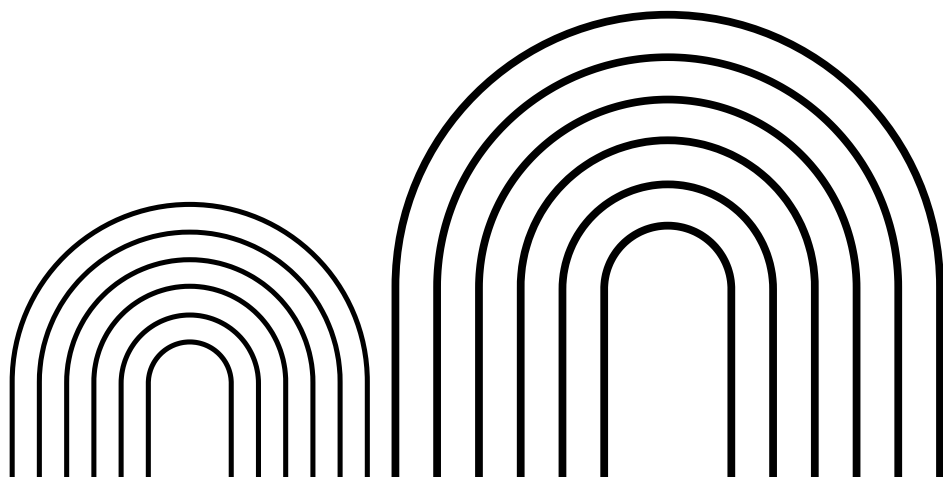
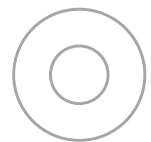
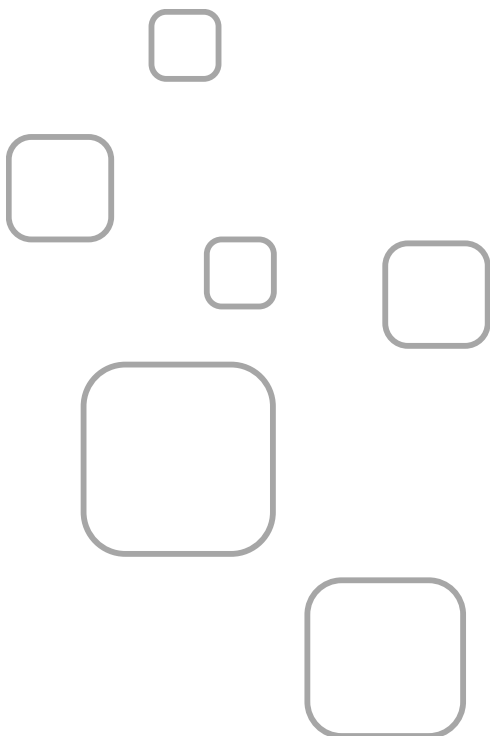


sensors and actuators

PROJECT

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Types of industrial sensors and actuators

Industrial sensors types

1. Temperature sensor

Temperature sensors are used to detect the temperature of an object and convert it into an electrical signal output. Common temperature sensors include thermistors, thermocouples, semiconductor temperature sensors, etc. These sensors have the characteristics of high precision, fast response and good stability. They are widely used in meteorological observation, industrial process control, household appliances and other fields.

temperature sensor

2. Pressure sensor

Pressure sensor is a device that measures the pressure value of liquid or gas. It is widely used in industrial automation, automobile manufacturing, weather forecasting and other fields. Common pressure sensors include piezoresistive sensors, capacitive sensors, piezoelectric sensors, etc. These sensors have the characteristics of high precision, good reliability and strong anti-interference ability.

pressure sensor

3. Motion sensor

A motion sensor is a device that measures the position change of an object or structure. It can convert the displacement of an object compared to a reference point into an electrical signal output, thereby realizing the monitoring of the position change of the object. There are also various types of motion sensors, such as displacement resistors, displacement optics, ultrasonic displacement sensors, etc. They are widely used in mechanical processing, bridge engineering, automobile manufacturing and other industries.

4. Liquid level sensor

The liquid level sensor is a common sensor for measuring the height of liquid. It converts the height of the liquid level into an electrical signal output. There are many types of liquid level sensors, including float type, pressure type, capacitance type, ultrasonic type and microwave type. It plays an important role in many industrial applications, such as tank level monitoring, water treatment system, petroleum and chemical industry, etc.



water level sensor

5. Flow sensor

The flow sensor is an instrument for measuring the flow of liquid or gas. It can convert the flow into an electrical signal output, thereby realizing the monitoring and control of the flow.

Common ones include magnetic flow sensor, turbine flow sensor, differential pressure flow sensor, ultrasonic flow sensor and radar flow meter. Flow sensors are widely used in HVAC systems, water treatment, chemical engineering and food and beverage processing.

6. Vibration sensor

The vibration sensor is a device that senses the vibration state of the measured object and converts it into a measurable electrical signal. It can simultaneously measure and monitor the vibration and temperature information of the target object. Vibration sensors can identify impending equipment failures as early as possible, so they are widely used in motors, fans, reducers, generators, gas engines, centrifuges, air compressors, and other equipment.

Vibration Sensor

7. Gas sensor

A gas sensor is a device that converts gas concentration into electrical signals and can measure and monitor the concentration of various gases. Common gas sensors include electrochemical gas sensors, catalytic combustion gas sensors, semiconductor gas sensors, infrared gas sensors, etc. Gas sensors are currently widely used in coal mining, chemical industry, agriculture, medical treatment and other fields. Used to detect flammable and toxic gases, or detect oxygen consumption.

gas sensor

8. Optical sensor

Optical sensors use optical principles to measure parameters such as light intensity, color and position. They are usually composed of light sources, optical elements and photosensitive elements, and have the characteristics of high precision, fast response and strong anti-interference ability. Optical sensors are widely used in automatic lighting, robot vision systems, photoelectric detection and other fields.



9. Humidity sensor

Humidity sensors are used to measure the humidity content in the air, which plays an important role in weather forecasting, indoor environment detection, agricultural production and other fields. Typical humidity sensors include capacitive humidity sensors, resistive humidity sensors, etc., which have the characteristics of high accuracy, good stability and fast response speed.

How are wearable body sensors most commonly used?

1. Heart Rate/Pulse Sensor

A heart rate/pulse sensor is a device that measures the electrical activity of the heart and provides insight into heart rate and other cardiac functions. It can monitor patients with cardiovascular conditions or detect signs of distress during physical activities such as exercise or sports.

2. SpO2 Sensor

A device used to measure oxygen saturation levels in the blood by detecting changes in light absorption caused by haemoglobin molecules carrying oxygen through the body. This type of sensor is often used in sleep studies and for long-term monitoring of patients with chronic respiratory diseases or other conditions that affect oxygen levels in the blood.

3. Inertial Measurement Unit (IMU) Sensor

Measures linear and angular motion, acceleration, and rotational rates in three dimensions (X, Y, Z). This type of sensor can detect changes in posture or gait, as well as sudden movements or falls. It can also track movements during physical activities such as running, swimming, and biking.

4. Pulse Wave Velocity (PWV) Sensor

Measures blood pressure indirectly by measuring the speed at which pressure waves travel through arteries. This type of sensor is often used to monitor patients with hypertension or other cardiovascular conditions because it indicates arterial stiffness, which can help diagnose certain diseases such as atherosclerosis or diabetes mellitus.



5. Temperature Sensor

Detects changes in temperature. It allows for long-term monitoring of thermal fluctuations within an environment or on a surface, such as skin temperature during feverish illnesses like colds or flu viruses or during hot weather events like heat exhaustion or sunburns from overexposure to UV rays.

6 . Respiration Rate Sensor

Monitors breathing patterns over time by measuring changes in air pressure caused by inhalation and exhalation. This type of device detects abnormalities in breathing patterns which may indicate respiratory issues such as asthma, chronic obstructive pulmonary disease (COPD), and sleep apnea.

7 . Blood Pressure (BP) Sensor

Measures arterial tension using oscillometric technology, which detects pressure waves generated by each heartbeat. BP sensors are often worn around the upper arm, continuously monitoring BP levels over time and providing valuable insights into overall cardiovascular health.

8 . Glucose Level (GL) Sensor

Monitors glucose levels over time without requiring invasive or painful procedures such as finger-pricking devices to draw blood samples. The most common type uses a combination of infrared light and near-infrared spectroscopy techniques to estimate GL concentrations in capillary blood samples taken from fingertip pores, earlobes, etc.

9 . Electrocardiogram (ECG) Sensor

Measures electrical activity along different points on the torso via electrodes attached directly onto skin surfaces. These devices detect abnormalities related to heart muscle function, which may indicate underlying issues such as arrhythmia (irregular heartbeats), ectopic beats, and conduction delays.

10 . GSR/EDA Sensor

GSR stands for galvanic skin response, while EDA stands for electrodermal activity. Both refer



to sensors explicitly designed to measure sweat gland activity via skin conductance measurements when an individual experiences emotional arousal due to excitement, fear, anger, and stress.

