

Classification of sensor

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Abstract-In Recent Time Sensor Technologies Has been powered by the very High speed and very low cost Electronic circuit Due to The Different method that are novel Processing method and very Advanced Manufacturing Technology which make it low cost .The Availability and the very wide range of application sensors of low cost are in very high demand .Integrated sensors are being develop to met all the criteria of designer's need for simple design. now a days smart Sensors are becoming the integrals parts of the system performing functions ,that previous sensors could not able to performed or were not that economically variable.the presence of digital processing power has a liberating effect on a sensors design .

INTRODUCTION

Now a days there are lots of competition in market requires the permanent enhancement of reliability and quality of

products. The rising demand of the comfort ,security, automation and advanced system lead to a completely new and advanced application for a Sensor system. To keep up full-fillment of user requirement ,the design of Sensor system is required to be provide novel approach and solution from the recent development in science and technology .

Development of sensors technology are based on the technical progress in these fields .now a days everything come with a sensor without sensor nothing is possible .if we take an example of toy car it's also a sensors which can make that car not to crash and id we take example of real world car which contains an automatic mode that's also contain thousand of sensors. The mobile phone that we have that also contain a numbers of sensors.it means sensors are everywhere. sensors can make any object smart even the animals like owl they have their natural sensors which help them to fly and catch a prey at night.

In recent people are creating micro technology ,for this technology our sensor

Classification of Sensors

The sensors are use everywhere in the world and it takes the world in the next level of automations. We can find different type of sensors in our homes, office, car, manufacturing etc. Sensors make our lives easier by detecting our presence, adjusting room temperature, detecting smoke and ring fire alarm. All these and many automation tasks are possible because of sensors.

What is a Sensor?

There are a lot of definition of sensors is but I would like to define a Sensor as an input device which provides an output (signal) with respect to a specific physical quantity (input).

The term “input device” in the definition of a Sensor means that it is part of a bigger system which provides input to a main control system (like a Processor or a Microcontroller).

Another unique definition of a Sensor is as follows: It is a device that converts signals from one energy domain to electrical domain.

Classification of Sensors

There are several classification of sensors define by Different authors.

In the first classification of sensors are:-

1. **Active Sensors &**
2. **Passive Sensors**

1. **Active Sensors:** - The Sensors which require an external excitation or power signal. It collect energy from use AC and DC electrical source. Example: LIDAR (Light detection and ranging), Photoconductive cell, Rader, GPS, X-ray etc.
2. **Passive Sensors:** - The Sensors which doesn't require any external power signal and directly generates output response i.e. it use its own energy. Example: Photographic, thermal, electric field sensing, chemical, infrared and seismic. However, as can be the case with some sensors, seismic and infrared light sensors exist in both active and passive forms.

The other types of classification is based on **Means of detection** used in the sensors. Some of the means of detection are Electric, Biological, Chemical and Radioactive etc.

The next classification is based on **conversion phenomenon** i.e. the Input and Output. Some of the common conversion phenomena are Photoelectric, Thermoelectric, Electrochemical and Electromagnetic etc.

The last one classification of sensors are

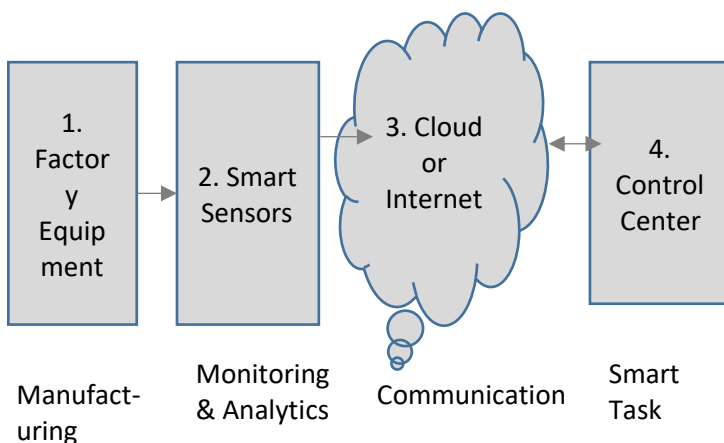


Figure1: configuration of a smart connected factory

1. Analog sensors and

2. Digital sensors

1. **Analog sensors:** - The sensor which produce and analog output i.e. a continuous o/p signal with respect to the quality being measured. Example: human voice, natural sound and analog electronic device etc.
2. **Digital Sensors:**-It work with discrete or digital data i.e. conversion and transmission is digital in nature. Example: computers, optical devices and other electronic devices.

The list of different types of sensors that are commonly used in various applications. All these sensors are used for measuring one of the physical properties like Temperature, Resistance, Capacitance, Conduction, Heat Transfer etc.

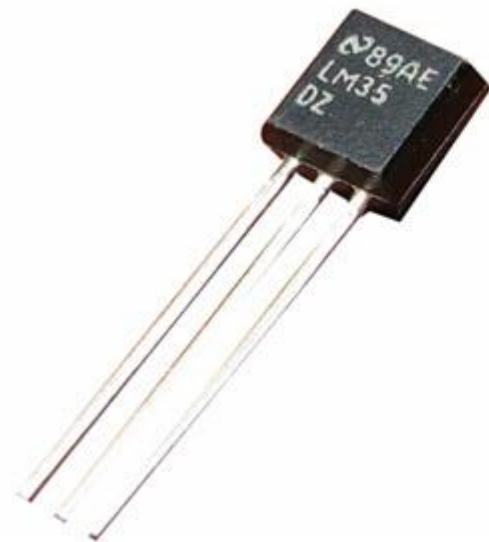
- Temperature Sensor
- Proximity Sensors
- Vibration Sensors
- Accelerometer
- IR Sensors (Infrared Sensor)
- Pressure Sensor
- Light Sensors
- Ultrasonic Sensors
- Smoke, Gas and Alcohol Sensors
- Touch Sensors
- Color Sensors
- Humidity Sensors
- Tilt Sensors
- Flow and Level Sensors



Figure2: Different Sensors

Temperature Sensor

One of the most common and most popular sensor is the Temperature Sensor. A Temperature Sensor, as the name suggests, senses the temperature i.e. it measures the changes in the temperature.



LM35 - Temperature Sensor IC

In a Temperature Sensor, the changes in the Temperature correspond to change in its physical property like resistance or voltage. There are different types of Temperature Sensors like Temperature

Sensor ICs (like LM35), Thermistors, Thermocouples, RTD (Resistive Temperature Devices), etc.

Temperature Sensors are used everywhere like computers, mobile phones, automobiles, air conditioning systems, industries etc.

Proximity Sensors

A Proximity Sensor is a non-contact type sensor that detects the presence of an object. Proximity Sensors can be implemented using different techniques like Optical (like Infrared or Laser), Ultrasonic, Hall Effect, Capacitive, etc.

Some of the applications of Proximity Sensors are Mobile Phones, Cars (Parking Sensors), industries (object alignment), Ground Proximity in Aircrafts, etc.

Accelerometer

An accelerometer is an electromechanical device that will measure acceleration forces. These forces may be static, like the constant force of gravity pulling at your feet, or they could be dynamic - caused by moving or vibrating the accelerometer.

The motion sensors in accelerometers can even be used to detect earthquakes, and may be used in medical devices such as bionic limbs and other artificial body parts. Several devices, part of the quantified self-movement, use accelerometers

IR Sensors (Infrared Sensor)

IR Sensors or Infrared Sensor are light based sensor that are used in various applications like Proximity and Object Detection. IR Sensors are used as

Vibration Sensors

Vibration sensors are piezoelectric accelerometers that sense vibration. They are used for measuring fluctuating accelerations or speeds or for normal vibration measurement.

Vibration in industrial equipment is sometimes part of the normal operation but sometimes it can be a sign of trouble. Maintenance professionals use the sensors in order to predict the maintenance of the machinery.

Example of vibration sensors are Velocity Sensor, Gyroscope Sensor and Vibration Data Logger etc.

Examples of applications where the vibration sensors are used: process control systems, aerial navigation and underwater-applications. Frequency range from 0.2 up to 2500 Hz etc.

proximity sensors in almost all mobile phones.

There are two types of Infrared or IR Sensors: Transmissive Type and Reflective Type. In Transmissive Type IR Sensor, the IR Transmitter (usually an IR LED) and the IR Detector (usually a Photo Diode) are positioned facing each other so that when an object passes between them, the sensor detects the object.

The other type of IR Sensor is a Reflective Type IR Sensor. In this, the transmitter and the detector are positioned adjacent to each other facing the object. When an object comes in front of the sensor, the sensor detects the object.

Different applications where IR Sensor is implemented are Mobile Phones, Robots, Industrial assembly, automobiles etc.