IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.67
Volume 5, Issue 4, March 2025

Sensors: An Overview

Dr. S. S. Patil, Prof. P. G. Chavan, V. E. Gaikwad
Guru Gobind Singh Polytechnic, Nashik, Maharashtra

Abstract: *A sensor is a device that detects and reacts to external input. Light, moisture, heat, movement, pressure, or any of a variety of other environmental factors could be the specific input. Food analysis, study of biomolecules, drug development, investigate crime, clinical diagnosis, environmental field supervising, industrial process regulation, pharmaceutical production, organ replacement, motorsport, agricultural sectors, and aerospace are some of the applications of various types of sensors.*

Keywords: sensor

I. INTRODUCTION

A sensor is a device that produces an output signal after sensing a physical phenomenon. In the broadest sense, a sensor is a device, machine, or subsystem that detects situation; makes changes in the environment and sends the information to other electronic communication equipmentor a computer processor. Sensors are always used with other electronics equipment. Sense organs are the vital parts of human body which are responsible for ―response to stimulusǁ action.

When there is an external stimulus to our body, there will always be a reaction to the action. Brain is the superior power which takes the decision accordingly. Sensors of the electronic world also behave sexactly like the sense organs of our body. Sensors are sophisticated device which senses, detects and responds accordingly. It‘s a type of transducer, which has electrical signals or optical signals. The explicit input could be moisture, pressure, heat, light or pressure.

Sensors are the objects such as touch-sensitive elevator buttons or lamps which brighten or turn dim when touching the base. One example is the touch screen mobiles we use in daily life.

With advances in micro machinery and easy-to-use microcontroller platforms, the uses of sensors have expanded beyond the traditional parameters like temperature, pressure and flow measurement. The output is generally a signal that is converted to a human-readable display, at the sensor location and transmitted electronically over a network for further processing. Some of the synonyms for sensors are photo-conductive cell, electric eye, magic eye, mine detector, sensing element, trace detector, detector, and photocell.

It may be noted that a Sensor is a device used for the conversion of physical characteristics into the electrical signals. This is a hardware device that takes the input from environment and gives the output to the system by converting it. For example, a thermometer takes the temperature of the body or the system as physical characteristic and then converts it into electrical signals for the system.

II. SENSOR

A sensor is a device that senses and reacts to input from the physical environment. Light, heat, motion, pressure, moisture, or any of a variety of other environmental phenomena could be the specific input. In general, the output is a signal that is converted to a human-understandable display at the sensor location or electronically transmitted over a network for reading or further processing.

1. **Chemical sensor**

A chemical sensor is a device that converts chemical information into an analytically useful signal, such as composition, the presence of a specific element or ion, concentration, chemical activity, and partial pressure.

Chemical sensors can be classified into several types based on their working principles, including mass, optical, magnetic, electrochemical, and thermal.

chemical sensors can also be classified based on the object to be detected, for example, gas sensors for trace gas analysis and monitoring, various ion sensors represented by the pH sensor and humidity sensor, and biosensors based on biological characteristics.

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.67
Volume 5, Issue 4, March 2025

Environmental monitoring is a well-known application field for chemical sensors, and the gas sensor plays an important role there. Sensitivity, selectivity, and stability are three key performance indicators for gas sensors, and they are largely determined by the sensing material and mechanism. The gas sensitive characteristic of the sensor can be significantly improved by utilising advanced materials and a new response mechanism. Semiconductor, electrochemical, solid electrolyte, contact combustion, photochemical, and contact combustion
are the most common types of gas sensors.

2. Biosensor

A biosensor is a device that analyses data. The sensor that combines biological elements with a physiochemical transducer to produce an electronic signal that is proportional to a single analyte and fetched into a detector is proportional to a single analyte.

The Biosensor is an analytical device that gathers biological components with a physicochemical detector and is used to detect the analyte. The sensing biological elements are biometric components that interact with tissue, microorganisms, antibodies, nucleic acids, and other components to recognise and analyse the study. Biological engineering can also be used to generate sensitive biological elements. The detector elements convert signals from the analyte-biochemical interface into other signals, such as transducers, that can be measured and qualified more easily. Biosensor devices are linked to electronics and
signal processors, and they are in charge of displaying the results and are user-friendly

Modern Sensors

The sensor technologies have changed a lot in the last decade in terms of compactness, smartness and sensitivity. The traditional sensors such as photosensors, optical sensors, capacitive sensors and almost all sensors have been replaced by their integrated circuit forms such as MEMS (microelectromechanical system). The sensors are embedded in all modern computing and navigation devices informs and this is why an ordinary smartphone carries around 22 sensors for various purposes. The technologies of sensors have further advanced and become intelligent as smart sensors and available in wearable forms. This may be seen in smart watches, smart gadgets or a large application such as self-driving cars where hundreds of smart sensors are involved for seamless and smooth driving without assistance of a driver. The same can also be seen in robotics, medical diagnosis, brain–computer interface (BCI) and many more, where AI (artificial intelligence) has empowered the sensors with intelligence and smartness for emerging and modern applications such as industry, healthcare and sophisticated automation

Applications of sensors

Food analysis, the study of biomolecules and their interactions, drug development, crime detection, medical diagnosis, environmental field monitoring, industrial process control, pharmaceutical manufacturing, organ replacement, motorsport, agriculture, and aerospace are some of the applications of various types of sensors.

III. CONCLUSION

A sensor is a device that receives various types of signals, such as physical, chemical, or biological signals, and converts them to electric signals. Sensors are classified into various types based on their input signal, applications, and conversion mechanism, as well as sensor material characteristics like cost, accuracy, and range. This paper provides an overview of sensors, including their classifications, properties and applications.

REFERENCES

[1]. Janata, J 2008, Introduction: modern topics in chemical sensing, Chemical Reviews, vol.108, no.2, pp. 327–328.
[2]. Ishiji, T& Imaya, H 2015, Advanced electrochemical sensor for gas detection, IEEJ Transactions on Sensors and Micromachines, vol. 135, no. 8, pp. 276–280.
[3]. Modular Sensor Architecture, PureEngineering LLC 2020, Sensor Network Architecture, 2020;Geeksforgeeks.
[4]. Wireless Sensor Networks Architecture, Encyclopedia, scholarly community.