

Introduction of Sensors in Instrumentation

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Introduction

- **What is sensor**

Sensor is a transducer that receives and respond to a signal from physical system.

- **What is Transducer**

Transducer is device which convert energy from one form to another.

□ Need for Sensors

➤ Sensors are pervasive. They are embedded in instruments, our bodies, automobiles, airplanes, cellular telephones, radios, chemical plants, industrial plants and countless other applications. Without the use of sensors, there would be no automation !!

□ Types of sensor

➤ **Active Sensors:**

Active sensors required an external Power.

➤ **Passive Sensors:**

Passive sensors does not required an external Power.

➤ **Temperature Sensors:**

Device which is sensitive to thermal.

➤ **Current Sensors:**

The device that detects current in a wire and generate a signal proportional to that unit.

➤ **Chemical Sensors:**

Device which is sensitive to layer based on polymer.

➤ **Acoustic Sensors:**

Device which is sensitive to Sound.

➤ **Optical Sensors:**

Device which is sensitive to light.

Characteristics

Dynamic range:

This is the ratio between largest amplitude signal and the smallest amplitude signal the transducer can effectively translate. Transducer with larger dynamic range are more sensitive and precise.

Repeatability:

This is the ability of sensor to produce an identical output when is stimulated by the same input.

Characteristics

Noise:

All transducers add some random noise to their output. In electrical transducers this may be electrical noise due to thermal motion of charge in circuits.

Hysteresis:

This is a property in which the output of the transducer depends not only on its current inputs but its past input.

e.g An Actuators which uses a gear train may have some backlash which means that if the direction of motion of the actuator reverses, their will be a dead zone before the output of the actuator reverses caused by play between gear teeth .

□ Applications

- **Electromagnetic e.g Antenna.**
- **Electrochemical e.g ph probes.**
- **Electromechanical e.g Galvanometer.**
- **Electro acoustic e.g Microphone.**
- **Electro optical e.g LED.**
- **Thermoelectric e.g Thermocouple.**
- **Radio acoustic e.g Radio receiver.**

Thank you