SNS COLLEGE OF TECHNOLOGY

Coimbatore-35
An Autonomous Institution

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

19EET304/ IOT for Electrical Sciences

III YEAR VI SEM

UNIT 2 – SENSORS

TOPIC 3 –INDUCTIVE SENSORS

Sensors in IoT

A sensor is a device that takes physical input from its surroundings and turns it into data that can be analyzed by humans or machines. The majority of sensors are electronic (the data is transformed into electronic data), although others are simpler, such as a glass thermometer that displays visual data.

Depending on the type of input, sensors can broadly be divided into two categories:

Analog Sensors

Digital Sensors

The Internet of Things (IoT) provides many opportunities to improve how businesses operate. IoT has enhanced the automation processes by collecting massive amounts of data via sensors.

The sensors are able to gather data and send it either directly or indirectly to the cloud or the edge. These sensors are also useful as standalone devices with processing and important communication capabilities.

Data collected from sensors also helps businesses to make intelligent decisions about their operations.

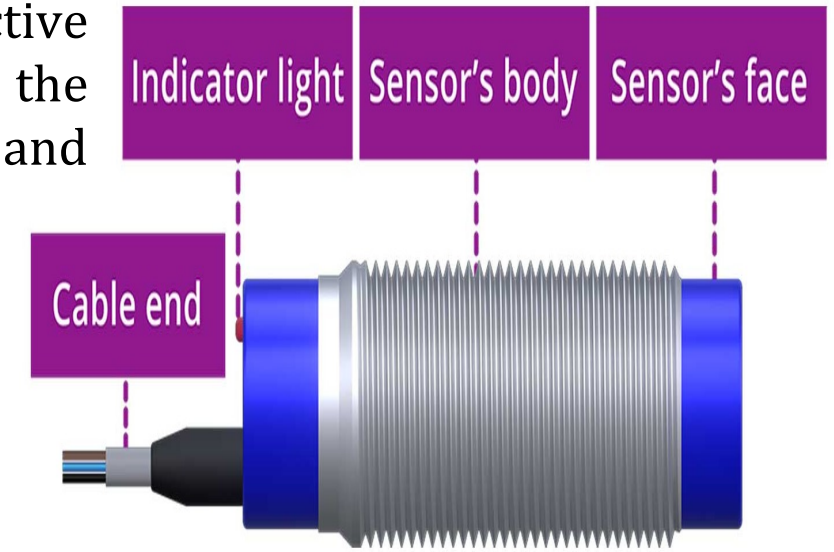
WHAT IS AN INDUCTIVE SENSOR?

•An inductive sensor is an electronic device that can detect ferrous metal targets without physical contact.

•Inductive sensors will also detect non-ferrous metal targets like aluminum, brass, and copper. But using non-ferrous metal targets decreases an inductive sensor's sensing range.

INDUCTIVE SENSOR PARTS

The four major external parts of an inductive sensor are the body of the sensor, the sensor's face, the indicator light, and the cable end or cable connector end.



TYPES OF INDUCTIVE SENSORS

Inductive sensors are available in a lot of different configurations. They can be

– AC or DC,
– shielded or unshielded,
– normally open or normally closed,
– NPN or PNP, just to name a few.

DESIGN OF INDUCTIVE SENSORS

Inductive proximity sensors and distance sensors comprise several components:

Attenuation object: The metallic object to be detected.

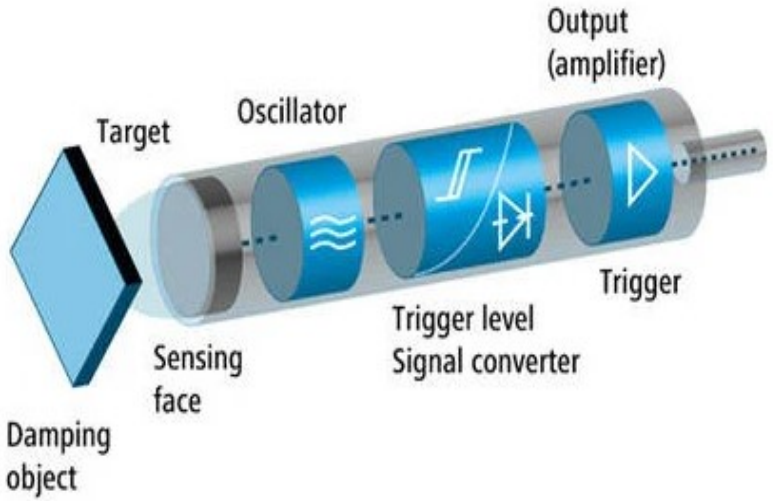
Measurement field: The sensor-generated electromagnetic field.

Active sensor surface: The sensor surface emitting the electromagnetic field.

Oscillator: A circuit generating high-frequency alternating voltage signals which build the measurement field.

Trigger stage / signal converter: Electronic system that detects the changes in the oscillator signal caused by presence of the damping object and convert it into analog or digital signals.

Output amplifier: Amplifies the converted signal for output to external devices.



WORKING PRINCIPLE OF INDUCTIVE SENSORS

The working principle of an inductive sensor mainly depends on the electromagnetic induction principle for detecting or measuring objects.
Inductive sensor mainly includes an induction loop which is enough for detecting electromagnetic.

The working of these sensors can be done by generating an oscillating electromagnetic field which is formed by a magnetic object when it is in motion.

The moving object activates the current flow within the induction loop likewise with Faraday's law of induction. So that changes will have occurred within the electromagnetic field.

So it can be detected with the circuit of sensors. A suitable signal can be an output when a magnetic metal is noticed.

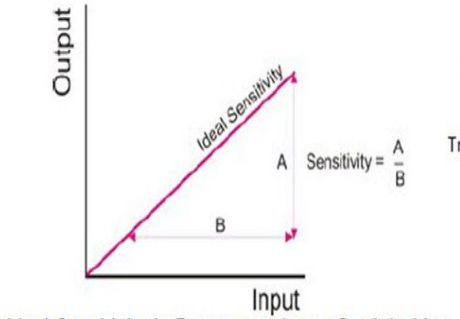
Applications of Inductive Sensor

✓These sensors are extensively used in industries, military, robotics, rail, aerospace, etc.
✓Used in Proximity sensors or switches
✓These sensors are used to notice ferrous metals like iron, steel, nickel, and cobalt.
✓Used in the medical field for MRI (Magnetic Resonance Imaging)
✓It is used to assemble the automotive body
✓These sensors are used for detecting motion position & controlling the motion of an object
✓Used in the production of transformer & coil
✓Used in metal detectors
✓Used in automated industries

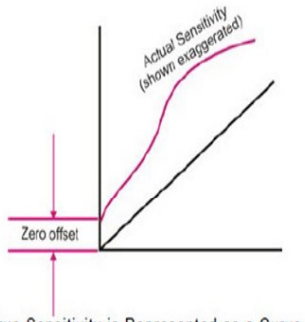
SENSITIVITY AND LINEARITY OF THE SENSOR

A sensor's sensitivity indicates how much its output changes when the input quantity it measures changes. For instance, if the mercury in a thermometer moves 1 cm when the temperature changes by 1 °C, its sensitivity is 1 cm/°C (it is basically the slope dy/dx assuming a linear characteristic).

Linearity is an indicator of the consistency of measurements over the entire range of measurements. In general, it is a good indicator of performance quality of a sensor, but on its own, it can be a misleading indicator. In simple terms, linearity tells us how well the instrument measurement corresponds to reality.



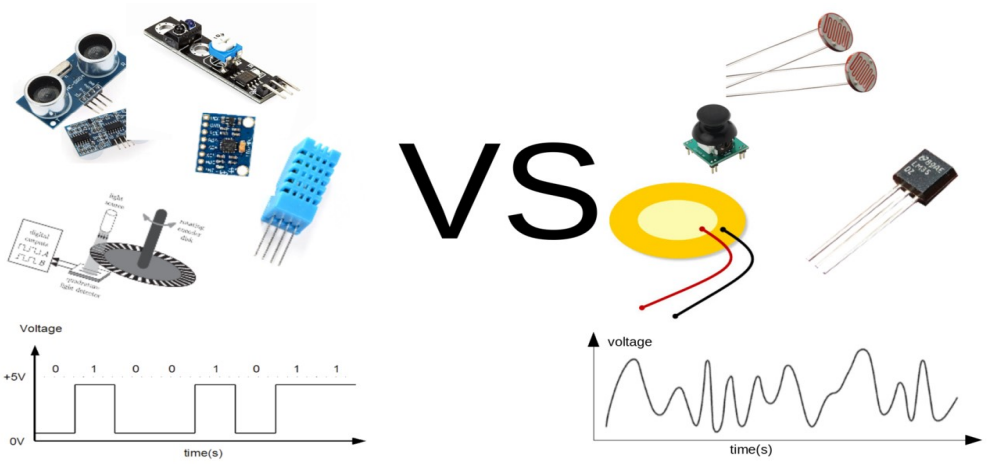
Ideal Sensitivity is Represented as a Straight Line



True Sensitivity is Represented as a Curve

ASSESSMENT – 1

HOW CAN YOU TELL IF A SENSOR IS DIGITAL OR ANLOG ?



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