

Sensors and Robotics Technology

Measurement and Sensors Unit - 1

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Temperature Sensor

- A temperature sensor is a device that measures temperature and converts it into an electrical signal. This signal can then be processed and displayed in a readable format.
- The core of a temperature sensor is its sensing element. This element changes its properties (like resistance or voltage) in response to temperature changes.

Types Of Sensing Elements

- Thermistors: These resistors change their resistance significantly with temperature.
- Thermocouples: These generate a voltage based on the temperature difference between two dissimilar metals.
- RTDs (Resistance Temperature Detectors): These have a stable resistance change with temperature.

DIFFERENT TYPES OF TEMPERATURE



Thermocouple



RTD



Semiconductor
Based



Thermopile

L

- Thermocouples: Used in high-temperature environments, such as furnaces and engines.
- Thermistors: Widely used due to their low cost and high sensitivity.
- RTDs: Offer high accuracy and stability over a wide temperature range.
- IC Temperature Sensors: Integrated circuits with built-in temperature sensing capabilities.

Applications:

Temperature sensors are used in a vast array of applications, including

- Home appliances: Refrigerators, ovens, air conditioners
- Automotive industry: Engine management, climate control
- Industrial processes: Temperature control, monitoring
- Medical equipment: Thermometers, patient monitoring
- Meteorology: Weather stations
- Research and development: Various experiments and measurements

- Choosing the Right Sensor:
- Selecting the right temperature sensor depends on factors such as:
- Temperature range: The expected temperature extremes.
- Accuracy: Required precision of measurement.
- Response time: How quickly the sensor should react to temperature changes.
- Cost: Budget constraints.
- Environment: The conditions where the sensor will be used (e.g., harsh environments).

