Sensor	Functionality	Working Mechanism
DHT22 (Humidity & Temperature Sensor)	Measures temperature and humidity.	- **Humidity**: Measures resistance change due to varying moisture levels between two electrodes. - **Temperature**: Uses a thermistor (NTC type) that changes resistance with temperature.
Touch Sensor	Detects touch, pressure, or force.	- **Capacitive**: Measures capacitance changes when a finger (acting as a conductor) touches the sensor. - **Resistive**: Detects pressure applied to conductive films by measuring voltage drop when the films touch.
Accelerometer	Measures acceleration due to gravity and dynamic movement.	- **Piezoelectric**: Crystal structures create voltage due to stress from acceleration. - **Capacitive**: Measures changes in capacitance between structures due to movement or acceleration.
Gyro Sensor	Measures angular velocity (rotation).	- Uses Coriolis force on a vibrating object to measure angular velocity (e.g., Epson's double-T structure crystal element).
Door/Elevator Sensor	Detects obstacles or people at the doorway and prevents door closure.	- Uses infrared light beams: **Transmitter** sends beams, and **Receiver** detects interruptions to prevent doors from closing.
Fingerprint Sensor	Provides security by identifying users based on fingerprint patterns.	- **Optical**: Shines light over fingerprint and captures the ridges and valleys as a digital image. - **Capacitive**: Measures changes in electrostatic charge due to fingerprint ridges and valleys, creating a detailed image.
LiDAR	Measures distance and creates 3D maps by firing laser pulses.	- Fires rapid laser pulses and measures the time it takes for the light to return. - The instrument calculates distance based on the time of flight, building a 3D map by repeating the process.

Water Level Sensor	Detects material levels (liquid or solid) inside tanks.	- **Capacitive**: Measures changes in capacitance based on the material's dielectric constant and level in the sensor. The capacitance changes as the material level rises or falls.
Fingerprint Optical Sensor	Provides secure identification by reading fingerprint details.	- **Optical**: Uses light to capture a fingerprint image by analyzing ridges and valleys, converting it to a personal digital code.
Capacitive Fingerprint Sensor	Measures fingerprint ridges and valleys based on electrostatic changes.	- Uses capacitive circuits to measure charge variations when a finger touches, producing a detailed map of ridges and valleys.
Infrared (IR) Sensor	Detects heat and objects in its path through infrared light.	- Detects infrared light emitted from objects. The sensor detects heat sources and objects by measuring reflected infrared light.
Pressure Sensor	Measures force applied to a surface.	- Detects changes in resistance or capacitance when force is applied. Common types include piezoelectric, capacitive, and resistive pressure sensors.
PIR (Passive Infrared) Sensor	Detects motion based on infrared radiation changes.	- Detects the infrared radiation emitted by warm objects (e.g., humans) moving in the field of view, triggering a response when significant changes are detected.
Ultrasonic Sensor	Measures distance to an object by emitting ultrasonic sound waves and measuring the time it takes for the sound to return.	- Emits high-frequency sound waves and calculates the time taken for the waves to return after reflecting off an object, determining the distance.
Gas Sensor	Detects the presence of various gases such as CO2, methane, and carbon monoxide.	- Uses a chemical reaction that occurs when the target gas comes into contact with the sensor. The change in resistance or conductivity is measured and analyzed.
Light Sensor	Measures the intensity of light in the environment.	- Converts light into an electrical signal. Common types include photodiodes, photoresistors, and phototransistors.