

## IoT

### Internet of things

these are physical devices that can exchange data with other devices that are connected to the internet. It uses various sensors like

Passive infrared (PIR)

- Ultrasonic sensor
- Pressure sensor
- Level sensor
- Temperature sensor
- Humidity sensor
- Gas sensor
- Light / optical sensor
- Motion sensor
- Magnetic field sensor
- Smoke sensor
- pH sensor
- Water quality

### Type of temperature sensor

Thermocouples → it is used for long distance. A thermocouple is a voltage device that indicates temperature by measuring a change in the voltage.

### RTD (Resistance Temperature Detector)

RTD requires an external current source to function properly.

However, the current produces heat in a resistive element causing an error in temp measurement.

$$\Delta T = P \times \Delta R$$

There are 2 wired 3 wired 4 wired methods to measure temp by using RTD.

(\*) Thermistors it changes its resistance when the temp changes like RTD sensor but it offers higher sensitivity

Most of thermistors negative temp coefficient  
so  $\text{temp} \propto \frac{1}{R}$

(\*) Semi conductor  
(IC temp. sensor) it comes in form of ICs (AD590 & LM35 temp sensor)

IR sensor (infrared sensor)

It is used to sense certain characteristics of its ~~surrounding~~ surrounding by either emitting or detecting IR detection.

It is non-contacting sensor

## 2. PIR Passive Infrared

A passive infrared sensor is an electronic sensor that measures infrared (IR) light radiating from object in its field of view.

They're most frequently utilized in PIR-based motion detectors. PIR sensors are commonly utilized in security alarms and automatic lighting applications.

EX - security alarms, door opening automatic lighting switches

## 3. Ultrasonic sensors

Most ultrasonic sensors are based on the principle of measuring the propagation time of sound between send and receive. The barrier principle determines the distance from the sensor to the reflector or to an object in the measuring range.

EX - MB7360, HRXL-Maxsonar  
WR

## 4. Pressure sensor

A pressure sensor converts change in pressure of a gas or a liquid into an electrical signal by means of a pressure sensing device, and generates an analog output proportional to the pressure or a

Switching output which operates at a particular pressure level

## Level Sensors

~~Level~~ The measuring principle of hydrostatic level sensors operates on pressure measurement. i.e. the pressure at the container bottom is detected by the measuring cell of the pressure transmitter for calculation of the related filling level.

## Humidity sensor

The work by measuring the amount of water vapor in the air per unit volume.

Measurements are expressed as mass per unit volume usually grams per unit volume, usually grams per

# Firewalls

## Firewalls

- A Network device
  - It can be a hardware & software device
  - All the data passes through the firewall
  - After exchanging the data, firewall either block or pass the data
- Ex- only authorised traffic will be allowed to pass

## Types

- \* Packet filtering firewall
- \* Application level firewall
- \* Circuit level gateways

## \* Packet filtering firewall

Applies a set of rules to each incoming IP packet and then forwards or discards the packet

Rules are based on source IP destination IP address, protocols and ports

Ex - if sources is 192.168.21.0 accept if else deny packets

## Application level ~~firewall~~ gateways

- also called proxy servers
- contacts uses using TCP/IP application like TELNET, FTP etc)
- more secure than packet filtering layers

## Circuit level gateways

- Uses two TCP connections
- (i) internal host & gateway
  - (ii) external host & gateway
- Security checks done before setting up a connection. once the connection is established, all the data will be passed

## Characteristics of IOT

1. Connectivity - In IOT, anything, anywhere anytime should be connected to the without connection nothing makes sense.

### 2. Intelligence

Extraction of knowledge from the generated data is important sensor generate data & this data should be interpreted properly

### 3. Heterogeneity

Devices in IOT are based on different hardware platform & networks & can interact with other device or service platform through different networks.

### 4. Enormous scale

The number of devices that need to be managed and that ~~need to be~~ communicate with each other will be much larger than the devices connected to the current internet

### 5. Dynamic changes

one of the important character → data collection from their environment. this is achieved through dynamic changes that occur in the environment around these devices.

### 6. Interoperability

IoT devices use standardized protocols and technologies to ensure they can communicate with each other and other systems.

### 7. Interconnectivity

The IoT refers to the interconnection between devices, the information they send and receive to one another, like a conversation.

### 8. Safety

Sensitive personal details of a user might be compromised when the devices are connected to the internet. so data security is a major challenge.

## APPLICATION OF IOT

### Smart home

smart homes are the most trendy among this list of IoT application. smart home control including lights, alarm, and water flow from taps and promoting home security safety through elaborate smart security system.

### Smart water system

IoT in water treatment plant streamlines water purification processes. sensors measuring water quality, pH, & pollutant levels help plant operators ensure that runoff meets regulatory standards.

## Smart transportation

IoT in transportation can also be used to design steering wheel control system, information on speed or km travel along driving times & rest breaks.

## Smart city

One of the key challenges in urban areas is traffic congestion. IoT-enabled smart traffic systems use real-time data to optimize traffic flow, reduce congestion and improve transportation efficiency.

## Social life & entertainment

A smart home theater integrates multiple smart devices to improve the user experience. Internet-connected smart projectors & IoT lighting enhance the current entertainment experience.

## Health & fitness

IoT-enabled fitness trackers capture data on physical activity, such as step count, distance traveled, and calories burned.

## Agriculture

IoT has obtained a level in agriculture as well. It gives us information regarding the type of soil needed, appropriate temperature and water required for proper growth of the crop.



## Livestock Monitoring

Monitor the health and vitality of livestock in real-time enabling farmers to quickly treat animals and prevent the spread of illness or disease.

## Supply chain and logistics

Locating your goods, tracking their movement determining where and when they are delayed in transit and planning detours calculating when they will arrive at a specific location, and keeping track.

## Energy conservation

IoT can help us increase the efficiency of the power plant and reduce the waste in energy generation → automated fuel boilers, oxygen is regulated automatically etc.

ex- Smart meter