

what is iot?

sol)

- Connecting everyday things embedded with electronics, software, and sensors to internet enabling to collect and exchange data without human interaction called as the Internet of Things (IoT).
- The term "Things" in the Internet of Things refers to anything and everything in day to day life which is accessed or connected through the internet
- IoT is an advanced automation and analytics system which deals with artificial intelligence, sensor, networking, electronic, cloud messaging etc.

Features of IOT:

- 1.Connectivity
 - 2.Analyzing
 - 3.Integrating:
 - 4.Artificial Intelligence
 - 5.Sensing
 - 6.Active Engagement
 - 7.Endpoint Management
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q2)example of iot devices?

sol)

- Internet of Things Devices is non-standard devices that connect wirelessly to a network with each other and able to transfer the data.
- IoT devices are enlarging the internet connectivity beyond standard devices such

as smartphones, laptops, tablets, and desktops.

- IoT devices include computer devices, software, wireless sensors, and actuators.
 - These IoT devices are connected over the internet and enabling the data transfer among objects or people automatically without human intervention.
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 - iot devices are :
 - 1.Google Home Voice Controller
 - 2.Amazon Echo Plus Voice Controller
 - 3.Amazon Dash Button
 - 4.August Smart Lock
 5. Nest Smoke Alarm
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q3)applications of IOT?

sol)

Applications of IoT:

1. Smart Home Applications

2. Health care

3. Smart Cities

4. Agriculture

5. Industrial Automation

6. Hacked Car

7. Healthcare

8. Smart Retail

9. Smart Farming

- Agriculture
 - Assets Tracking
 - Energy Sector
 - Defense
 - Embedded Applications
 - Education
 - Waste Management
 - Healthcare Products
 - Telemedicine
 - Safety And Security Sector
 - Smart City Applications etc.
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q4)Characteristics of IOT? SOL)

Characteristics of the Internet of Things :

The Internet of Things (IoT) is characterized by the following key features:

1.Connectivity:

- Connectivity is an important and first requirement of IoT infrastructure.
- Every Things in IoT should be connected to the IoT infrastructure.
- Connectivity should be guaranteed at anywhere and anytime.

2.Identity:

- Each IoT device has a unique identity (e.g., an IP address).
- This identity is helpful in communication, tracking and to know status of the things.

3.Intelligence:

- Intelligence is Just data collection is not enough in IoT, extraction of knowledge from the generated data is very important.
- For example, sensors generate data, but that data will only be useful if it is interpreted properly.
- So intelligence is one of the key characteristics in IoT

4.Scalability:

- The number of devices connected to IoT zone is increasing day by day
- Therefore, an IoT setup should be capable of handling the expansion.

5.Architecture:

- IoT architecture is yet not uniformed and standardized.



It should be hybrid, supporting different manufacturer's products to function in the IoT network.

6.Safety:

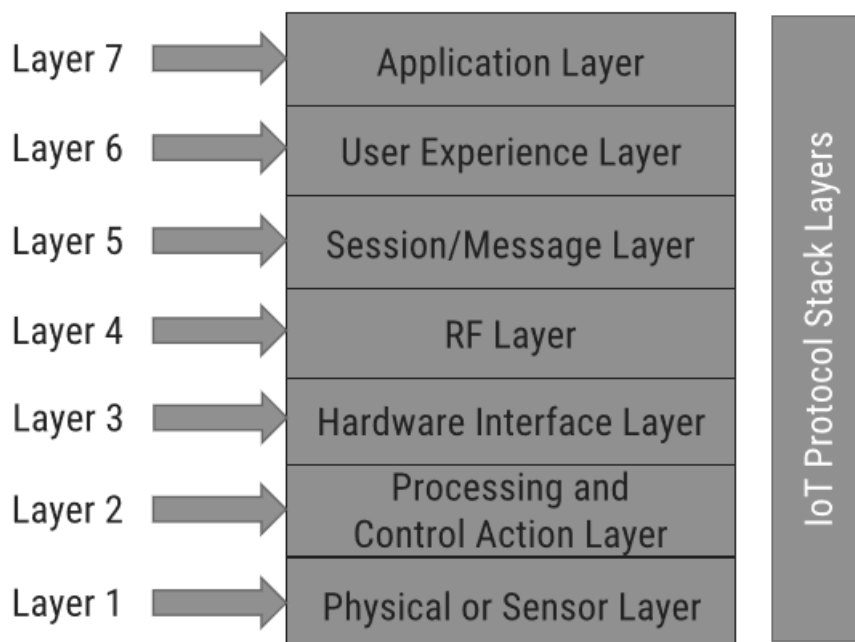
- Sensitive personal information of a user might be compromised when the devices are connected to the Internet.
 - So data security is a major challenge.
 - This could cause a loss to the user.
 - Equipment in the huge IoT network may also be at risk
 - Therefore, equipment safety is also critical.
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q5)explain IOT stack?

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there are 7 layers in IOT stack

- 1.Layer 1 (Physical or Sensor Layer)
- 2.Layer 2 (Processing and Control Action layer)
- 3.Layer 3 (Hardware Interface Layer)
- 4.Layer 4 (RF Layer)
- 5.Layer 5 (Session/Message Layer)
- 6.Layer 6 (User Experience Layer)
- 7.Layer 7 (Application Layer)



1. Layer 1 (Physical or Sensor Layer):

- This layer is concerned about the physical components, which mainly includes sensors.
- In this layer, the sensors are the core component.
- Temperature sensor, pressure sensor, humidity sensor, etc. can all be referred as physical layer components

2. Layer 2 (Processing and Control Action Layer):

- This important layer contains core components of IoT system.
- The microcontrollers or processors are found in this layer.
- The data is received by the microcontrollers from the sensors.

3. Layer 3 (Hardware Interface Layer):

- The 3rd layer in the stack is the Hardware Interface Layer.
- Hardware components and communication standards such as RS232, CAN, SPI, SCI, I 2C, etc. occupy this layer.

4.Layer 4 (RF Layer):

- It plays a major role in the communication channel – whether it is short range or long range.
- Protocols used for communication and transport of data based on RF are listed in this layer.
- Some famous and common protocols are Wi-Fi, NFC, RFID, Bluetooth, Zigbee, etc.

5.Layer 5 (Session/Message Layer)":

- computer network session management is also important in IoT.
- There are many protocols which manage how messages or data are broadcasted to the cloud.
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- Layer 5 (session layer) deals with the various messaging protocols as MQTT, CoAP, etc. and also other protocols such as SSH and FTP.

6.Layer 6 (User Experience Layer):

- This layer deals with providing best experience to the end users of IoT products
- The 6th layer takes care of rich UI designs with lots of features,

- Object-oriented programming languages, scripting languages, analytics tools, etc. all should be included in this layer.
- This is also known as User Experience and Visualization Layer

7.Layer 7 (Application Layer):

- Everything comes to perfection at this layer.
 - This layer utilizes the rest six layers in order to develop desired application
 - It can range from a simple automation application to smart city application.
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q6)explain Enabling Technologies?

sol)

IoT(internet of things) enabling technologies are

1. Wireless Sensor Network
2. Cloud Computing
3. Big Data Analytics
4. Communications Protocols
5. Embedded System

1. Wireless Sensor Network(WSN) :

- A WSN comprises distributed devices with sensors which are used to monitor the environmental and physical conditions.
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- A wireless sensor network consists of end nodes, routers and coordinators.

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- The coordinator also acts as the gateway that connects WSN to the internet.

Example:

1. Weather monitoring system
2. Indoor air quality monitoring system
3. Soil moisture monitoring system
4. Surveillance system
5. Health monitoring system

2. Cloud Computing :

- we can access applications as utilities over the internet.
- Cloud means something which is present in remote locations

- With Cloud computing, users can access any resources from anywhere like databases, web servers, storage, any device, and any software over the internet.

3. Big Data Analytics :

- It refers to the method of studying massive volumes of data or big data.
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- Collection of data whose volume, velocity or variety is simply too massive and tough to store, control, process and examine the data using traditional databases.
- Big data is gathered from a variety of sources including social network videos, digital images, sensors and sales transaction records.

Several steps involved in analyzing big data:

1. Data cleaning
2. Munging
3. Processing
4. Visualization

Examples:

1. Bank transactions

2. Data generated by IoT systems

3. E-commerce and in Big-Basket

4. Health and fitness data generated by IoT system such as a fitness bands

4. Communications Protocols:

- They are the backbone of IoT systems and enable network connectivity and linking to applications
- Communication protocols allow devices to exchange data over the network.
- Multiple protocols often describe different aspects of a single communication.
- A group of protocols designed to work together is known as a protocol suite
- They are used in
 - 1.Data encoding
 2. Addressing schemes

5. Embedded Systems :

- It is a combination of hardware and software used to perform special tasks.
- It includes microcontroller and microprocessor memory, networking units (Ethernet Wi-Fi adapters), input output

units (display keyword etc.) and storage devices (flash memory).

- It collects the data and sends it to the internet.

Examples:

- 1.Digital camera
- 2.DVD player, music player
- 3.Industrial robots
- 4.Wireless Routers etc.

q7)IOT challanges?

sol)

1. IoT security
2. Coverage
3. Scalability
4. Interoperability

5. Bandwidth availability

6. Limited battery life

7. Remote access