Q1

1] What is IoT ? Explain its components and applications

Ans

Definition: Internet of things is network of physical objects embedded with sensors, actuators, microcontrollers, softwares and communication modules for the purpose of communication and data exchange between different devices.

Components:

Internet of Things consists of 3 types of components:

a] Hardware: The hardware components includes sensors, actuators, microcontrollers and communication modules.

b] Software: The software components includes operating systems, applications and connectivity protocols

c] Network: The network components include Internet, Wi-fi, Bluetooth, Cable connection, etc.

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Applications

- Internet of things finds itself in wide range of use-cases.

a] Smart - Home Automation: Automatic door locks, Smart lights, Smart kitchen appliances like Micro-oven, Refrigirator, etc. are some of the application of IoT in making home a smarter environment.

b] Infrastructure: Smart street lights that turns off or on based on human presence and time of the day, Smart garden fountains, Smart parking lots where automatic indicators are present for vehicles for vacant spaces, etc.

Q1

5] What are IP and TCP protocols in the Internet? Explain their functions and differences.

Ans.

1] IP:

Definition: Internet protocol is a communication protocol which is a part of TCP/IP Network model and is the ..

mainstream protocol used to run the internet. It deals with providing logical addresses for devices on the internet.

IP addresses are of two types:
1] IPv4: The current widely accepted
2] IPv6: The newer protocol picking up the use-case.

2] TCP:

Definition: Transmission control protocol is a communication protocol which is also a part of TCP/IP model and is a widely used protocol. It deals with port addressing and session management for connection between devices on the internet.

TCP utilizes the concept of port addressing to manage sessions for a device. It helps to build multiple connection for a single device for multiple applications while IP protocols concern themselves to the virtual connection setup to ensure a reliable internet route from source to destination host.

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Q2
3] What are electronics, sensors and actuators in IoT devices? Explain their functions and types.

As

[+] IoT devices consists of hardware components that include electronics, sensors and actuators.

[+] These components actually work with the real life physical objects to sense and process act in order to achieve a physical change or observe such.

[+] Electronics:
[-] So, electronics are a crucial part of IoT devices as they enable the control of other hardware components.
[-] Electronics include PCBs, Relays, Switches, ICs, etc.

[+] Sensors:
[-] Sensors have the purpose to sense physical obje properties from the environment and transmit them to an instrument or observer
[-] Examples of sensors are Gas sensor, Photo sensor, Accelerometer, Camera, etc.

[+] Actuators:
[-] Actuators turn electrical energies into force or movement. Thus they are helpful in changing the physical properties.
[-] Example of actuators: Electric motor, Light, Heater, etc.

Q2
4] How can embedded computing be scaled up for IoT devices? Explain the challenges and solutions.

AS

[+] Scaling up IoT devices network is growing demand due to the rapid growth in their Use-Cases.

[+] There are many solutions using which IoT devices can be scaled efficiently and effectively with minimal cost and power consumptions.

[+] But let us discuss the challenges that scaling can face:

[-] Network security: Security is the foremost concern of scaling IoT as the bigger system have more vulnerability

[-] Data storage: Storing data is a ~~bigg~~ also a concern as more device means more data generated to be stored and computed.

[-] Power Consumption: The increasing amount of IoT devices is leading to much more power demand.

[+] Now the possible solution for the challenge we face above, are given below:

[-] Techniques like encryption, data privacy, & protection, secure communication protocols can solve the network security issue

[-] Cloud computing can be a possible ~~for~~ one-stop solution for data storage as well as processing at much reduced cost and power consumption.

[-] Harvesting renewable energies like solar, wind, hydro can be a possible solution to meet the growing demand for power.

Q3
S) What is an API? Explain its importance in IoT design.

As

[+] API or application programming interface is a programming interface between two distinct applications on same or distinct devices.

[+] It is the ability of applications to talk with each other, exchange data or communicate without relying on the knowledge for how the application are designed & work.

[+] IoT devices require a wide range of APIs as each type of IoT device would have its own standard software that wants to communicate with other softwares.

[+] Basically IoT devices have fundamental need for APIs as the very nature of IoT is diverse applications working together.

[+] For example, A standard API like RESTful API is used for client and server to talk with each other with completely different applications.