Physical Design of Internet of Things (IOT)

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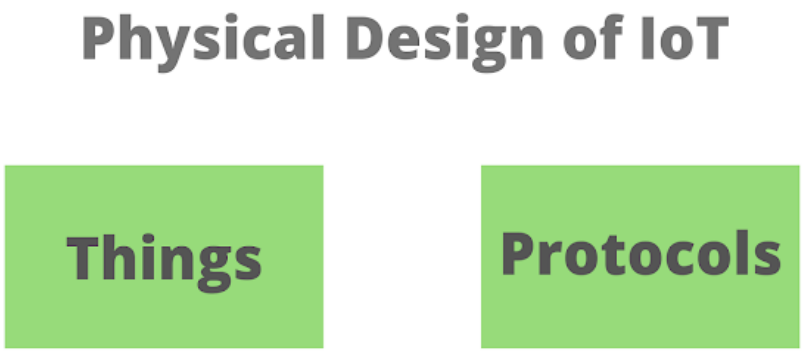
The **physical design** of an IoT system is referred to as the **Things/Devices** and protocols that are used to build an IoT system. all these things/Devices are called Node Devices and every device has a unique identity that performs remote sensing, actuating and monitoring work. and the protocols that are used to establish communication between the Node devices and servers over the internet.

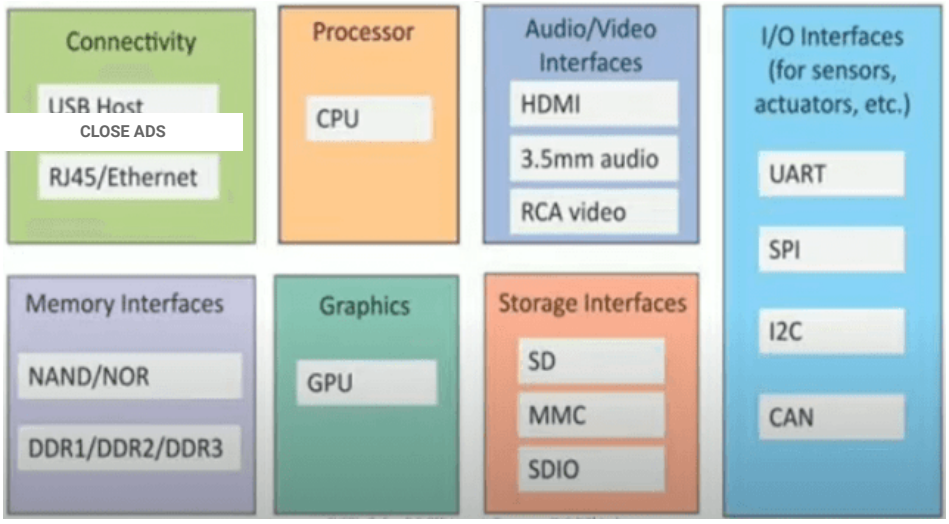
Physical Design of IoT



Things/Devices

Things/Devices are used to build a connection, process data, provide interfaces, provide storage, and provide graphics interfaces in an IoT system. all these generate data in a form that can be analyzed by an analytical system and program to perform operations and used to improve the system.

for example temperature sensor that is used to analyze the temperature generates the data from a location and is then determined by algorithms.



Connectivity

Devices like USB hosts and ETHERNET are used for connectivity between the devices and the server.

Processor

A processor like a CPU and other units are used to process the data. these data are further used to improve the decision quality of an IoT system.

Audio/Video Interfaces

An interface like HDMI and RCA devices is used to record audio and videos in a system.

Input/Output interface

To give input and output signals to sensors, and actuators we use things like UART, SPI, CAN, etc.

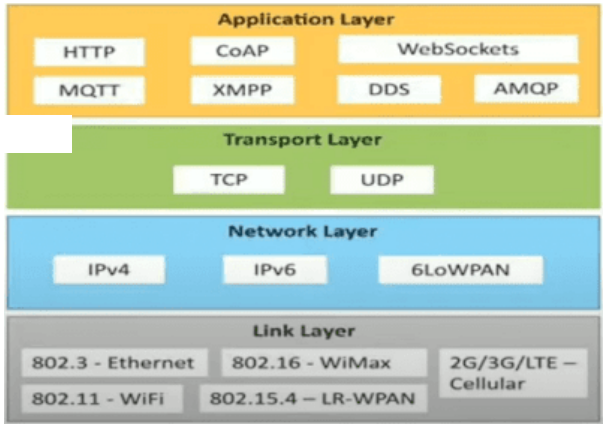
Storage Interfaces

Things like SD, MMC, and SDIO are used to store the data generated from an IoT device.

Other things like DDR and GPU are used to control the activity of an IoT system.

IoT Protocols

These protocols are used to establish communication between a node device and a server over the internet. it helps to send commands to an IoT device and receive data from an IoT device over the internet. we use different types of protocols that are present on both the server and client-side and these protocols are managed by network layers like application, transport, network, and link layer.



Application Layer protocol

In this layer, protocols define how the data can be sent over the network with the lower layer protocols using the application interface. these protocols include HTTP, WebSocket, XMPP, MQTT, DDS, and AMQP protocols.

HTTP

Hypertext transfer protocol is a protocol that presents in an application layer for transmitting media documents. it is used to communicate between web browsers and servers. it makes a request to a server and then waits till it receives a response and in between the request server does not keep any data between two requests.

WebSocket

This protocol enables two-way communication between a client and a host that can be run on an untrusted code in a controlled environment. this protocol is commonly used by web browsers.

MQTT

It is a machine-to-machine connectivity protocol that was designed as a publish/subscribe messaging transport. and it is used for remote locations where a small code footprint is required.

Transport Layer

This layer is used to control the flow of data segments and handle the error control. also, these layer protocols provide end-to-end message transfer capability independent of the underlying network.

TCP

The transmission control protocol is a protocol that defines how to establish and maintain a network that can exchange data in a proper manner using the internet protocol.

UDP

a user datagram protocol is a part of an internet protocol called the connectionless protocol. this protocol is not required to establish the connection to transfer data.

Network Layer

This layer is used to send datagrams from the source network to the destination network. we use IPv4 and IPv6 protocols as host identification that transfers data in packets.

IPv4

This is a protocol address that is a unique and numerical label assigned to each device connected to the network. an IP address performs two main functions host and location addressing. IPv4 is an IP address that is 32-bit long.

IPv6

It is a successor of IPv4 that uses 128 bits for an IP address. it is developed by the IETF task force to deal with long-anticipated problems.

Link Layer

Link-layer protocols are used to send data over the network's physical layer. it also determines how the packets are coded and signaled by the devices.

Ethernet

It is a set of technologies and protocols that are used primarily in LANs. it defines the physical layer and the medium access control for wired ethernet networks.

WiFi

It is a set of LAN protocols and specifies the set of media access control and physical layer protocols for implementing wireless local area networks.

Read other IoT tutorials

- What is the Internet of Things (IoT) - Definition and characteristics
- What is IoT Definition
- Characteristics of IoT
- Logical Design of IoT | Communication Models | APIs | Functional Blocks
- Architecture of IoT
- IoT Sensors - Overview
- Communication in IoT
- Middleware in IoT
- Applications of IoT
- Basic Building blocks of IoT
- IoT Architecture Layers
- IoT Communication Models
- IoT Levels - Deployment Templates
- IoT Communication APIs
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- Embedded System in IoT
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- Features Advantages/Disadvantages of IoT
- Building Blocks of Internet of Things (IoT)
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- TinyOS in IoT