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I.O.T. Notes

[IOT]

- IOT To almost all information & data exchange
- IOT To provide record, not trigger last stage

INTRODUCTION TO IOT :-

Internet of things Describes the network of Physical Object [things/devices] that are Embedded with Sensor, Software and other technologies for the purpose of Connecting & Exchanging DATA with other Devices or System Over the Internet

OR

IOT - Internet of Things is a network or A Interconnection b/w Physical Objects that are Embedded with Software, Electronics, or Sensors that allows these objects to Collect and Exchange DATA. Over the Internet

HOW IT WORKS?

There are 4 Fundamental Components of IOT System that helps it for proper functioning of IOT :-

- 1 Sensors/Devices
- 2 Connectivity
- 3 DATA Processing
- 4 User Interface

Sensors/Devices

Sensors & devices are a key Component that helps us to collect live DATA from the surrounding Environment

It Could be Simple Temperature Monitor Sensor or it may be in the form of Video feed

A Device may have various type of sensors which performs Multiple tasks a part from Sensing.

Example:-

A Mobile phone which has multiple Sensors like GPS, Camera, but your Smartphone is not able to sense these things

« CONNECTIVITY »

All the Collected data Send to a cloud infrastructure
The Sensor should be Connected to the cloud using Various medium of Communication which includes Mobile or Satellite network, bluetooth, Wifi, WAN, etc

« DATA PROCESSING »

Once DATA is Collected, and it get to the cloud, The Software perform processing of the gathered data

The process can be just checking the temperature, reading of Device like heater or AC. However it can sometime also be very complex like Identifying Object using Computer Vision on Video

« USER Interface »

The information needs to be available to End USERS in some way which can be achieved by triggering alarm on there phone or sending them notification through Email text message

AdvANTAGES N OF IOT

DisADVANTAGES

Advantages of IOT :-

- Technical Optimization - IoT technology helps a lot in improving technology & Making it better Ex. Phone Updates
- Improved DATA Collection :-
- Reduced WASTE :- IoT offers real time information leads to effective decision making & Management of resources
- Monitor DATA
- Ease of Access
- Speedy operation
- Saving Money Machine

Disadvantage of IOT :-

- Security / DATA Breach
- Privacy
- Complexity
- Compatibility
- Technology takes Control of life

APPLICATION OF IOT

Smart Home

WEARABLES & IOT

CONNECTED CARS

Smart Cities

IOT in Agriculture

Characteristics of IoT

There are the following characteristics of IoT :-

1. Connectivity
2. Intelligence & Identification
3. Scalability
4. Dynamic & Self-Adapting
5. Safety

Connectivity

Connectivity is an important requirement of the IoT infrastructure.

Things of IoT Should be Connected to the IoT infrastructure.

It is necessary to have a Guaranteed Connection/Connectivity at all time to Ensure the proper functioning of DATA Transfer from Devices & Sensors.

Intelligence & Identification

The Extraction of knowledge from the Generated data is very important.

Example A Sensor Generated data, but the data will only be useful if it is interpreted properly.

Scalability

The number of elements & Devices are Connected to the IoT zone are Increasing day by day. An IoT Setup should be Capable of handling the massive Expansion Appropriately.

Dynamic & Self-Adapting

IoT devices should dynamically adapt themselves to the changing contexts and scenarios.

Example - Assume a camera meant for surveillance. It should be adaptable to work in different conditions and different light situations [Morning, afternoon, Night].

SAFETY

There is DANGER of the sensitive personal details of the user getting compromised when all devices are connected to the Internet.

This can cause loss of user data. Security is a major challenge.

Heterogeneity

The devices in the IoT are heterogeneous as based on different hardware platform, works, with Internet. Due to ~~hetero~~ heterogeneity, it helps to interact with other devices or services platform through different network.

A.I. ARTIFICIAL INTELLIGENCE

AI

The word Artificial Intelligence Consist of two parts.

Artificial
Man made things

Intelligence

The ability to Learn &
Solve problems

Artificial intelligence is a Software which mimics Human behavior by Learning DATA Pattern and insights.

Artificial Intelligence is a method of making a Computer, a Computer-Controlled Robot or a Software think intelligently like human mind.

A.I is accomplished by studying the pattern of human brain and by analyzing the Cognitive Process.

The Outcome of these studies develops intelligent software & system

OR

Artificial intelligence is an area of Computer Science which involves creation of intelligent Machine which can perform tasks like human being and take decision by there own

These Specific AI Machines Can perform the tasks which generally requires human intelligence Like vision perception, Speech Recognition, Decision Making translation between language.

AI is Composed of:

- Reasoning
- Learning
- Problem Solving
- Perception
- Verbal intelligence
- Self-Awareness

Example of AI :-

- Siri, Alexa and other smart Assistants
- Self Driving Cars
- Netflix's recommendations

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Requirement of A.I. in IoT

Application of AI in IoT

There are many applications across multiple industries that are required Artificial intelligence & IoT. Some of these are given as following :-

Collaborative Robots [Cobots] - These Cobots are highly complex machines that are designed to help humans in a shared workspace. They can be Robot Arms designed to perform tasks or even a Complex iRobot robot designed to fulfill tough tasks.

Drones: Drone air aircraft without a human pilot. They are extremely useful as they can navigate unknown surroundings & able to reach at hazardous [dangerous] area for humans by its own such as :- ① Warzone ② Mine ③ Burning Building

Smart Cities: Smart City can be created with Network of Sensors that are interconnected to each other with the physical City infrastructure. These Sensors can be used to monitor the city for various civic factors such as Energy Efficiency, Airport, Noise pollution, Traffic Condition etc.

Digital twins: Digital Twins are twins object in which one is a real world object & other is its digital replica.

Smart Retailing

ADVANTAGE OR DISADVANTAGE OF AI

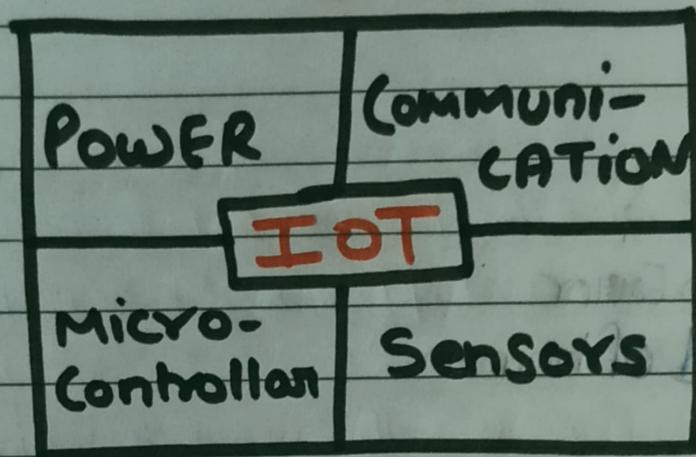
Advantage :-

1. Reduction in human Error
2. Take risks instead of human
3. Available 24x7
4. Digital Assistance
5. Faster Decision

Disadvantage :-

1. High Costs of Creation
2. Making human Lazy
3. Unemployment
- 4.
- 5.

PHYSICAL DESIGN OF IoT



Physical design of IoT refers to IoT Devices & IoT Protocols

IOT DEVICES

Anything that has a sensor attached to it and can transmit data from one object to another node with the help of Internet is known as IOT Device.

The IOT device include wireless sensors, Software, Actuators, Computer device and more.

The IOT devices are attached to a particular object that operates through the Internet / IoT.

IoT Protocol

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Protocol: A protocol is a set of rules and guidelines for communication and exchanging of information or we can say that which helps to perform a task with perfection

IoT Protocol:

An IoT Protocol Enables hardware to Exchange data in a Structured and Meaningful way.

Interaction between Sensors, devices, gateways, Servers and user application are the essential character that makes IoT

There are 4 type IoT Protocol =

- 1 Constrained Application Protocol [COAP]
- 2 Message Queue Telemetry Transport Protocol [MQTT]
- 3 Advance Messaging Queuing Protocol [AMQP]
- 4 DATA Distribution Services [DDS]

Constrained Application Protocol

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Message Queue Telemetry Transport Protocol

~~Advantage~~

Advance Message Queuing Protocol

DATA Distribution Services

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LOGICAL DESIGN OF IOT

IoT architecture

TOT Communication

SENSORS & ACTUATORS

Sensors:

Sensors are the main Source / Component of IoT
we can say

Sensors is transducers which converts one form of Energy
into another form

Sensors Converts some Physical changes and its observation
into electrical Signals and it will come as output in form
of reading

Example :- Temperature Sensor receives the Physical behaviour
of Environment and converts with electronic Impulse
into reading

While

Actuators works in reverse direction of Sensors
It take electronic impulse as Input and process it and turns
into physical Action

Example