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Internet of Things: and Its Architectue

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Abstract: **Internet of things is becoming a growing topic for conversation. The proliferation of the devices in a communicating-actuating network creates the Internet of Things (IoT), wherein, sensors and actuators blend seamlessly with the environment around us, and the information is shared across platforms in order to develop a common operating picture (COP). Fuelled by the recent adaptation of a variety of enabling wireless technologies such as RFID tags and embedded sensor and actuator nodes, the IoT has stepped out of its infancy and is the next revolutionary technology in transforming the Internet into a fully integrated Future Internet. As we move from www (static pages web) to web2 (social networking web) to web3 (ubiquitous computing web), the need for data-on-demand using sophisticated intuitive queries increases significantly. This paper explains provides the brief introduction to the Internet of Things and the various architecture and at a glance.**

***Keywords*: IoT (Internet of Things), Cloud computing, Wireless sensor networks**

I. INTRODUCTION

Connecting all the people together is a major task and connecting people with the device is a demanding one.so, let's take an example a fridge, what if it says "I am left out of milk "to your mobile phone texting you if its internal camera saw that there was none left or what if the air conditioning system automatically recognises the temperature of the surrounding and accordingly changes the temperature and automatically turns off if there is no one around, can these thing be done? Yes we can so with the internet of things. IoT is more than smart homes and connecting appliances it scales up to connecting a diverse range of devices and everyday things that utilize embedded technology to communicate and interact with the external environment, all via the internet we can use them collaboratively to achieve complex tasks that require a high degree of intelligence.

For this intelligence and interconnection, IoT devices are equipped with embedded sensors, actuators, processors, and transceivers. IoT is not a single technology; rather it is an agglomeration of various technologies that work together in tandem. Sensors are devices which detects or measure physical property and records, indicates or otherwise responds to it. There are many types of sensors used in the internet of things they are temperature sensors, pressure, water quality, proximity, level, IR sensor so on. Actuators are devices that is used to effect a changes in the environment such as the temperature controller of the air conditioner.Smart connectivity with existing networks and context aware computation using network resources is an indispensable part of IoT. With the growing presence of Wi-Fi and 4G-LTE wireless Internet access, the evolution toward ubiquitous information and communication networks is already evident. Cloud computing can provide the virtual infrastructure for the storage of large amount of data which integrates monitoring devices, storage devices. The communication between IoT devices is mainly wireless because they are generally installed at geographically dispersed locations. The wireless channels often have high rates of distortion and are unreliable.

Now, after processing the received data, some action needs to be taken on the basis of the derived inferences. The nature of actions can be diverse. We can directly modify the physical world through actuators. Or we may do something virtually. For example, we can send some information to other smart things.

The process of effecting a change in the physical world is often dependent on its state at that point of time. This is called context awareness. Each action is taken keeping in consideration the context because an application can behave differently in different contexts. For example, a person may not like messages from his office to interrupt him when he is on vacation. Sensors, actuators, compute servers, and the communication network form the core infrastructure of an IoT framework. However, there are many software aspects that need to be considered. First, we need a middleware that can be used to connect and manage all of these heterogeneous components. We need a lot of standardization to connect many different devices.

Fig-1: Internet of things-intro

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INTERNET OF THINGS ARCHITECTURE:

There is no single consensus on architecture for IoT, which is agreed universally .Different architecture have been proposed by different researchers.

(I)THE PERCEPTION LAYER:

It is the physical layer, which has sensors for sensing and gathering information about the environment. It senses some physical parameters or identifies other smart objects in the environment.

(II)THE NETWORK LAYER:

It is responsible for connecting to other smart things, network devices, and servers. Its features are also used for transmitting and processing sensor data.

(III)THE APPLICATION LAYER:

It is responsible for delivering application specific services to the user. It defines various applications in which the Internet of Things can be deployed, for example, smart homes, smart cities, and smart health.

The three-layer architecture defines the main idea of the Internet of Things, but it is not sufficient for research on IoT because research often focuses on finer aspects of the Internet of Things.

That is why, we have many more layered architectures proposed in the literature. One is the five-layer architecture, which additionally includes the processing and business layers.

The five layers are perception, transport, processing, application, and business layers. The role of the perception and application layers is the same as the architecture with three layers. The outline of the function of the remaining three layers.

(I)THE TRANSPORT LAYER:

It transfers the sensor data from the perception layer to the processing layer and vice versa through networks such as wireless, 3G, LAN, Bluetooth, RFID, and NFC.

(II)THE PROCESSING LAYER:

It is also known as the middleware layer. It stores, analyses, and processes huge amounts of data that comes from the transport layer. It can manage and Provide a diverse set of services to the lower layers. It employs many technologies such as databases, cloud computing, and big data processing modules

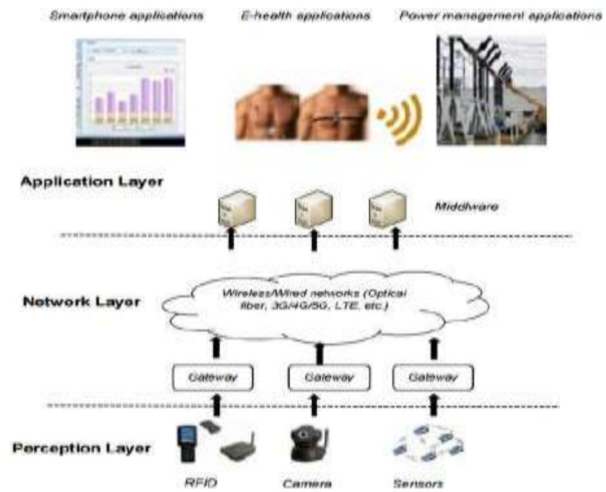

Fig-2: Three layer Architecture

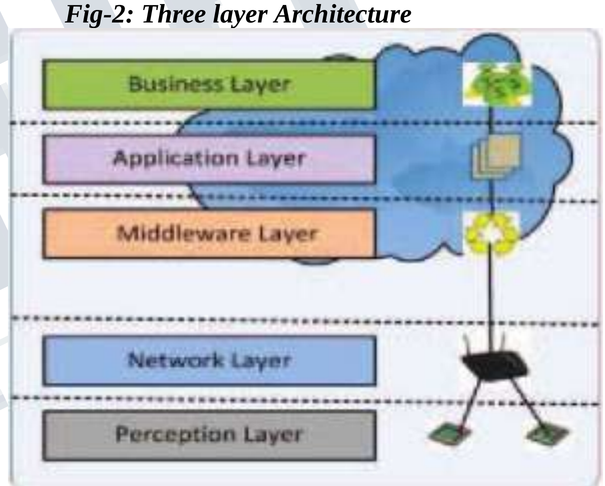

Fig-3: Five layer architecture

PRECEPTION LAYER:

Agriculture is the biggest user of water in the world. Farmer's use 70% of the world's freshwater, but 60% of it is wasted due to leaky irrigation The main function of this layer is to obtain the various static or dynamic status of the real world through the sensors. There are different types of sensors. Sensors are the troops of the "internet of things," the on-the-ground pieces of hardware doing the critical work of monitoring processes, taking measurements and collecting data.

TEMPERATURE SENSORS:

These devices can be used in nearly every IoT

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environment, from the factory floor to agricultural fields. In manufacturing, these sensors can continually measure the temperature of a machine to ensure it stays within a secure threshold. On the farm, they are used to track the temperature of soil, water and plants to maximize output.

PROXIMITY SENSORS:

These sensors detect motion and are frequently used in a retail setting. A retailer can use a customer's proximity to a product to send deals and coupons directly to their smartphone. Proximity sensors can also be used to monitor the availability of parking spaces in large venues like airports, malls and stadiums.

PRESSURE SENSOR:

systems, inefficient applications methods and the cultivation of thirsty crops, according to the World Wildlife Fund. Pressure sensors can be used to determine the flow of water through pipes and notify the correct authority when something needs to be fixed. They are also used in smart vehicles and aircraft to determine force and altitude, respectively.

WATER QUALITY SENSOR:

Precision agriculture, water treatment and rainwater quality monitoring –require water quality sensors.

CHEMICAL OR SMOKE GAS SENSOR:

These devices can be used for air quality control management in smart buildings and throughout smart cities.

LEVEL SENSOR:

Level sensors detect the level of liquids and other fluids including slurries, granular materials and powders that exhibit an upper surface. Level sensors can be used for smart waste management and recycling purposes.

IR SENSOR:

Infrared vision has several applications. It can visualize heat leaks in houses, help doctors monitor blood flow, identify environmental chemicals in the environment and can be integrated with wearable electronics.

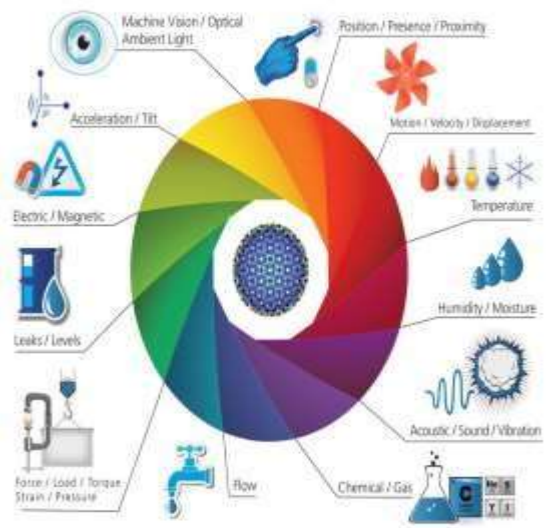

Fig-4: Sensors used in IoT

II.APPLICATION LAYER

The application layer is equivalent to the Internet, and application layers of the ITU (International Telecommunication Union) model, the main features including:

a) Provide secondary development of the expanded operational capacity, and the open API (Application Program Interface) for data registration and device control.

b) Provide the standard WCF (Windows Communication Foundation) likely SOAP (Simple Object Access Protocol) PRC web services, it has an interface described in a machine process format. c) The display interface use WPF (Windows Presentation Foundation) client technology to support various third-party terminal access, including mobile phone or PC. WPF is Microsoft's new graphics system that provides a unified description and method of operation for the user interface, 2D/3D graphics, documents and media. Between the system interface and data is the distributed structure system. The system can be shown in any type of client, such as PC, mobile device etc. The data can be classified into two types which are Nonrealtime data and realtime data, according to its frequency of change and updating. Non realtime Data refers to the data which does not change frequently as the time goes which thus needs not be collected every time a decision is made. As a result, the data can be obtained from both online or offline service providers.

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III. REPRESENTIVE ARCHITECTURE

Most architectures proposed for the IoT have a server side architecture as well. The server connects to all the interconnected components, aggregates (composes) the services, and acts as a single point of service for users.

The server side architecture typically has three layers. The first is the base layer that contains a database that stores details of all the devices, their attributes, metainformation, and their relationships. The second layer (Component layer) contains code to interact with the devices, query their status, and use a subset of them to effect a service. The topmost layer is the application layer, which provides services to the users.

On the device (object) side, we broadly have two layers. The first is the object layer, which allows a device to connect to other devices, talk to them (via standardized protocols), and exchange information. The object layer passes information to the social layer. The social layer manages the execution of users' applications, executes queries, and interacts with the application layer on the server.

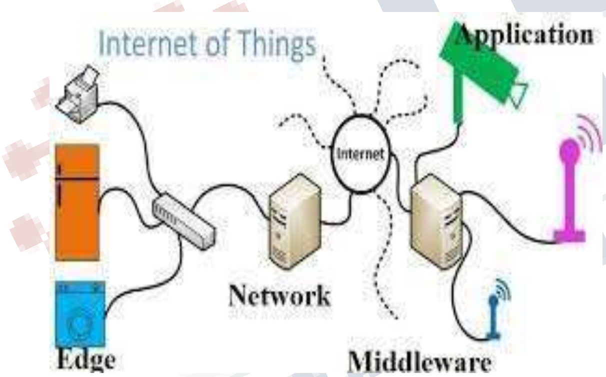

Fig-5: Architecture

IV. CONCLUSION

In this survey paper I presented a survey of the current technologies used in the IoT domain as of 2017 and its architecture and the protocols. Currently, this field is in a very nascent stage. The technologies in the core infrastructure layers are showing signs of maturity. However, a lot more needs to happen in the areas of IoT applications and communication technologies. These fields will definitely mature and impact human life in inconceivable ways over the next decade.

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