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Internet of Things(IoT):A Future Vision OF MODERN SOCIETY

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Abstract:

In the today's technology the information technology is more focused on internet of things which has a lot of scope in urban as well as rural areas. Automated system is becoming more and more popular due to its numerous benefits in a large number of different and heterogeneous end systems. The future of internet of things is to unify everything in the world under a common infrastructure which gives us control over the things, we use in our day to day life. The objective of this paper is to provide an overview of internet of things, architectures, challenges and its applications.

Keywords — **Internet of things(IoT), Smart machines, Social IoT.**

I. INTRODUCTION

Internet of things is undemonstrative to as the internet of objects. Internet of Things is a risingand modern technology of the Internet accessing [1]. The objects recognize themselves and gain intelligence behaviour by sanctioning related decisions thinks to the details that they can convey information about themselves through the internet of things. The IoT is comprised of intelligent machines interacting and communicating with each other (M/c to M/c communication)[2].Now a day people and machines are connected with each other using various communication ways. Where internet is the most common and tourist way to connect and communicate with each other. The IoT communication language is based on interoperable protocols operating in various different environment and platforms.The IoT is a technological modification whichrepresents theupcoming of computing and communications, and its advancement depends on technical creation in a different fields. They (IoT) are going to analyse the each object for identifying,monitoring, automating and controlling.

II. ARCHITECTURES

There are several architectures have been introduced by different researches. There is no common architecture for internet of things which is universally agreed as it is still in its evolution phase.

A. Three- and Five-Layer Architectures

The most fundamental architecture is three layers architecture as shown in Figure 1.1[6]. It was introduced in the primal stages to research. It consists of three layers, the perception layer, network layer, and application layer.

1) ***The perception layer*** is the physical layer; it has sensors for sensing and collecting information about the environment. It senses some physical parameters and identifies other intelligent objects in the environment.

*2)****The network layer*** is responsible for connections. It is used for connecting to other smart things, network devices, and servers. It is also used for sending and processing sensor data. It shares the sensor data among other networks and devices.

*3)****The application layer*** provides access to various shared networks and responsible for delivering application specific services to the user. It defines various applications in which internet of things is used, for example, smart homes, smart cities, and smart health centres, smart environment, smart machines.

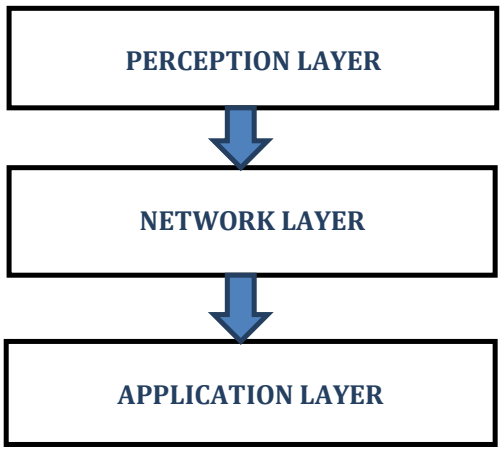

FIGURE 1.1: THREE LAYER ARCHITECTURE

The three layer architecture is not sufficient for researches as it left some of the aspects of internet of things. Thus,five layers architecture is introduced in the literature. In five layer architecture there are five layers namely perception layer, transport layer, processing layer, application layer and business layer. In this two more layers are introduced the processing layer and business layer.

The functions of these two layers are –

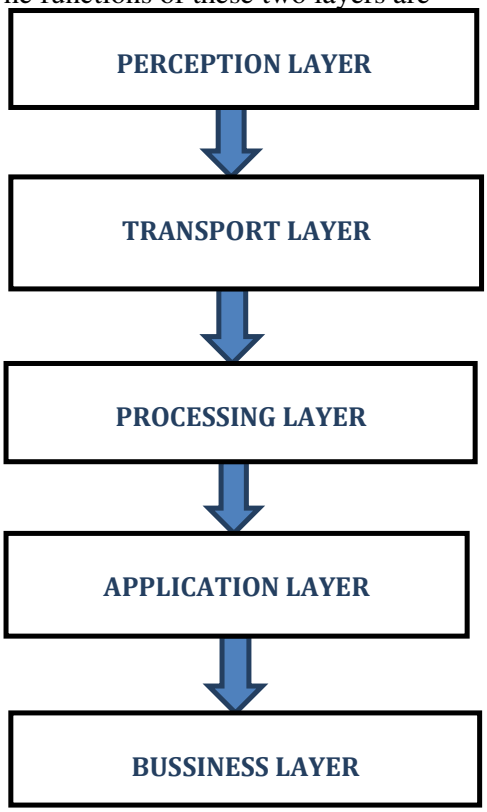

FIGURE 1.2: FIVE LAYER ARCHITECTURE

The *processing layer* store, analyse and processes large amount of data. It manages the services of lower layers also. The technologies like databases, cloud computing and big data processing modules are employs by this.

The *business layer* is used as manager in the IoT system. It mainly manages applications, security profit models among other things.

B. Cloud and Fog Based Architectures

The cloud and fog are two types of systems architectures:[6]

First we discuss about cloud processing in which processing of data is done in a centralized way by cloud computers. In this the applications are keeps above of cloud and the cloud at centre. The networks are keeps below cloud. Cloud computing has large storage capacity it provide services like the platform, storage, software, infrastructure and the different type of tools such as machine learning tools, data mining tools etc.

Another system architecture is fog computing in which the sensors and network gateways do a part of data processing and analytics. It consists of monitoring layer, pre-processing layer and security layer in between physical and transport layers. The monitoring layer is used to monitor resources, services, and responses. The pre-processing layer provides functionalities like filtering of sensor data, processing of sensor data and analytics of sensor data. The security layer provides security to data through encryption and decryption and by various protocols.

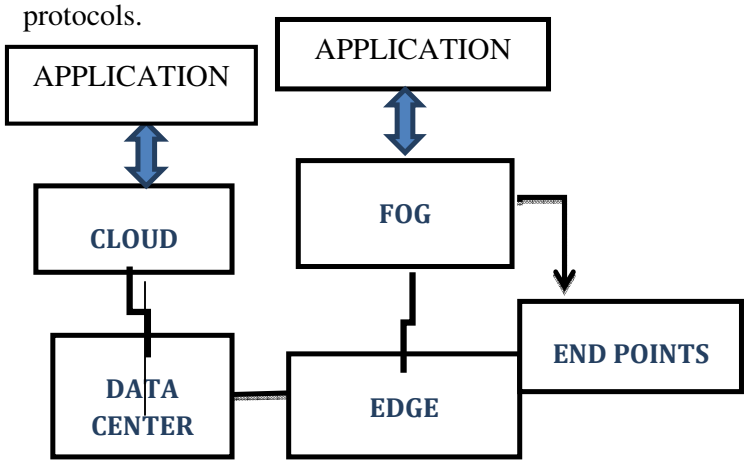

FIGURE 2.1 : FOG AND CLOUD BASED ARCHITECTURE

C. Social IoT

The concept of social IoT is based on the relationship between the devices and services[7]. The outlines of social IoT systems are:

1) In this it is easy to search new devices and services by simply connecting one device to others.
2) There is a need of trust building between the devices.
3) We can use this social IoT model to understand the devices social network through human social networks.

The social IoT architecture consists of three layers which are *base layer, component layer* and *application layer*. The base layer has database which is used to store the information of all the devices, their meta-information and relationships. The component layer contains coding part through which the devices can communicate with each other. The uppermost layer is application layer which is used to give the services through which user can interact.There are also two layers on the device side which are *object layer* and *social layer*.The object layer authorize device to interact with the other devices through standard protocols and to interchange information which is then move to social layer. The social layercontrols the execution of user's applications, queries and communicates with above layer on the server.

III. APPLICATIONS

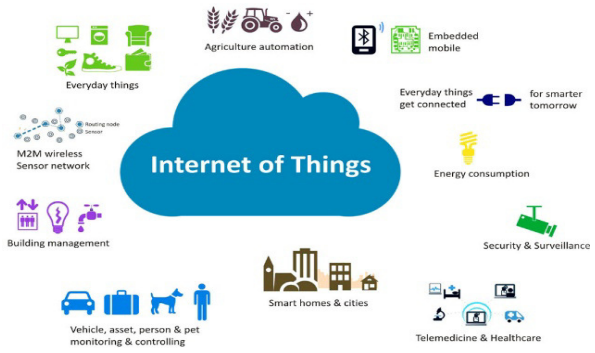

FIGURE 3.1: APPLICATIONS OF IoT(Image source:https://www.xtendiot.com/top-internet-things-application-areas/)

A. Smart Cities

Smart cities are the future of cities through which human life is improved. For the development of smart cities internet of things plays an important role. Cities can make smart by improving infrastructures, parking facilities, shopping malls, traffic control, weather control and other facilities. For controlling all the different systems the systems are connected with other systems, so that the monitoring and controlling of the systems become easy. By the availability of internet it is very easy to accept the internet of things for the development of various fields of urbanisation.

B. Smart Home

Internet and Wi-fi are the technologies which make possible to control and monitor the various smart devices at home. We can provide facilities such as security, automatic switching of lights, fan and air conditioner controlling and the controlling and monitoring of other smart appliances which are used at homes. By connecting these appliances to the mobile devices they can be controlled and monitored at any remote location. This makes human life simple, saves costs, resources, energy and also helps to prevent accidents. These facilities become possible by the internet of things.

C. Medical Field

IoT can be used in many ways in medical areas; smart systems are needed to monitor the health conditions of patients. In medical area smart machines and sensors are used, which collect information and analyse it. This information is stored in the cloud which is further analysed for more research. IoT provides comfort to disabled persons and helped them to become independent by using controlling systems they can easily use any appliances

D. Smart Factory and Smart Manufacturing

Smart factory consists of smart machineries which are intelligent, controlled automatically and have machine to machine communication. Smart machines automatically identify the problems and

solve it. Smart factory and manufacturing also ensures the safety of the workers by monitoring and controlling the systems. Automated machines are easy to handle which reduces the man work and also it gives perfection in work. Temperature inside the factory is controlled according to the conditions and need. In chemical factories indoor air quality is monitored by measuring the oxygen and toxic gas level inside chemical plants for the safety of products and workers.

IV. CHALLENGES

Internet of things provides technologies for smart things, but there are some challenges of the IoT[1,5]. The challenges are given below:

Scalability: Internet of things consist various things in an open environment. It is need to function uniformly in small area and large area environment IoT needs more methods and functions to develop and use efficiently.

Self-Organizing: Smart objects should be able to react to wide range of situations to minimize human intervention. It should have capacity to adapt environmental change according to situation. The things are able to manage and configure themselves according to the environment.

Data interpretation: The data collected from sensors are considered asaccurately as possible. The inaccurate data may lead to wrong conclusions and actions according to it. It needs to be able to get some proper conclusion from the interpreted data.

Interoperability: Smart systems need to work in different environment and different conditions. It needs to adjust in any environment according to situations to make it possible common rules and standard required.

Automatic Discovery: Some situations are automatically discovered which are able to identify by the systems. So, it needs proper semantic for representing their functionality.

Security: The protection of the system is one of the necessary things. If system is involved in business, transactions and communication then confidentiality, authentication and integrity are required for maintaining the privacy and security.

Wireless communications: For wireless technologies some new WPAN standardsare there like ZigBee and othersunder development can have narrower bandwidth, they use less power.

Cost: IoT is little bit expensive compare to other technologies, which is also a challenge to its implementation.

V. CONCLUSION

Internet of things is becoming more popular due to its numerous benefits. It works on the concept of connecting everything whether to connect human to things or things to things.

It provides many applications like smart cities, smart homes, medical, environmental, industrial etc. There are many challenges for internet of thing such as there is no ideal architecture of internet of thing, there is no standardize protocols and due to connection of internet which is open source for everyone it compromises with security. This paper is focusing on the architecture, applications and challenges of the internet of things. Let us hope that there will be more research on internet of things and other future technologies become possible.

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