FUTURE INTERNET OF THINGS AND IT'S CHALLENGES

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Abstract

Internet is revolutionary invention which is always transforming into some new kind of hardware and software making useful to everyone. In this paper we are going to give a review of IoT applications and challenges that facing the implementation of the IoT.Internet of Things is a sort of "Universal Global Neural Network"in the cloud which connects various things.IoT gained attention from researchers.It became very important which provides a smart life to everyone by allowing a communication between objects,machines etc. IoT consists a system with real world things along with sensors these are connected to Internet via wired and wireless network structure. This Iot sensors can use various type of connections such as RFID, Wi-Fi, Bluetooth and Zigbee inorder to allow wide area connectivity using GSM,GPRS,3G and LTE technologies. The whole world becomes very smarter with this Internet of Things.It has lot of challenges which makes impact on their performance. Applications of IoT have been used widely in every field like social production, energy, industries etc.

Keywords:RFID, WSN, Big data, Cloud Computing, QoS.

1.Introduction

Today we are living in era of smart technologies which represents a "Ubiquiting computing or web 0.3". IoT emerged as a area to express a kind of new technology. This is not the first technology in this field ,but also the cloud computing technology has been used to represent the Ubiquiting computing world. In the seventh of the series of ITU internet reporters originally it was launched in 1997 under the title of "Challenges to the Network" and it was first coined by Kevin Ashton in the RFID journal in 1922.In 2005, this name was changed to "Internet of Things (IoT)". The vision of IoT according to Kevin Ashton is it has to enable networked device to propagate their information about physical world objects through the web. Simply Internet of Things means the ability to make everything around us starting from machine, devices, mobilephones, cars etc. IoT environment contains a large number of different objects/things.These are classified into two types :i) Things rechargeable batteries things: In these most of them are mobiles. (laptops, mobiles, tablets). ii)Things non-rechargeable things: From the mobility point of view these things are static. Generally, Internet of Things includes 3 demands:
i)Understanding of situation of the users and their applications .

ii)software architecture and perversive communication networks to process contextual information.

iii)Analytics tools in IoT that aims for autonomous and intelligent behavior .

On the other hand Internet of Things is facing with some challenges which affects on their performance some of the challenges are common and some are special this paper divides this challenges into two:

i)General challenges: This includes common challenges between IoT and traditional network.

Example: communication, Qos, scalability, virtualization, heterogeneity, data mining and security etc.

ii)Special challenges: RFID and WSN.

The objective of this paper is to provide an overview about Internet of Things, it's definition and difference between Internet of Things and traditional internet, challenges of Internet of Things. In this paper we are mainly focusing on challenges of Internet of Things. Internet of Things is also referred as internet of objects. IoT promises a great future for the internet where the type of communication Machine to Machine(M2M).
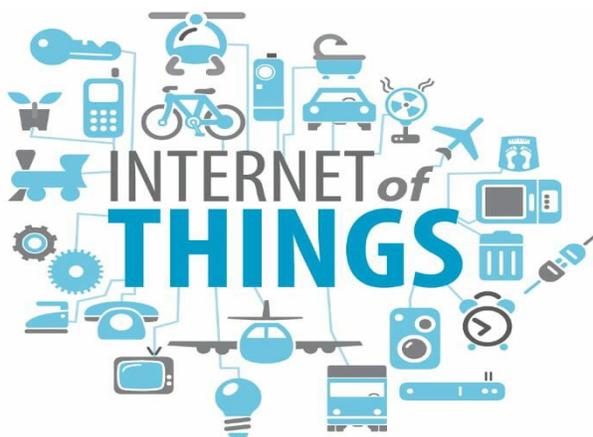

Figure 1 Internet of Things

TOPIC	TRADITIONAL INTERNET	INTERNET of THINGS(IoT)
Who creates content ?	Human	Machine
How is the content consumed?	By request	By pushing information and triggering actions.
How is the content combined?	Using explicitly defined links.	Through Explicitly Defined Operators
What is the value?	Answer questions .	Action and timely information.
What was done so far?	Both content creation (HTML) and content consumption(search engines)	Mainly content creation.

Table 1 Differences between Traditional Internet and Internet of Things(IoT)

Internet has impact on education, communication, business, science, Government .With this we can say that internet is the most important and powerful creation of human . Now with the concept of Internet of Things it became more favorable to everyone. With the growth of IoT applications and devices cyber attacks will also be improved and pose many serious threats to security and privacy than ever before IoT devices are widely used in military industry etc. Internet of Things represents the abilty of network devices to sense and collect data around the world. Some threats have been emerging so many researches have been going to ease these threats but many of them are remains same

2.Difference between Traditional Internet and IoT

Generally, IoT is short form for Internet of Things. IoT technology has broken a lot of the traditional ideas of network. The major equation to represent the environment is;
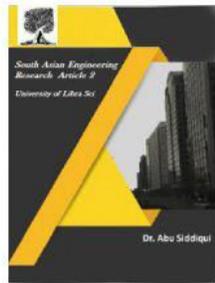
IoT environment = Internet + WSN (1)

It is used to express the IoT environment and used to analyze and judge correctness of the statement.

3.Literature Survey

Vandana Sharma et.al proposed a paper that each and every organization requires staff for giving all the information and advertisement required by the customers in all aspects. The intelligently connected devices and systems to gathered data from embedded sensors and actuators and others physical objects are referred to as IoT. Due to IoT many people get benefited like the quality of life of consumers get improved and also the productivity of an enterprises increases. Using mobile networks we are able to get connected to a broad range of devices,due to which new services and applications can be developed. Sensor network has been made viable by the convergence of microelectro-mechanical system technology, wireless communication. In this concept sensor network applications and sensing task are explored, then the algorithm and protocols are developed ,then the communication architecture is outlined. This system is for working without humans, just like when employee or customer needs any information they send SMS to the system.

Internet of Things will transform the real world objects into intelligent virtual objects. The Internet of Things (IoT) from this we get two words one is internet and the other is things . Here internet means it is a global system of interconnected computer networks which uses the standard internet protocols suite helps to serve the usage all around the world presently more than hundred countries are exchanged data, news and opinions through Internet. Here things refers to any objector person. IoT includes many different groups including academics, researchers, practitioners, innovators, developers and corporate people.IOT decides the future of computing and communications and its developments depends on dynamic technical innovation in a number of important folds ,from wireless sensors nanotechnology. Other names for IoT is web of Things, Internet of Things, Embedded Intelligence, Connected devices and Technology omnipotent, omniscient and omnipresent. There is no uniform architecture in IoT. Internet of Things was inspired by the members of the RFID community, RFID is the foundation and networking core of the construction of the internet of things.

There were many researchers made of IoT from them one was to understand the feasibility of IoT in bus transportation system in Singapore.As Singapore is technically very advanced but still it has scope of advancement in their transportation system. By using IoT for the consumer were able to understand and evaluate different bus options in an effecrtive manner. By this literature we can present a three layered network construction of IoT. Communication method for high-voltage transmission line which involves the wireless self-organised sensor network(WSM), OPGW, GPRS, COMPASS, CNSS. Energy consumptionare studied in this research.
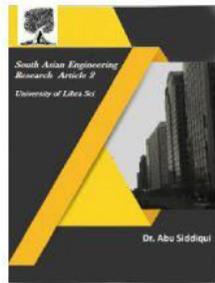
4.Internet of Things Technologies

Internet of Things refers to a global network of interconnected objects that are uniquely addressable based on standard communication protocols which serve billions of users world wide. In 1992, only one lakh people were using IoT as technology.By 2012,there was huge increase .We observed that the number of users has been growing exponentially over the years. IoT provides various kinds of services,works with some technologies and which has a different meaning for different people. Today more than 60 companies for leading technology in communication and energy are working with standards such as IETF, IEEE and ITU to specify IP based technologies for IoT. The design of the Internet of Things standards is required to consider the efficient use of energy and network capacity. Internet of Things mainly comprises of two essential members :Interoperability and IoT protocols .Inter-operabilty is mainly to develop technology standards and certification for devices involved in the IoT.Internet of things protocols: Bluetooth, DDS, HTTP, SATCOM, NFC, Zwave etc. IoT is also involved with some risks similar to any technology but the risks are not physically visible. Internet of things promises many applications in human life which make life easier, safe and smart. Previously there were no internet facilities in many useful aspects of life such as no mobile phones, laptops etc. But nowadays whole world is dependent on Iot though having many risks but without IoT there will be no development. All human beings are depending on Internet of Things (IoT).

4.1 Interdependence:

Depending on each other will help in many ways. But, if more and more we depend on Internet of Things makes less human involvement takes place. Iot devices are nowadays controlled not only explicitly but also implicitly. This relationship is called as Interdepence.

4.2 Diversity:

As we know that more kinds of Iot devices are designed for specific tasks to interact strongly with physical environment. So, the hardware system and process requirements are unique. Many Iot companies launched their cloud platform to manage IoT devices and each of designs their own wireless access and authentication.So, we call many different kinds of Iot devices and protocols as diversity.

5. Challenges related to IoT

In this paper we are going to discuss some of the popular challenges or general challenges of IoT environment; it also displays the recent research directions for every topic. Some of the challenges are

1.Cloud computing

2. Bigdata

3.Quality of service

4.Inter operability

5.Scalabilty

Despite of these challenges there are many more challenges in IoT,which are most probably used in IoT such as Security,Awareness,Connectivity and Business Model.
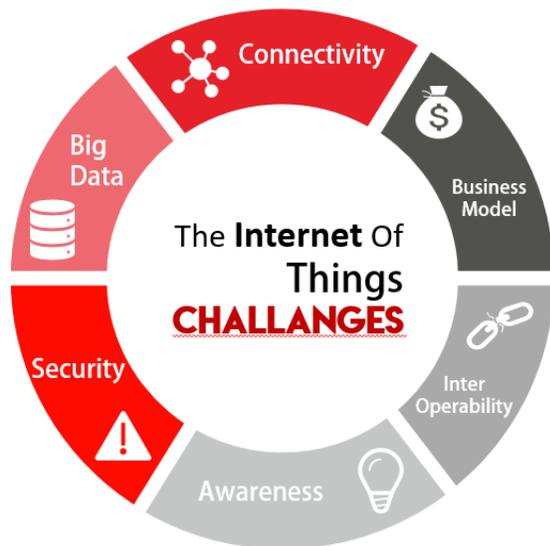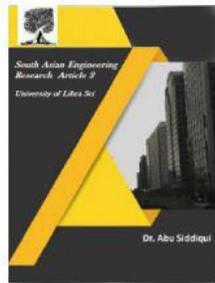
Figure 2 Challenges of IoT

5.1 Cloud Computing:

It is an intelligent computing technology in which number of servers are converged on one cloud platform to allow sharing of resources.As per the technology at present and also in future the cloud will become only to store all data effectively . It is the most important part of IoT which not only converges the server but also processes and analyzes the useful information. Cloud computing also provide good storage capacity. Cloud computing is also considered as a standard framework to represent both Iot and cloud computing as some of benefits and restrictions. IoT represents a real world and small things within it's limited storage in additional to traditional problems in the network such as scalability and privacy.Cloud computing has virtually unlimited capabilities and processing power.

5.2 Big Data:

It is a new expression to describe massive data whether it is structured or unstructured which is difficult to deal with traditional database methods and with some software techniques. Generally, Big Data is defined as a large volume of data. Dataset is considered as big data when it meets these four properties , velocity, volume, variety and value. It almost attracts all online social networks like twitter, facebook, instagram etc. for example, twitter in 2010 producing of 120 terabytes of data.IoT is considered as a good example of big data because to deploy the sensors the amount of data collected is heterogeneous.

5.3 Quality of Services(QoS):

It gives different timepriority to different applications in different ways. If this time is less or equal than the pre-specified time requirement then the QoS is achieved. Internet services can be classified into internet service models.

IOT MODELS	DELAY	PROCESS/APP	INTERACTIVITY
Open Service	Not real time	Not Mission critical	Interactive
Supple Service	Soft real time	Mission critical	Application dependent
Complete Service	SRT/HRT is depending on app	Mission critical	Not Interactive

Table 2 Internet Services Models

5.4 Interoperability:

This concept is defined as ability to create devices cooperating with each other in an efficient way Jussi et.al sort use of semantic level interoperability architecture for perversing the IoT . The architecture is relied on semantic information sharing some
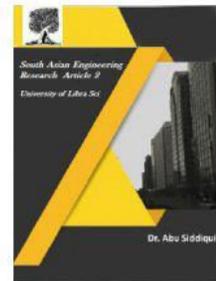
solutions called "smart-M3".The main principle of this architecture is dividing IoT environment into small spaces to facilitate their management process.

A information broker SIB is used to provide methods for agents .The main observation of this architecture performance after using the agent interaction operations scales also enable interaction with the world physically.
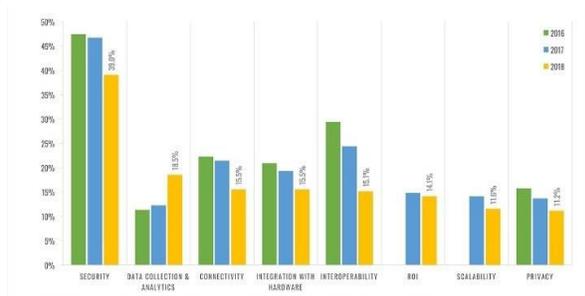

Figure 3Graph showing top IoT concerns between 2016-2018.

5.5 Scalability:

It is regarded as the most important challenges of IoT. It tells us how to deal with the sustainable growth of the internet in effiective manner. Without causing any effect on performance it handles the growing scale of environment. At present, the internet consists of 9 billion devices with the next generation of internet which is known as web 0.3 or ubiquitous computing it is expected to reach 24 billion devices.This increasing of this number have a adverse effect on performance.

6.The Hot Topics and Related Challenges

IoT consists of a host of a some elements which considered as an extension of general challenges of IoT or it can also be called "Unique challenges".

1.Radio-Frequency Identification (RFID)
2.Wireless Sensor Networks(WSN)

3.Addressing schemas and communication protocols

6.1 Radio-Frequency Identification (RFID):

RFID is a break through in embedded communication and WSN, it is used to generate a unique ID for a object in WSN. It has two parts :passive RFID and active RFID.

Passive RFID: It is used to power of the reader's interrogation signal to communicate the ID.

Active RFID:It has own battery supply and instantiate the communication.

It uses Ultrawide Bandwidth(UWB) technology in IoT field.The technology allows the next generation of RFID and many of the current restrictions in current RFID.

RFID frequencies are divided into four:

1)low frequency(135 KHz or less)

2)high frequency(13.56 MHz)

3)Ultra-highfrequency(862 MHz-928 MHz)

4)Microwave frequency(2.4G,5.80)

We can also secure implementation of IoT based on RFID with key authority mechanism.
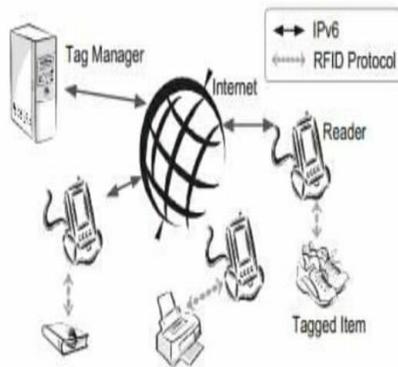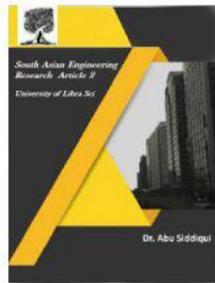
Figure 4 Connecting RFID Tags to IoT

6.2 Wireless Sensor Network(WSN):

It is wireless bi-directional network of sensors which collects the object specific data and pass on the processing equipments. The sensing nodes are connected in multi-hop fashion , each sensor is a trans receiver which have an antenna, micro controller and interfacing circuit .Memory unit is apart of sensing node which is proposed to save data.

6.3 Addressing schemas and communication protocols:

Internet contains a large amount of objects which need to determine their location to complete the process in an efficient manner. Thus, it is considered as a main objective of addressing process.

Internet Protocol(IP) is used to identify objects with the Internet. There are two versions of IP, namely

1)IPv4,it uses 32-bit addresses.

2)IPv6,it is the latest version of Internet Protocols uses 128 bit-address.

6.4.Advantages

Here are some advantages of IoT:

1. Data: If there is more information it make easy to take right decision.

2. Tracking: The computers are also used in IoT for tracking. With the help of this we can check the viability and expiry date of the products.

3. Time: If the time is saved in monitoring there will be possibility to do number of tasks.

6.5.Disadvantages

Here are some disadvantages of IoT:

1)Compatibility

2) Complexity.

3) Privacy.

4) Safety.

6.6.Applications

1)Smart cites

2)Wearables

3)Connected Cars

4)IoT in Agriculture

5)Energy Engagement

6.7.Conclusion

This paper goes through various aspects of IoT. Internet of Things (IoT) is a smart and easy network which is used to express computing network . Over a past years, technology has been developed more and more in such a way that it has become more competitive in present world. we have discussed here about challenges and technologies of IoT. Accordingly, the future of IoT structure relies on integration among real and physical world. Based on the above data we can consider that IoT environment is rich search area and flourishing area to research a particular topic with cloud computing. Every aspect including
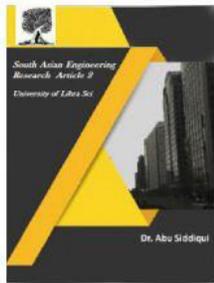
technology, business resist the rate of IoT. Acceptance of technology by people is essential and should be taken into consideration. People who are not fond of using gadgets will face difficulties .To overcome this problem IoT will engage with them.By this we are going to conclude IoT is an useful one which makes our lives better.

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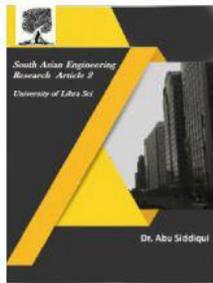
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