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# "The Internet of Things- Where the Web and the Physical world will meet"

Vaishali Jain [*]
*Assistant Professor*
**Information Technology Department*
*Acropolis Institute of Technology and Research, Indore, India*

Roopali Jain [#]
*Assistant Professor*
*#Applied Science and Humanities Department*
*Acropolis Institute of Technology and Research, Indore, India*

***Abstract*-Internet, the network of networks links us with the world at one tink. The Internet is a worldwide network phenomenon that linking billions of private and public networks by wired or wireless networking technologies of computer system. This paper is a survey on Internet of Things (IoT) which is believed to be the next evolution of Internet. Basic concept of IoT is that everything will be able to be connected through an Internet. More than 200 countries are linked together to exchange data, news and views via Internet. The aim of this engineering science is to induce physical object to interact in the like-a-way as the computer devices do.**

**IoT is a novel technology with the help of which devices can communicate with each other using sensors. In this paper, we discuss the chronicle of Internet of things, its different application areas, research challenges, open troubles concerned to the Internet of things and talk about the hereafter sight of IoT. Here we also talk over the latest invention done so far in this technology.**

**IoT is a novel engineering course. Every major Global Government and every major Economic Blog is now investing heavily in IoT because this is the place where in future there going to be lots of money to make. The development of the future of network will totally depend upon the creativeness of the researchers for designing in applications. However, there will be open issues regarding security and privacy. In this era of 21st century, this study is aimed to those who have interest in this field and adds their efforts to its growth.**

***Keywords*- Internet, Internet of Things (IoT).**

## I. INTRODUCTION

The Internet is a most prominent network of networks, which is now-a-days become necessary tool to every person in any age of group. It connects millions of computers together which are globally connected, forming a network in which any computer can communicate with any other computer as long as they are both connected to the Internet via wired or wireless technologies. We have abundance of information available in terms of Cloud, a digital information available to us. According to current estimate, it is about 4000 Exabyte in size which is almost a stack of books from Earth to Pluto and returning back from Pluto to earth 80 times.[8] The Internet of Things (IoT) is a new prototype of Internet which is quickly earning popularity in the era of 21st Century due to its rapidly acceptance. When we connect the Physical World to the Internet, the Planet and everything on it become THINGS in the "Internet of Things" (IoT) and not only web pages we can see in IoT but there will be real Physical presences that we can observe and control.

IoT is the one of the paradigm with many visions or perspective of different researchers. According to Gartner, there will be approximately 26 billion devices that might be on the Internet of Things by 2020. More researches estimates that more than 30 billion devices will be wirelessly connected to the Internet of Things (Internet of Everything) by 2020 [1].

### *A. What is Things:*

To understand IoT, first of all we have to understand what is "THING". Thing is literally everything and anything around us. The Things that we encounter in our daily live are Goods, Objects, Machines, Appliances, Buildings, Vehicles, Animals and even people are Things in Internet of Things(IoT).

### *B. How will IoT works:*

For communications among several Things in IoT, we have to give each object a unique identity as allotting IP address to each object so that we can quote the objects from any other part in the world. As we know that there is limited address space available in IPv4 address scheme hence the objects in Internet of Things are addressed with the help of IPv6 addressing scheme which offer really large address space but at the same time the worldwide acceptance of IPv6 addressing scheme in forthcoming years will be an open challenge for the fortunate growth of Internet of Thing. Objects in the IoT will be controlled over the Internet through sensorial capableness of the devices and actuation capabilities which are monitored by the computer system over the internet [1].


Fig. 1 Overview of Internet of Things

## II. TECHNOLOGIES INVOLVED

The basic concept of IoT is that everything around us will be connected with each other with the help of Internet. Actual implementation of the IoT construct into the real world can be done with the help of consolidation of various emerging technologies available. This could be happen with one of the following enabling technologies:

*A. RFID* – Radio Frequency Identification is a wireless device uses electromagnetic field to connect objects with the help of tags attached to the objects [14]. From a physical point of view a RFID tag is a small microchip attached to the objects [5].It is a new version of Barcodes. You can just stick RFID tag onto your wrist and wave it around the room and it will pick up all of the RFID tags of the objects in the room.

*B. NFC* – Near Field Communication is a set of thoughts and technologies with the help of which the smart phones and other objects that wants to communicate under IoT [15].

*C. M2M* - Machine to machine is a technology that exchange information between the machine and execute work without the help of manual help [16].

*D.* Wireless Sensor Network (WSM) - Wireless sensor network is a set of large number of sensors which monitor environmental conditions.

*E.* Addressing schemes (IPv6 addresses) – Addressing scheme is the basic tool by which IoT concept can be implemented by giving IP addresses to each object which we want to communicate.

## III. PYRAMID OF INFORMATION

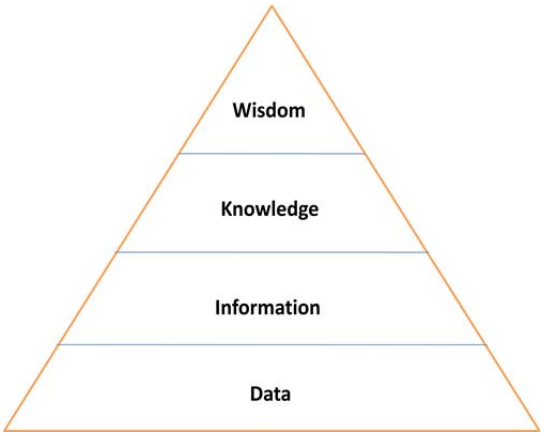


Fig. 2 Pyramid of Information

We know there are tremendous amount of data available which is to be filtered for usefulness of information gathering for IoT. For this we can consider this pyramid of information, which consist of 4 levels. These level are discussed in brief below-

A. *DATA* – There are enormous amount data available about 4000 Exabyte in size, hence these data needs filtering for its proper use.

B. *INFORMATION*-With this huge amount of data, we can use data mining to extract information from the data.

C. *KNOWLEDGE*- From the above information we can use knowledge engineering to extract the important knowledge.

D. *WISDOM*- After passing all the above phases of this pyramid we reach to the Wisdom of Information by which we can formulate our dreams under IoT.

## IV. OBSERVATIONS, DISCUSSIONS AND APPLICATIONS OF IOT:

We are highly restricted with our imagination as our machine can't talk with each other before invention of IoT but with IoT we can think a lot. We can connect with the THINGS in a variety of new ways with IoT technology. Internet of thing allows us to monitor Things. Let us understand usability of IoT. These are a few examples of how the Internet of Things could change our daily lives [11]:

*A.* Today when we go to buy some vegetables or fruits, we have to check our fridge what is to bring from market and what is not, but with the help of IoT we can add sensory capabilities via special kind of sensors so your fridge can communicate with you and list the things which are short and which are access in quantity every day. With this

concept we can add one more idea of IOT BUCKET , this bucket is connected with a wireless display device which also have RFID technology inbuilt, when we go the market and buy some goods then this Bucket will tell you what we want to purchase (as directed by the fridge concept above) and what are the actual cost of the objects we want to buy (objects should also have a RFID tag attached to it) and simultaneously calculate the price so that we become sure that we have enough money to buy some more things or not.

*B.* Let say I have Sugar problem, so I can wear a Wireless Insulin Monitor commonly used in the Hospitals these days and if I have a smart phone with Insulin counting app then it can monitor my insulin level and gives me warning about internal body activity or a remote monitor can observe my heartbeat and insulin level 24 by 7 or I can show to my relatives that my heart is still beating and can adjust insulin while eating anything rather to check it weekly or monthly.

*C.* Think about a scenario that you are going out somewhere and struck the door without acquiring the keys with you then suddenly you can hear a siren "Beep Beep" which indicating that you forgot to take keys with you and then your smart-door hold over the door to be locked and you have enough time to go back into the house and bring the keys with you.

*D.* IoT can also used for monitoring environmental parameters. If we talk about agricultural practices such as quality of agricultural land, environmental conditions, water level condition, humidity and all the thing which are required for farming can be monitored and access with the help of Radio Frequency Identification. Other than this all spoilable foods such as milk, vegetables, sweets, fruits etc need extra take care while transportation through several miles, hence with the help of sensors we can monitor them.

*E.* With the help of IoT we can easily manage things. Now more than 50 % of world's population lives in cities and major problem in cities are traffic congestion problem so we need a better way to manage our cities' traffic problem [8]. Let us talk about the crowded place in Indore city say "Rajwada area". If I know in this area where the large numbers of vehicles are or where they want to go, I can better remove the congestion problem. For this I can put some RFIDs on the nearby traffic signals and count/monitor on every 15 minutes where the large number of traffic moving but before this all vehicles should have one RFID tag attached to it. All this information are then collected by centre traffic booth and delivered the updated information to that area's police officer for controlling the congestion. Hence I can better look after every health safety and security of all my citizens with the help of IoT.

*F.* IoT can search the things. One of best thing with IoT is that it is a "Reality Search Engine". Is that it's just Google to search this 4000 Exabyte of information? Yes it is somewhat true but not completely right as Google cannot give answers to these questions as-

1. Where are my keys?
2. Where is my child?
3. Where is my tablet? Etc.

But with the help of IoT we can get answer all of the above questions easily, as for the first question our keys can be tagged located with RFID to the object on IoT.

Apart from all the usefulness of IoT in the real scenario, it is highly vulnerable to attacks like man in the middle attack as it allows communication between the objects almost wirelessly, so it became very easy to penetrate the system [6]. Even authentication, data integrity, privacy are also some open issues when we think to work under IoT. Hence the concept of IoT is feasible and flexible but a prominent research attempt is however demanded to make it productive [5].

## V. OPEN ISSUES

By now, as we all know that IoT is a very novel concept to connect Web to the Physical world, however every good thing had some bad side with it so we have to consider some open issues related to this technology. Some issues are as follows-

*A. Security*: Security is one of the major issues to be taken under consideration. Precisely it include Authentication which says that the entity which is conveying should be the one which it claims to be because in IoT we use mostly wireless devices to connect so it must be maintained.

*B. Data Integrity*: Data Integrity is second most popular issue concerned with IoT. As we all know data in IoT, data float mostly via wireless communication so there will chances of theft in between the path commonly known as Man-in-the-Middle attack. Hence data integrity issue is very important and should be taken under consideration on serious note [5].

*C. Data Storage Complexity*: Although IoT will shape our life in very leisurely manner but the main problem behind the curtain is the storage of all data required for the functioning of IoT and after storage integrity of data should maintained. Hence for the proper functioning of IoT this issue should be considered seriously.

*D. Expensive*: The main hurdle with the IoT is the devices with the help of which IoT works are very expensive. Hence the initial cost for proper working of any idea will be high and not in approach to the poor people.

## VI. FUTURE SCOPE

IoT is a new technology trend. It is the future of mobile technology and vision for the development of web to increase usefulness of the Internet. IoT makes communication between the devices from the items like smart-phone equipped with touch screen to the objects which may run mostly unattached or be designed to be controlled from a nearby phone's mobile programmable screen [9]. Nobody in 1993 will predict the impact of Internet in our daily lives but one thing hit my mind that why in future or by 2020, we are individually be in contact with about 5000 objects or smart things in our daily lives however only thing required is to make them communicate with each other so then we can also communicate with them. The first IoT devices are already in the market including NEST (a thermostat), LOCKITRON (remote control locks), Pay By Phone (parking system).

## VII. CONCLUSION

Right now everybody is going to opt this whole new concept of IoT because this is only one concept discovered recently where there is going to be lots of money and lots of possibilities to make in future [9]. This is an amazingly new paradigm that is growing on rapidly and something that you should really know about it and understand. IoT will change our lives. If this IoT is to be for common good, we need the input and support of common people on human and social sciences. We need ordinary people to join us to make it to the good of society and good of individual. Literally imagination is the limit when it comes to INTERNET OF THING (IoT).

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