Affordable Luxury or Liability- The Internet of Things

Beulah Supriya

Student, Alliance Francaise ,
Plot No.4, Aurora Colony,
Road No.3, Banjara Hills,
Hyderabad, Telangana, 500034, India
email: beuls89@gmail.com

Abstract— What is common between a spoon, a light bulb and the garage door? For a long time the answer has been nothing but with the emergence of the Internet of things(IoT) these mundane objects become "smart", receive connectivity and can be controlled remotely or used to monitor informative patterns. Though seemingly recent to the ever evolving technology industry, it's presence has been evident for a long time. With the focus on convenience we have moved from PCs to laptops, finally smart phones and their huge potential. Despite this unprecedented demand for the hand-held gadgets, IoT is the future and every step in innovation taking us closer to it than before. It is a combination of various forms of technology like tracking, sensors, enhanced communication and thus can be interpreted in various ways. This paper attempts to understand how this technology has unassumingly become part of our daily lives and goes through current applications and its future potential with all the bright possibilities; it has also unknowingly giving rise to security threats which never existed before, these will be examined as well. The aim is to have a more comprehensive understanding on this amalgamation of technologies. This is due to the fact that thorough knowledge gives rise to efficient practices.

Keywords : Internet of Things, smart environments, computing applications, cyber security

I. Introduction

The Internetof Things (IoT) seems to be a fairly recent term but is being used for quite some time. This fast developing technology is an amalgamation of many technologies like Radio Frequency Identification (RFID), sensors etc. It can loosely be defined as communication among various devices via the internet for our convenience and greater efficiency.

To have a better understanding of it we will take a brief look at communication and its impact on our lives and the evolution of devices which we have used to communicate. One of the major differences between u and animals is our ability to communicate coherent and complex thoughts. The mathematical Shannon had created the communication model which was the guideline for functioning of the various communication devices. In our quest to connect with people and communicate we have invented various devices. The first broadcast device was the printing press invented Guttenberg. Early devices include

telegraphs and telephones. The telephone was invented by Alexander Bell and had brought in a revolution like never before making the sending and receiving of messages much faster. Yet though this was a major breakthrough there were some issues which had to addressed like reliability and mobility. To elucidate this further we can analyze phone lines during festivals which are so busy that they end up not allowing us to connect at all. The problem of mobility has been solved by the ubiquitous mobile phones. It was in search of the reliability of message sending that the internet was invented. At first it's basic features were sending emails and web browsing but as the capacity of sending data increased through the years the ability to share pictures, document and even videos became possible.

The complex technology which we are trying to understand today is actually the result of decades of innovation in various fields. Right from the discovery of electro-magnetic waves and radar to the trans Atlantic telephone networks. They are all interlinked and buildon each other be it directly on certain cases but most probably indirectly. Tracking animals one of the most early forms of RFID (radio frequency identification). A more common use is the tag attached to clothes if taken from store without deactivation; this is used widely to prevent thefts

II IoT, working, popularization

The textbook definition of the internet is " an interconnection of networks", so another way to define IoT- A network of interconnected objects able to collect and exchange data. Though the spotlight is on smartphones and its various uses all these are just bolstering the further growth of the Iot. According to a survey by the year 20202, fifty billion devices will be connected worldwide by the internet of things. The reason for it popularity is it's versatility in usability and management. So dependence on the devices we currently use is inevitable. The data collected by the various devices are stored by the IoT yet like various technologies these are possible to hacked and the information collected is extensive implying the damage done will also be as evident. It has opened up avenues which were considered impossible before. In it we can connect things as dissimilar as a spoon, light bulb and a window. This technology helps the object or "thing" interact not only with but also with other things. So when we consider a spoon with sensors which can help us monitor our food intake and also vibrate if we overeat, this is an example of how communication had advanced to the next level. From communication among humans, communication between a human and a device, to finally communication among devices, development has come a long way

An important component which deserve mention is RFID and RADAR which helps track and locate various objects. RADAR was used

during the WW II to locate hidden submarines and missile.(Zhang. Y)The working of IoT can be summarized as, A form of communication which works by having an entity I.e a person who using a remote like smartphone or a tablet to send commands through iot devices and a network through which data passes. Data collected can be stored on the cloud, local database, on the remote(smartphone)or on the IoT device as well. Usually data is stored at numerous places in case of an emergency, for backup purposes. Smart phones, smart TVs and smart buildings, they are called smart due to the interaction of various object in the given environment with each other and us to make it easier.

The reasons which have been observed for the rapid growth and progress are:

1.Incresed net connectivity and speed – With the arrival of superfast network speeds which have been able to send huge amounts of data in a matter of milliseconds to remote corners of the world. And almost every part of the world being connected to the internet, it has become easy for IoT to integrate into the system.

2.Larger mobile adoptions – As mentioned earlier smartphones have become very common and an integral part of our lives. They have made it possible to multi task and do various chores while on the go.

3.Huge IoT investments – The International Data Corporation estimates in it's survey that,

global spending on IoT devices and services will rise from $656 billion in 2014 to $1.7 trillion in 2020. This growth is expected to be fueled by growth in devices, connectivity solutions, and IT services.

These reasons and many more like seamless integration, added benefit in various field ranging from medicine and health to the business sector and the low consumption of energy have brought it to the forefront of innovation.

Though examples in the paper are related to individual or household uses the scope for IoT is first seen in the business sector. Right from controlling employee access to tracking shipments and managing huge loads of various forms of data, this technology has become indispensable. And the second under consideration are the various governments by easing burden on management of data stored, performing mundane jobs and much more to produce accurate and time efficient results. Chip companies like Qualcomm and Intel have been exploring new avenues in IoT by the use of data collected for big data analytics, which simply means the finding and recognizing of various patterns which give useful information. For example to know a person's health from his/her shopping choices online or the prediction of various market trends.

The domains we can see the influence of the iot and future scope as well:

1. Mobile health- fitbit ,iwatch ,heart rate monitors are simple examples. The data collected can be analyzed in new way to find a sol to problems- data analytics by detecting patterns and causes

2. Smart Homes- This includes security as well. To have motion sensors and send an alert to your phone when movement in house is detected, smart lighting, connection of the devices like ACs and heaters to the phone, cameras to keep an eye when not at home are the various applications we can find under this category.

3. Automotive- In cars remote software updates to enhance driving pleasure. Air bag deploy and GPS location to certain contact. Diagnosis of vehicle preventing accidents can be made possible.

III SECURITY FEATURES AND ISSUES

Despite the above uses, many people are skeptical about the security concerns they bring in various forms. Some of them are: Privacy, security, uncontrolled environments, uncontrolled data sharing and trust.

It is not enough to see its potential which inevitably will be harnessed to a large extent but to boost IoT facing prevalent and upcoming issues is mandatory. There has to be cognizance of its impact on future society and thus rules to ensure proper usage of the devices and data being sent through it. If the dialogue is left for a later date, there will be damage control not prevention of problems which is not the situation we are looking for. The first most basic place to keep an eye is, the environment in which the data is being shared or transferred through. Uncontrolled environment is basically, physical accessibility like can access traffic cameras are possible

Next is Heterogeneity: IoT is expected to be a highly heterogeneous ecosystem as it will have to integrate a multitude of things from various manufacturers. Therefore, version compatibility, and interoperability have to be considered

Constrained resources: Things in the IoT will have constraints that need to be considered for security mechanisms. This includes energy limitations, e.g., battery powered devices, as well as low computation power, e.g., micro sensors mobility of devices: As the devices are mobile or move around frequently it is not possible to stay connected all the time, stable networks cannot always be present.

We can learn security management from various other technologies like big data and cloud but not all aspect can find a solution through them. Cloud cannot help in mobility

and other physical aspects. Furthermore, the uncontrolled environment and the heterogeneity of the IoT have a serious impact on trust, which is the key element.(Emmanouil et al 2015).

Network security requirements can be split into confidentiality, authenticity, integrity. It is important to stay anonymous on the net as anyone can access information and use it for purposes other than those designated.(Ning 2010) There is also uncontrolled flow of data which results in information we generally would not have give would be passed on to the receiver as well. There has to be certain restrictions in this area as well.

These issues and many more are being worked upon and will continue to enhance security of this technology. As we become more advanced technologically the possibilities will be limitless and IoT takes steps in the direction of advancement and automation. It will not only make many jobs

easier by remotely controlling what goes only but will also be able to save lives in the health sector thanks to the mobility and accessibility of this technology. As we learn more about the ever changing scenario in the IoT with all the plans that lie ahead it is imperative to keep up or be completely left out as it grows at such a breathtaking pace. The various sectors impacted by it development and proper usage will be the business, healthcare, transportation, retail and security sectors. Being as powerful as it is, care must be take to understand it thoroughly and harness it in the right direction. We have come a long way, from people getting along we are now able to make "things" get along.

References

1. Ning, H., Liu, H., &Yang, L, T. (2010). Cyberentity Security in the internet of things. IEEE Internet Computing, 4(46), 46-53.
2. Zhang, Y., Yang, L., & Ning, H. (n.d.). *The Internet of Things: From RFID to the Next-Generation Pervasive Networked Systems.* Auerbach.
3. Emmanouil Vasilomanolakis , JorgDaugbert,ManishaLuthra ,VangelisGazis ,AlexWeismaier ,Panayotis Kikiras.‖On The Security and Privacy Of Internet Of Things Architectures and Systems‖International Workshop on Secure Internet of Things.2015