A SURVEY ON ESSENTIALITY OF INTERNET OF THINGS IN TODAY'S WORLD

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ABSTRACT

The Internet of Things(IoT) has become an attractive system paradigm. The Internet of Things (IoT) has the potential to transform our daily lives and societies, due to its massively distributed and ubiquitous nature. The Internet of things (IoT) is a technology that connects physical objects and not only computer devices to the Internet, making it possible to access data or services remotely and to control a physical object from a remote location. To realize the benefits of the IoT, security and privacy issues associated with the use of the IoT need to be identified and addressed properly. The Internet of Things (IoT) is part of Future Internet and will comprise many billions of Internet Connected Objects (ICO) or 'things' where things can sense, communicate, compute and potentially actuate as well as have intelligence, multi-modal interfaces, physical/ virtual identities and attributes. Collecting data from these objects is an important task as it allows software systems to understand the environment better. In this paper we are trying to explore the needs, requirements, basics and essentiality of IoT in today's technological world.

Keywords: IoT, Internet Traffic, Virtual Interface, ICO, Communication, Sensor

I. INTRODUCTION

Internet of things refers to identifying a physical Object through internet. Any object even a human being, animal or anything else can be connected in Internet so that they can be accessible from anywhere in the world through internet. The Internet of Things (IoT) is a scenario in which objects, animals or people are provided with unique identifiers and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction. A thing, in the Internet of Things, can be a person with a heart monitor implant, a farm animal with a biochip transponder, an automobile that has built-in sensors to alert the driver when tire pressure is low -- or any other natural or man-made object that can be assigned an IP address and provided with the ability to transfer data over a network. IPv6's huge increase in address space is an important factor in the development of the Internet of Things. According to Steve Leibson, who identifies himself as "occasional docent at the Computer History Museum," the address space expansion means that we could "assign an IPV6 address to every atom on the surface of the earth, and still have enough addresses left to do another 100+ earths." In other words, humans could easily assign an IP address to every "thing" on the planet. An increase in the number of smart nodes, as well as the amount of upstream data the nodes generate, is expected to raise new concerns about data privacy, data sovereignty and security[2].

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The Internet of Things (**IoT**), also called Internet of Everything is the network of physical objects or "things" embedded with electronics, software, sensors, and connectivity to enable objects to exchange data with the production, operator and/or other connected devices. The Internet of Things allows objects to be sensed and controlled remotely across existing network infrastructure, creating opportunities for more direct integration between the physical world and computer-based systems, and resulting in improved efficiency, accuracy and economic benefit. Each thing is uniquely identifiable through its embedded computing system but is able to interoperate within the existing Internet infrastructure. Experts estimate that the IoT will consist of almost 50 billion objects by 2020. IoT is expected to offer advanced connectivity of devices, systems, and services that goes beyond machine-to-machine communications (M2M) and covers a variety of protocols, domains, and applications.[3]

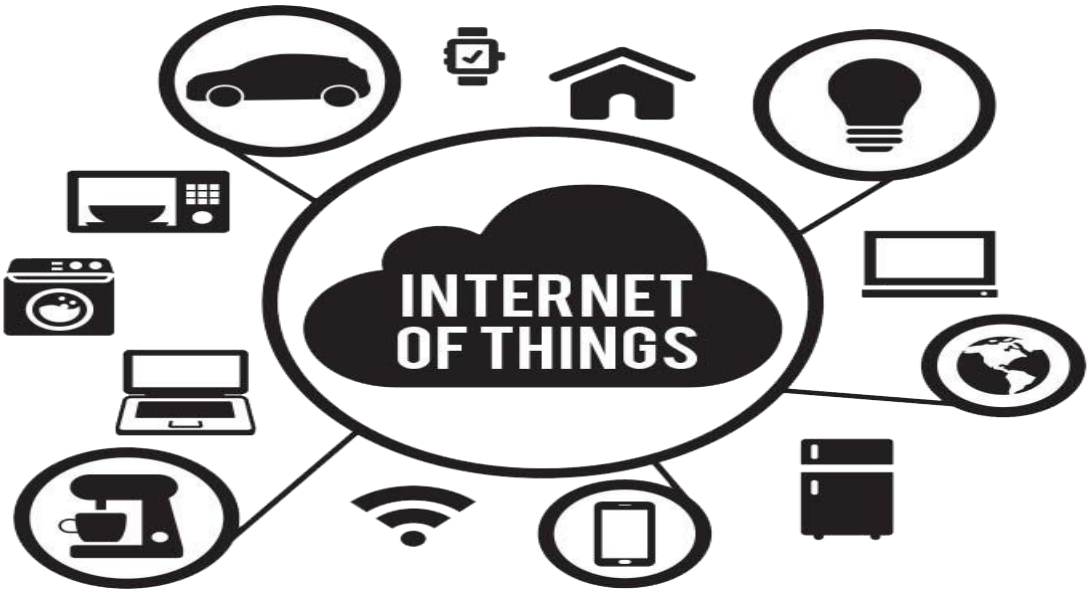

Fig.1.1 INTERNET OF THINGS

Keven Ashton Inventor of the term “Internet of Things” (Source: Twitter)

Today the Internet of Things (IoT) is one of the main topics of discussion in the ICT world; it can be defined as the interconnection of uniquely identifiable embedded computing devices within the existing Internet network. The IoT evolved to a convergence o f multiple technologies, ranging from many different fields of application such as industrial, health, Smart Grid and Smart Cities in general covering the Machine- to - Machine (M2M) paradigm. Until nowadays the main effort was to create applications and platforms hardware oriented, to improve devices connection and communication, giving little importance to aspects related to the user - experience, privacy and security policies. [3]

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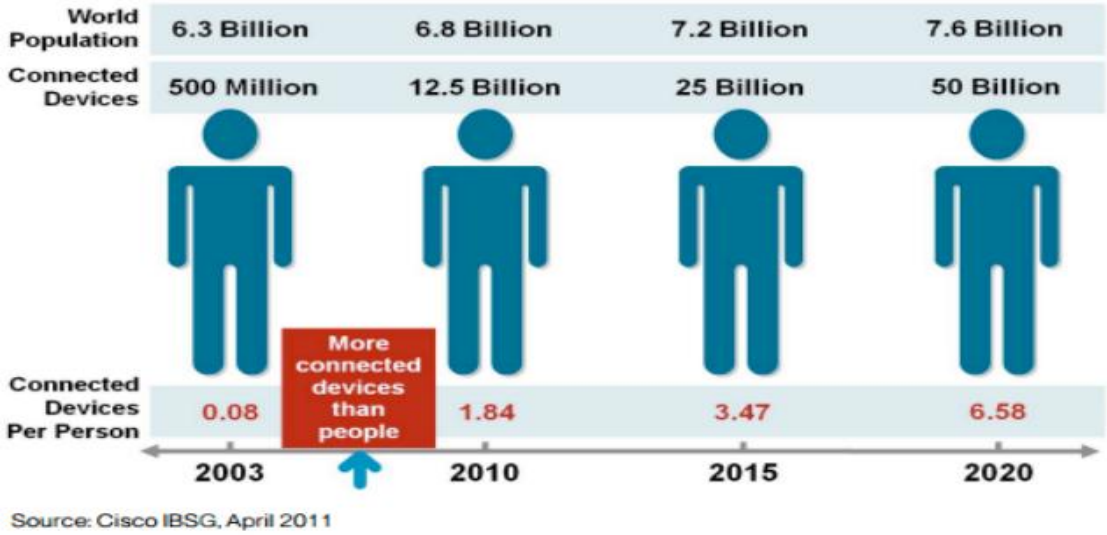

Fig 1.2 The Internet of Things – How the Next Evolution of the Internet (CISCO)

II. INSIGHTS OF IOT

Today computers and the Internet are almost whole and solly dependent on human beings for information. Nearly all of the roughly 50 petabytes (a petabyte is 1,024 terabytes) of data available on the Internet were first captured and created by human beings by typing, taking a digital picture, pressing a record button, or scanning a bar code. The problem is, people have limited time, attention and accuracy – all of which means they are not very good at capturing data about things in the real world. If we had computers that knew everything there was to know about things – using data they gathered without any help from us – we would be able to track and count everything and greatly reduce waste, loss and cost. We would know when things needed replacing, repairing or recalling and whether they were fresh or past their best" [2].

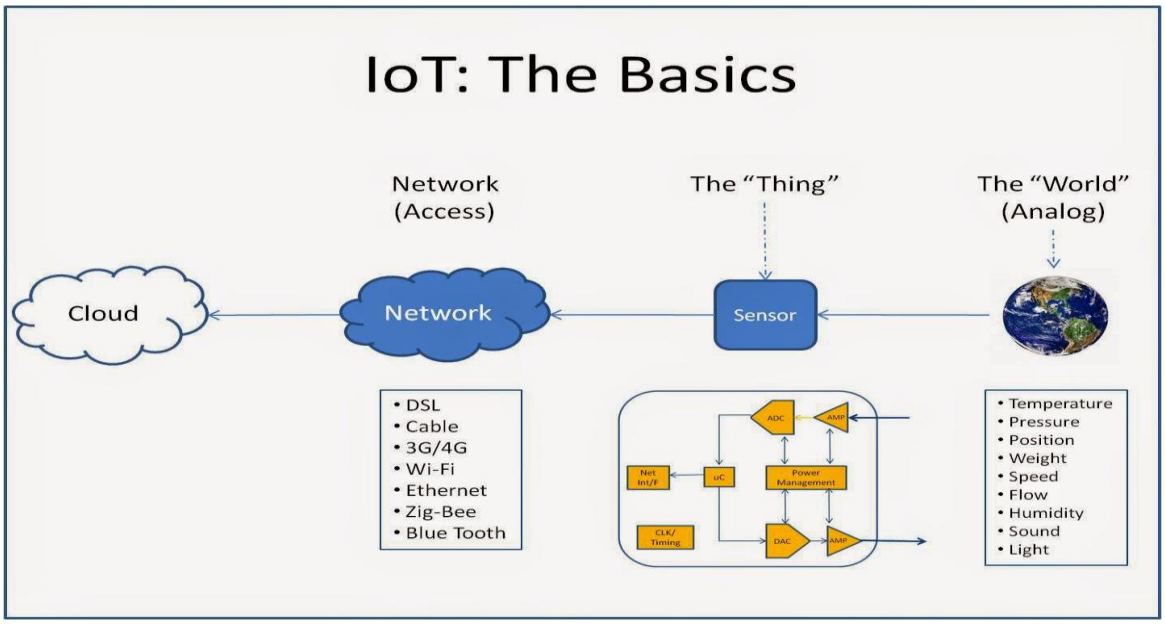

Fig. 2.1 IoT Basics

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Everyone, however, thinks of the IoT as billions of connections (a sort of "universal global neural network" in the cloud) that will encompass every aspect of our lives. All of this public discussion suggests the IoT is finally becoming a hot topic within the mainstream media. Many recent articles point to the IoT as the interaction and exchange of data (lots of it) between machines and objects, and now there are product definitions reflecting the same concept. Hence, from a technology perspective, the IoT is being defined as smart machines interacting and communicating with other machines, objects, environments and infrastructures, resulting in volumes of data generated and processing of that data into useful actions that can "command and control" things and make life much easier for human beings.

III. OVERVIEW OF IOT TECHNOLOGY

3.1 Layered Technology of IoT

The Internet of Things builds on three major technology layers:

- Hardware (including chips and sensors),
- Communication (including mostly some form of wireless network), and
- Software (including data storage, analytics, and front end applications).

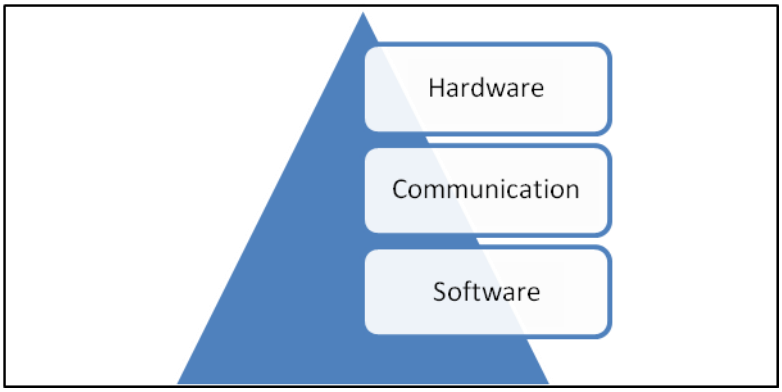

Fig. 3.1 Layers of IoT Technology

3.1.1 Hardware Layered Technology

One of the important factor in IOT's operation is the hardware associated with it. Like sensors and chips are integral part of h IOT.

3.1.2 Software Layered Technology

Another layered technology of IOT is software associated with it. Because without use of software we can not even use the concepts of IOT.

3.1.3 Communication Layered Technology

Last layered technology is related with the communication of different entities present and working in the execution of IOT.

So, from this we can say that basic building blocks of IOT are Hardware, Software and Communication. All these three things are connected with each other in one or other way like, hardwares and softwares are communicated with other with the help of some interface. That is hardwares are worked only with the help softwares.

3.2 Example of IOT

Let's consider a situation which will depict the working and use of Internet of Things. Consider If anyone is not present in his/her house or gone on a vacation and the house is remains empty. We have installed a sensor called "moisture sensor" which detects water on the basement floor. This sensor is processed by an app, which will receive another report from a another sensor called "temperature sensor" that detects the flow of water in the main water pipe. Both sensors are detecting anomalies/problems is cause for concern. A high rate of flowing water may signal a slight water flow that might be in a running toilet, the water on the basement floor by routine leakage from a heavy rain, a burst pipe, triggering an automated valve shutoff. In either case, we will get a machine-generated message describing the problems, and from this we can investigate in a following way. With the help of a system builded mobile app, we get two one-time codes to unlock front door of house, one for neighbor and another for a plumber, means one code is for neighbour and one code is for plumber When the door is unlocked, a text alert tells who entered into the house. So ultimately with this we can take care of our house from a remote location without actually going to location[7]. This is one of the example for use of IOT in our day to day life, which is important.

IV. APPLICATIONS OF INTERNET OF THINGS

While there are literally hundreds of applications being considered and identified by different industries, there are lots of applications of Internet of Things available for various fields. Like from Home Automation to Farming to Industry. Some of the applications are listed below[4]:

Fig.3.2 Smart home [6]

4.1 Smart home

Smart Home clearly stands out, ranking as highest Internet of Things application on all measured channels. More than 60,000 people currently search for the term "Smart Home" each month. This is not a surprise.

4.2 Wearables

Wearables remains a hot topic too. People eagerly waits for the wearables to come into the market.

4.3 Smart City

Smart city spans a wide variety of use cases, from traffic management to water distribution, to waste management, urban security and environmental monitoring. IoT solutions in the area of Smart City solve traffic congestion problems, reduce noise and pollution and help make cities safer.

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4.4 Industrial internet

The industrial internet is also one of the special Internet of Things applications, industrial internet is the IoT concept with the highest overall potential, its popularity currently doesn't reach the masses like smart home or wearables do.

Fig. 3.3Industrial internet[6]

4.5 Connected car

The connected car is coming up slowly. Owing to the fact that the development cycles in the automotive industry typically take 2-4 years, we haven't seen much buzz around the connected car yet. But it seems we are getting there.

4.6 Connected Health

Connected health remains the sleeping giant of the Internet of Things applications. The concept of a connected health care system and smart medical devices bears enormous potential not just for companies also for the well-being of people in general. Yet, Connected Health has not reached the masses yet.

4.7 Smart supply chain

Supply chains have been getting smarter for some years already. Solutions for tracking goods while they are on the road, or getting suppliers to exchange inventory information have been on the market for years.

4.8 Smart farming

Smart farming is an often overlooked business-case for the internet of Things because it does not really fit into the well-known categories such as health, mobility, or industrial. However, due to the remoteness of farming operations and the large number of livestock that could be monitored the Internet of Things could revolutionize the way farmers work.

V. ADVANTAGES AND DISADVANTAGES OF IOT

The Internet of Things is a futuristic technology in which interconnection of devices and the Internet is proposed. It can make possible the automation of many daily chores. There are some advantages and disadvantages of Iot some of them are :

5.1 Advantages :

- Better Quality of Life

- Saves Money
- Efficient and Saves Time
- Automation of daily tasks leads to better monitoring of devices

5.2 Disadvantages :

- Technology Takes Control of Life
- Loss of privacy and security
- Lesser Employment of Menial Staff
- Complexity
- Compatibility

VI. CONCLUSION

Internet of Things is future technology which is taking its shape in today's life of human beings. IoT contains the synchronization of humans as well as machines, but larger part is handled by machines and not by humans. Through IoT lots of things will get easy to work and execute. The Internet of Things promises to deliver a step change in individuals' quality of life and enterprises' productivity. The evolution of the next generation mobile system will depend on the creativity of the users in designing new applications. IoT is an ideal emerging technology to influence this domain by providing new evolving data and the required computational resources for creating revolutionary apps. In coming days it is been predicted that billions of devices are connected with each other. Through a widely distributed, locally intelligent network of smart devices, the IoT has the potential to enable extensions and enhancements to fundamental services in transportation, logistics, security, utilities, education, healthcare and other areas, while providing a new ecosystem for application development.

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