INTERNET OF THINGS (IOT)

[1]Swapnali Kadam, [2]Rohit Dhonde
[1,2]Department of Information Technology, B.V.I.T. Navi Mumbai
[1]swapnalisyif@gmail.com [2]rohit10dhonde@gmail.com

Abstract—**This paper provides an overview of the Internet of Things (IoT) with emphasis on enabling technologies, protocols, and application issues. The IoT is enabled by the latest developments in RFID, smart sensors, communication technologies, and Internet protocols. The current revolution in Internet, mobile, and machine-to- machine (M2M) technologies can be seen as the first phase of the IoT.**

Index Terms— **smart sensors, communication technologies, and Internet protocols.**

I. INTRODUCTION

The term Internet of Things (often abbreviated IoT) was coined by industry researchers but has emerged into mainstream public view only more recently. Some claim the Internet of Things will completely transform how computer networks are used for the next 10 or 100 years. Internet of Things represents a general concept for the ability of network devices to sense and collect data from the world around us, and then share that data across the Internet where it can be processed and utilized for various interesting purposes. Some also use the term industrial Internet interchangeably with IoT. This refers primarily to commercial applications of IoT technology in the world of manufacturing. The Internet of Things is not limited to industrial applications, however. IoT describes a system where items in the physical world, and sensors within or attached to these items, are connected to the Internet via wireless and wired Internet connections. These sensors can use various types of local area connections such as RFID, NFC, Wi-Fi, Bluetooth, and Zigbee. Sensors can also have wide area connectivity such as GSM, GPRS, 3G, and LTE [2].
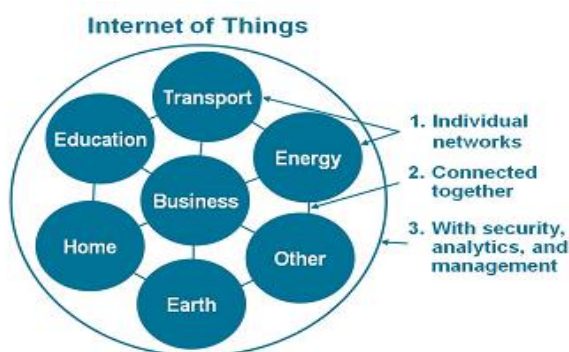
These networks connected with added security, analytics, and management capabilities. This will allow IoT to become even more powerful in what it can help people achieve.

A. Structure of IoT

The IoT can be viewed as a gigantic network consisting of networks of devices and computers connected through a series of intermediate technologies where numerous technologies like RFIDs, wireless connections may act as enablers of this connectivity.

➢ Tagging Thing : Real-time item traceability and addressability by RFIDs.
➢ Feeling Things: Sensors act as primary devices to collect data from the environment.
➢ Shrinking Things: Miniaturization and Nanotechnology has provoked the ability of smaller things to interact and connect within the "things" or "smart devices."
➢ Thinking Things : Embedded intelligence in devices through sensors has formed the network connection to the Internet. It can make the "things" realizing the intelligent control.

B. History:

The concept of the Internet of Things first became popular in 1999, through the Auto-ID Centre at MIT and related market-analysis publications. Radio-frequency identification (RFID) was seen as a prerequisite for the IoT at that point. If all objects and people in daily life were equipped with identifiers, computers could manage and inventory them. Besides using RFID, the tagging of things may be achieved through such technologies as near field communication, barcodes, QR codes, Bluetooth, and digital watermarking. [3]

C. Working:

The 'Internet of Things' basically works by M2M (Machine to Machine) communication, in which physical objects or 'Things' function by interacting with each other. The user can assess, analyse and control the functioning of his 'Things'.

The User's objects communicate with each other. Billions of connected devices are part of the Internet of Things. They use built-in hardware and software to send and receive data via various communication protocols. They might use our smart phones as their gateway to the Internet, connect to some other piece of hardware in our homes that's acting as a hub or connect directly through our home Internet service. They often send data to cloud-computing servers where it's then analyzed.[5]
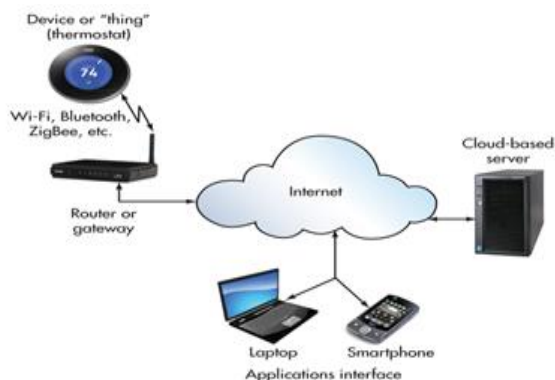
II. ADVANTAGES

Here are some advantages of IoT:

A. *Data:* The more the information, the easier it is to make the right decision. Knowing what to get from the grocery while you are out, without having to check on your own, not only saves time but is convenient as well.

B. *Tracking*: The computers keep a track both on the quality and the viability of things at home. Knowing the expiration date of products before one consumes them improves safety and quality of life. Also, you will never run out of anything when you need it at the last moment.

C. *Time*: The amount of time saved in monitoring and the number of trips done otherwise would be tremendous.

D. *Money*: The financial aspect is the best advantage. This technology could replace humans who are in charge of monitoring and maintaining supplies.

III. DISADVANTAGES

Here are some disadvantages of IoT:

A. Compatibility*:* As of now, there is no standard for tagging and monitoring with sensors. A uniform concept like the USB or Bluetooth is required which should not be that difficult to do.

B. Complexity*:* There are several opportunities for failure with complex systems. For example, both you and your spouse may receive messages that the milk is over and both of you may end up buying the same. That leaves you with double the quantity required. Or there is a software bug causing the printer to order ink multiple times when it requires a single cartridge.

C. Privacy/Security*:* Privacy is a big issue with IoT. All the data must be encrypted so that data about your financial status or how much milk you consume isn't common knowledge at the work place or with your friends.

D. Safety*:* There is a chance that the software can be hacked and your personal information misused. The possibilities are endless. Your prescription being changed or your account details being hacked could put you at risk.

IV. EASE OF USE

IoT platforms can help organizations reduce cost through improved process efficiency, asset utilization and productivity. With improved tracking of devices/objects using sensors and connectivity, they can benefit from real-time insights and analytics, which would help them make smarter decisions. The growth and convergence of data, processes and things on the internet would make such connections more relevant and important, creating more opportunities for people, businesses and industries.[4].

V. APPLICATION
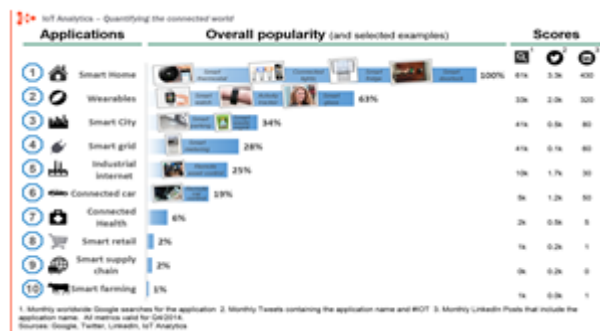
A. Smart home

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. The IoT Analytics company database for Smart Home includes 256 companies and startups. More companies are active in smart home than any other application in the field of IoT. The total amount of funding for Smart Home startups currently exceeds $2.5bn. This list includes prominent startup names such as Nest or Alert Me as well as a number of multinational corporations like Philips, Haier, or Belkin.

B. Wearables

Wearable's remains a hot topic too. As consumers await the release of Apple's new smart watch in April 2015, there are plenty of other wearable innovations to be excited about: like the Sony Smart B Trainer, the Myo gesture control, or Look See bracelet. Of all the IoT startups, wearable's maker Jawbone is probably the one with the biggest funding to date. It stands at more than half a billion dollars!

C. 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. Its popularity is fueled by the fact that many Smart City solutions promise to alleviate real pains of people living in cities these days. IoT solutions in the area of Smart City solve traffic congestion problems, reduce noise and pollution and help make cities safer.

D. Smart grids

Smart grids is a special one. A future smart grid promises to use information about the behaviors of electricity suppliers and consumers in an automated fashion to improve the efficiency, reliability, and economics of electricity. 41,000 monthly Google searches highlights the concept's popularity. However, the lack of tweets (Just 100 per month) shows that people don't have much to say about it.

E. Industrial internet

The industrial internet is also one of the special Internet of Things applications. While many market researches such as Gartner or Cisco see the industrial internet as the IoT concept with the highest overall potential, its popularity currently doesn't reach the masses like smart home or wearable's do. The industrial internet however has a lot going for it. The industrial internet gets the biggest push of people on Twitter (~1,700 tweets per month) compared to other non-consumer-oriented IoT concepts. [7]S

VI. CONCLUSION

In conclusion, the internet of things is closer to being implemented than the average person would think. Most of the necessary technological advances for it have already been made, and some manufactures and agencies have already begun implementing a small-scale version of it. the main reasons why it has not truly been implemented is the impact it will have on the legal, ethical, security and social fields.

workers could potentially abuse it, hackers could potentially access it, corporations may not want to share their data, and individual people may not like the complete absence of privacy. for these reasons, the Internet of Things may very be pushed back longer than it truly needs to be.

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