A REVIEW PAPER ON INTERNET OF THINGS

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ABSTRACT

In today's world, there are many advance technology building up, from which we are coming across. One of the latest and most popular technology we are going to discuss is about "Internet of Things". It is the fastest growing technology in today's world and also it is influencing our lifestyle. IOT is a global network structure that is highly interconnected. It increases the business productivity, improves government efficiency and much more. To share the data with other machines, the IOT devices are interconnected. IOT also uses various types of sensors embedded in devices, which is used to emit the data. The IOT common platform is used to share the data. These platforms collects the data from sources and further the data is operated and essential information is extracted so that the final result could be shared. This article comprises of meaning of IOT, characteristics, basic requirements of IOT and also it's applications. The main objective of this review paper is to provide an overview of using IOT. Today computers and the Internet are almost wholly dependent on human beings for information. Nearly all of the roughly 50 petabyte (1 petabyte=1015 bytes) of data available on the Internet were first captured and created by human beings by typing, pressing a record button, taking a digital picture, or scanning a bar code. Conventional diagrams of the Internet leave out the most numerous and important routers of all - people. 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.

Keyword - *IOT, sensors, architecture, smart devices, Radio Frequency Identification.*

1. INTRODUCTION

The development demand for the internet applications is increasing day by day in today's world. So, IOT is a latest and major technology, through which we can produce various useful internet applications.

Basically, IOT is a system through which we can transfer the data without any requirement of interaction between the human-to-human or human-to-computer. It just requires unique identifiers to interconnect with devices and transferring the data. IOT is becoming more and more important in our daily lives.

In IOT, physical devices are connected to the internet through routers or any other network device and then the data is exchanged. IOT also allows object to controlled it remotely. IOT is an intelligent technique which reduces the efforts of the human and also easy access to the device. This technique also has the autonomous control feature through which the device can be controlled without the interaction of the human.

In today's modern digital world each individual is connected with the other by using communication devices, wherein the most popular mode of communication is Internet. Therefore it is the internet that connects the people around the world and this IOT becomes the focus for deriving the underlining behavior, information, trends as well as patterns through the usage of internet. The basic idea of IOT has prevailed from around two decades. Because of its huge impact in improving the daily life and society, it has attracted many researchers, industrialists as well as academicians. When things like household appliances are connected to network, they work together in cooperation to provide ideal service not as a collection of independently working devices. The idea of IOT is valuable with disabilities, as IOT technology can support human activities at larger scale.

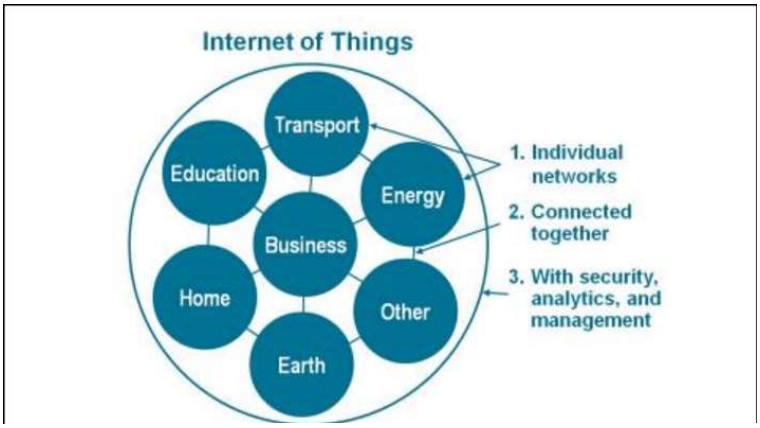

Fig-1: IOT Can Be Viewed as a Network of Networks

The theoretical basis of network of smart devices was first applied in 1982 to a coke vending machine at Carneige Mellon University. After this, it was found that the book "The computers of the 21st century" was by Mark Weiser in 1991 as well as academic quarters like ubicomb and percom designed a vision of IOT. Reza Raji, a researcher in 1994, described the concept of IEEE spectrum as "moving small packets of data to a large set of nodes to integrate and automate everything from home appliances to entire factories". From 1993 to 1997, several companies proposed solutions based on a similar platform. The idea gained popularity when Bill Joy envisaged device to device (D2D) communication at the World Economic Forum at Davos, Switzerland in 1999 [3]. Manpower requirements are urgent in every organization for the information desk to each and every department. To provide information, advertisement, messages, and other notifications for the customers and the staff, the information desk play the important and crucial role. Due to IOT, this function and manpower role has been cut down and replaces by the smart devices.

2. ELEMENTS OF IOT

1. **RFID (Radio Frequency Identification)** – RFID is a wireless technology, through which data is transferred by using electromagnetic fields in order to automatically identify and track tags attached to the objects. RFID is used to identify the distance of the object of few meters with a stationary reader typically communicating wirelessly. It provides two basic functions for an IOT they are, identification and communication.

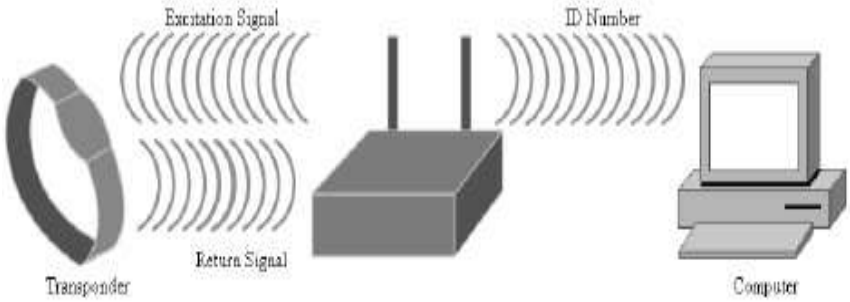

Fig-2: Basic functioning of RFID.

2. **WSN (Wireless Sensors Network)** – Wireless communication has led to the development of miniature devices having the ability to sense, compute and communicate wirelessly over the short distances. These miniature devices called nodes interconnect to form wireless sensor network. The components that makes up the WSN monitoring network includes:

1. **WSN hardware: -** It contains sensor interfaces, processing units, transceiver units and power supply.
2. **WSN communication stack:-** The communication stack at sink node must be able to interact with the outside world through the internet to act as a gateway to WSN subnet and internet.
3. **WSN middleware:-** It is a mechanism to combine the cyber with the service oriented architecture (SOA) and sensor networks to provide the access to the user.
   Secure data aggregation:- To extend the lifespan of the network as well as reliable data collected from sensors, an efficient and secure data aggregation method is used.

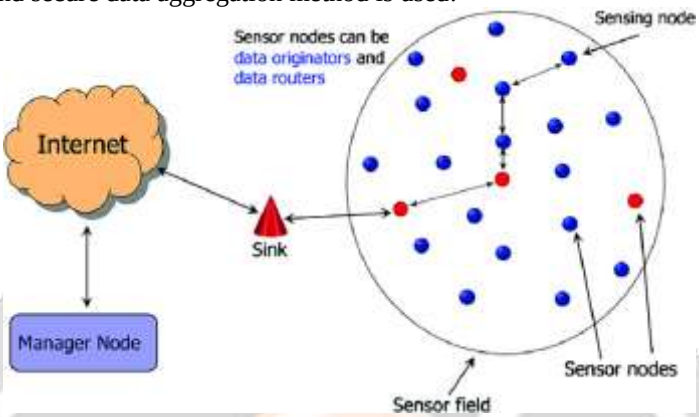

Fig-3: Wireless Sensor Network.

3. LITERATURE SURVEY

A British technological pioneer, Kevin Ashton invented the term "Internet of Things" to support the idea of supply chain management in 1999. In past few years, the term has become more comprehensive and includes wider spectrum of services in now-a-days like HealthCare, transport, consumer goods, etc. The authors in [5] describes the concept of IOT along with the architecture of IOT, protocols to develop IOT architecture and challenges for developing Intelligent system for real time environment. The author [6] describes smart urban ecosystem which includes smart cities, applications and infrastructure. In literature present in [7] describes the concept of automatic smart parking system by using the technology i.e., IOT. Components for smart parking includes Raspberry Pi, camera, IR Sensors, display device, user device, etc. In [8] the author describes the IOT along with the new paradigms like fog computing and edge computing. Fog computing is computing infrastructure which means processing is done closer to the node where data is created[9] . IOT helps in cost reduction and supports new business models.

Some technologies that supplements and promotes IOT are :-
Near-field communication and Radio Frequency Identification – Near-field communication enables the communication between two devices during 2010 NFC in short range only. In 2000s, RFID technology uses radio waves to spot the object.
Quick response codes and optical tags – QR codes consists of data. This is a low cost tagging technique.
Bluetooth and low energy – It is the latest high speed, low powered wireless technology, which connects the devices with each other wirelessly but in short range only approximately the range of Bluetooth is 10meters.

Major advantages of IOT :-

1. Access information – data can be accessed from remote location.
2. Communication – effective communication is possible via connected devices.
3. Automation – task done without human intervention.

Major disadvantages of IOT :-

1. Complexity – a diverse devices connected to a network single loophole can affect entire network.

2. Privacy/security – loss of data is possible, because of many connections of the devices or multiple connection.
3. Loss of jobs – automation leads to the loss of jobs , because there will be less need to human because machine operates it's own.

Applications of IOT :-

1. Smart home
2. Smart cities
3. Connected cars
4. Industrial internet
5. IOT in agriculture
6. IOT in healthcare
7. IOT in poultry and farming
8. Ground water detection and water reservation , etc.

4.FUTURE SCOPE OF IOT

The future for IOT is very scalable and bright. Most of the developed countries are investing billion dollars to convert the existing infrastructure in Smart Infrastructure. The Industrial Internet of Things (IIOT) market is predicted to reach $123B in 2021, attaining a CAGR of 7.3% through 2020 according to a recent Forrester survey of 2018.

Quality of Service:- Quality of Service in Cloud computing is another major research area which will require more and more attention as the data and tools become available on clouds. Dynamic scheduling and resource allocation algorithms based on particle swarm optimization are being developed. For high capacity applications and as IoT grows, this could become a bottleneck. New Protocols:- The protocols at the sensing end of IoT will play a key role in complete realization. They form the– backbone for the data tunnel between sensors and the outer world. For the system to work efficiently, an energy efficient MAC protocol and appropriate routing protocol are critical.

GIS based Virtualization:- As new display technologies emerge, creative visualization will be enabled. The evolution– from CRT to Plasma, LCD, LED, and AMOLED displays has given rise to highly efficient data representation (using touch interface) with the user being able to navigate the data better than ever before. With emerging 3D displays, this area is certain to have more research and development opportunities.

Cloud Computing:- Integrated IoT and Cloud computing applications enabling the creation of smart environments such– as Smart Cities need to be able to (a) combine services offered by multiple stakeholders and (b) scale to support a large number of users in a reliable and decentralized manner.

5. CONCLUSIONS

IOT promises of an improved quality of human life and productivity of enterprises. It has the potential to enable extension and advancements of fundamental services in health care, transportation, logistics, security, education through widely distributed and locally intelligent networks of smart devices and robust ecosystem of application development. Although, substantial efforts are required to mobilize the industry to move beyond the early stages of market development towards market maturity by unleashing the hidden opportunity offered by IoT. The market can place differing demands on the mobile networks with regard to service distribution, customer-charging model and capacity to deliver IoT services etc. which can pose a challenge to the mobile service providers. The pieces of technology puzzle are coming together to welcome IoT sooner than most conservatives expect. Just as it was not very long ago the internet became a household name within few years and www became a necessity, the Internet of Things will also touch every aspect of human life sooner than we can imagine.

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