INTERNET OF THINGS: VIEWS, IMPLEMENTATIONS AND CHALLENGES IN DEPLOYMENT

Mr M. Suresh[1], Dr S. Manju Priya[2]

Research Scholar, Department of Computer Science,

Karpagam Academy of Higher Education, Coimbatore, India[1]

Professor, Department of Computer Science,

Karpagam Academy of Higher Education, Coimbatore, India[2]

ABSTRACT

Internet of things refers to a kind of network that links every objects to the web utilizing protocols to share information through object sensing devices and communications, so as to achieve smart identification and positioning.The paper addresses what IoT is, how IoT facilitates different technology, apps and implementations, how IoT works and what potential problems IoT faces.

Key Words:-Internet of Things, IoT Applications

I INTRODUCTION

The internet is now broadly used by millions of people for different purposes like data sharing, video streaming, e-shopping, banking, social networking etc. The internet has continued its evolution and has paved the path for internet of things. It has changed the life of many people.

The term Internet of Thing (IoT), is defined as the connection of things through internet. It is able to connect the objects together to get and share information. IoT brings creative elements to the ICT environment through mobile networking and information processing capacities. This has encouraged modern ways of interaction between individuals and objects and among entities. [1]. IoT has proven to be a revolution in latest technology in changing the lifestyles of the people [2].

II TECHNOLOGIES ENABLING INTERNET OF THINGS (IOT)

The Internet of Things(IoT) is a global knowledge society network. It provides digital technology that focus on current and emerging interoperable information and communication technologies by interconnecting physical and virtual nodes. The Internet of Things is a transition in technology that reflects the future of computation and connectivity. Radio frequency identification (RFID) is considered one of the best technologies enabling Internet of Things. The objects should be identified to connect them for enabling communication between them. RFID provides this feature by using radio waves to identify and classify artifacts [3]. RFID is often described as a substitution for bar code, but RFID may do much more than a barcode. In addition to recognizing things, it may also monitor objects in real time in order to provide details regarding their place and state.In retail, medical care and facility maintenance RFID are already having several useful applications [4]. The Internet of Things is assisted firmly by advanced RFID technologies. Merging of digital world or information world with physical world is one of the biggest advantage of Internet of Things. Sensors play a significant role in bridging the gap between digital world and physical world. The sensors gather and extract knowledge from their surroundings and build context perception. This helps to track the changes in the atmosphere and to have the appropriate response if required [5]. Nanotechnology and miniaturization will bring information into products those are considered intelligent devices.

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III HOW IOT WORKS?

There are three main components which are more important for the working process of IoT. They are

1. Sensors
2. Connectivity
3. Data Processing
4. User Interface

Sensors

The sensors are tiny devices which help in collecting the data from the environment. A single application can have multiple sensors in it. For instance, the handset is just a device but it has multiple sensors in it like GPS, camera, touch screens, etc.

Types of IoT Sensors

Some of the IoT sensorsare available in the market; they are listed below:

1. **Temperature sensors**
   This sensor is used to detect the heat energy produced from any object. These sensors are mostly used in the agricultural area to monitor the temperature of the plants, soil and water.
2. **Smoke sensors**
   It is mostly used in the places like homes and industries. It helps to detect whether any smoke is emitted from the appliances used.
3. **Pressure sensors**
   These sensors are used in monitoring devices and systems which are determined by force signals. It is mostly used in appliances like vehicles.
4. **Gas sensors**
   It is mostly used for detecting toxic gases.
5. **IR sensors**
   These sensors are used in smartphones for controlling, measurable devices for detecting amount of light, sensitivity, etc.
6. **Image sensors**
   It is used in appliances like digital cameras, sonars, radars and biometric systems. It is also used in retail industry for monitoring the customers in the store.
7. **Water -level sensor**
   This type of sensors are used to monitor the water level in any tank or to prevent natural disasters during flood,

Connectivity

The second component is the connectivity. The data was collected by the sensors which are sent to the cloud through a medium of transports. It can be connected through different means like cellular networks, satellite networks, Bluetooth and Wi-Fi. Based on the applications, devices, communication range, power consumption the medium of connection differs.

Data Processing

Once the data is collected, it is stored inside the cloud. Here the data is analyzed by using machine learning or artificial techniques. Based on the complexity of the data different techniques are used to find the results. Till now, several researchers have tried to resolve the problem of inquiring data on IoT [6, 7, 8, 9].

User Interface

The user interface provides a medium for a person to communicate with the computer program. It includes websites, windows, keys, pictures, shapes etc. Applications and apps on laptops and tablets are the most visible representations of user interfaces.

IV POPULAR IOT APPLICATIONS

The most popular IoT applications are as follows:

1. **Smart Home**: Most of the companies are active in smart home than any other applications in the field of IoT [10]. The things which are used in the houses can be remotely controlled from anywhere.
2. **Wearables**: Devices like smart watches and fitness tracker are examples of IoT technology. These devices help the people to monitor their health conditions too.
3. **Smart City**: It includes smart parking, traffic monitoring, waste management and smart lightning.
4. **Industrial IoT**: It can provide real time supply chain management by tracking the products.
5. **Smart Health**: The patients can be monitored remotely, monitor the elderly people with the help of IoT devices. Treatment record data can be mined to explore ways to minimize the costs and provide better medicines [11].
6. **Smart Farming**: Precision farming is one of the most popular applications of IoT in agriculture which helps to monitor the growth of the plants, its productivity, to detect whether any diseases attack the crops, weather, wind speed and humidity

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prediction from previous data. It may be helpful to users like farmers or tourists before deciding their plans 12, 13].

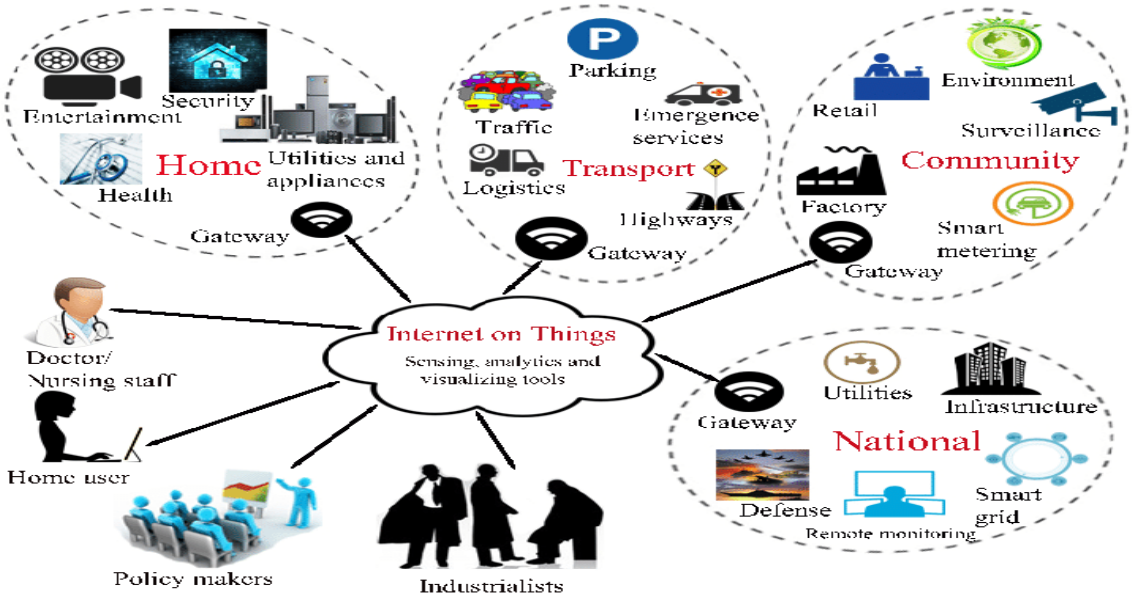

Fig 1 :- IoT Application [14]

V TECHNOLOGY ROAD MAP – INTERNET OF THINGS

In the longer perspective, the technology road map pattern of the Internet of Things comprises three steps.

1) Embedded Intelligence
2) Connectivity
3) Interaction

Firstly, all the actions can be executed automatically with the help of embedded intelligence. There are many application already using embedded intelligence. Few examples are flight management applications and other connected aircraft and rocket networks; the laundry machine regulator will allow the washer perform its operation automatically; drive controls and anti-lock braking systems for vehicles; semi-functional hands robotic weapons etc [15]. While all these tools are clever, they just operate on their own and locally. They are not capable of working in network.

And the next move is that any smart device should be connected. Smart machines are exhibitingsmartness not just because they are fitted with embedded intelligence and all behavior are human-designed but because they are linked in a network. The connection can be either wireless or wired. Wireless connection is crucial to the Internet of Things. There are several ways to link things dependent on established infrastructure like LAN, 3G, WiMax, RFID, ZigBee etc. Connecting smart things enables interaction.

Although the objects are linked to each other, objects do not interact on their own. Therefore new and intelligent things must be developed so that they can process information, organize, retain, fix and take independent decisions and eventually they play an important part in their own usages. Things can communicate and information can be shared by itself. Thus the communication process shifts from person to person to objects to objects. Since the Internet of Things is powered by technology, new enterprise solutions need to be built that will accelerate Internet of Things creativity and growth [16].

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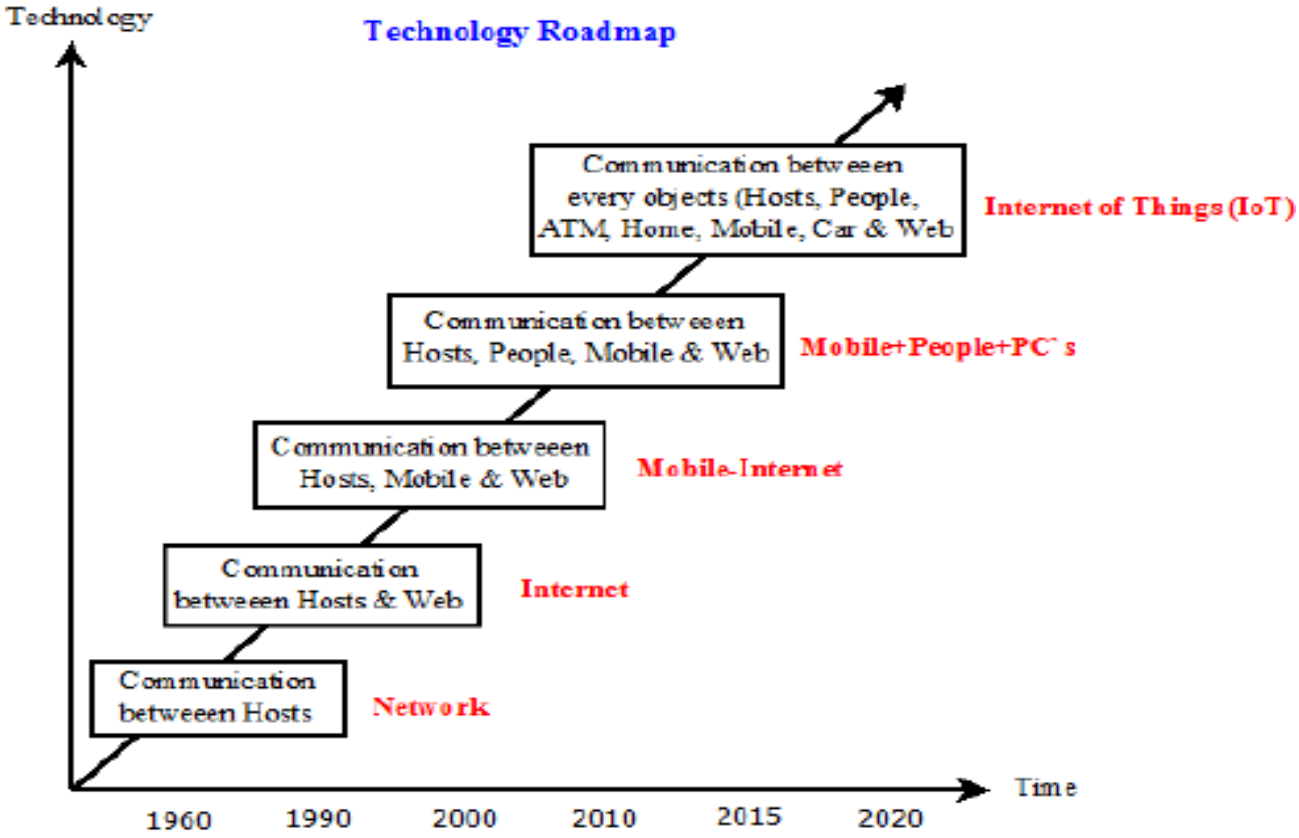

Fig 2:- Technology Roadmap of IoT [17]

VI FUTURE WORLD WITH IOT

The studies says that by 2025, more than 21 billion IoT devices will be in use. Most of the cities will become as "smart cities". The world must transform towards a sustainable resource management system, traffic movements, population behavior and quality of life.It includes the following

1) Smart cities and smart houses.
2) Taking data processing to next level
3) Revolutionize health care
4) Improved resource management.
5) Artificial Intelligence and Big Data
6) Innovations in agriculture sector.

VII CHALLENGES IN REACHING IOT EFFICIENCY

There are still big obstacles and risks those must be resolved before IoT will be a widespread deployment.

The general theme in the modern IoT environment is the creation of a number of solutions for individual applications. Such software frameworks have restricted compatibility between structures and technologies and are not compatible with IoT standardization and comprehension. In order to facilitate convergence and scalability, device implementations must be structured and applications must be made interoperable at various rates and on multiple platforms.

IoT utilizes methods and technologies for establishing the connection with physical objects. In order to improve IoT adoptions, the price of equipment needed to sustain to implement functionality such as detecting, monitoring and control frameworks in the coming years need to be reasonably cheap

When IoT is implemented, the data collected and processed would become massive. The privacy of these data would be the major concern. Data security and safety represent the key obstacle for persuading consumers to implement emerging technology. Security issues and data security are widely kept, particularly when device motion, behaviors and ongoing desires can be tracked through sensors. IoT applications must determine who manages the data and for how much time the data need to be managed.

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Currently, different companies use multiple criteria for their implementations. The usage of common interfaces between these various organizations is essential with multiple data sources and heterogeneous tools. It is especially relevant for applications promoted cross-agency and device boundaries.

The problem for IoT system deployment is that such devices may be falsified physically [18].

VIII CONCLUSION

The Internet of things arrives and takes people into a modern era where everything can be defined, linked, shared knowledge and determined about itself. Finally, the Internet of Things is the term through which the virtual environment of IT links to the physical world of things. The Internet of Things is a modern development in the Internet. Due to the much diversified area of operation and heterogeneity, the combination of various networks and embedded systems is a core research subject of the researchers of embedded, computing sciences and information technology.

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