International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395 -0056
Volume: 04 Issue: 06 | June -2017 www.irjet.net p-ISSN: 2395-0072

A Study on Internet of Things

Deepthi S[1]

[1]*M.Tech Graduate, Dept. of ECE, University of Kerala, Kerala, India.*

Abstract - *The Internet is a means of connecting a computer to any other computer anywhere in the world via dedicated routers and servers, which is continuously changing and evolving now. The main communication form of present Internet is human –to-human. The Internet of Things (IoT) can be considered as the future evaluation of the Internet that realizes machine-to-machine (M2M) learning. Thus, IoT provides connectivity for everyone and everything. The IoT embeds some intelligence in Internet connected objects to communicate, exchange information, take decisions, invoke actions and provide amazing services. It provides a new method of communication between all the things and the people, and also between the objects itself. IoT provides a different level of communication. This paper addresses the existing development trends, the generic architecture of IoT, its distinguishing features and possible future applications. The IoT is getting increasing popularity for academia, industry as well as government that has the potential to bring significant personal, professional and economic benefits.*

Key Words: IOT

1. INTRODUCTION

Internet of Things (IoT) is an ecosystem of connected physical objects that are accessible through the internet. The 'thing' in IoT could be a person with a heart monitor or an automobile with built-in-sensors, i.e. objects that have been assigned an IP address and have the ability to collect and transfer data over a network without manual assistance or intervention. The embedded technology in the objects helps them to interact with internal states or the external environment, which in turn affects the decisions taken.

The Internet of Things (IoT) provides connectivity for anyone at any time and place to anything at any time and place. With the advancement in technology, we are moving towards a society, where everything and everyone will be connected [1]. The IoT is considered as the future evaluation of the Internet that realizes machine-to-machine (M2M) learning [2]. The basic idea of IoT is to allow autonomous and secure connection and exchange of data between real world devices and applications [3]. The IoT links real life and physical activities with the virtual world [4].

The numbers of Internet connected devices are increasing at a rapid rate. These devices include personal computers, laptops, tablets, smart phones, PDAs and other hand-held embedded devices. Most of the mobile devices embed different sensors and actuators that can sense, perform computation, take intelligent decisions and transmit useful collected information over the Internet [5]. Using a network of such devices with different sensors can give birth to enormous amazing applications and services that can bring significant personal, professional and economic benefits [6].

The IoT consists of objects, sensor devices, communication infrastructure, computational and processing unit that may be placed on cloud, decision making and action invoking system [7]. The objects have certain unique features and are uniquely identifiable and accessible to the Internet. These physical objects are equipped with Radio-Frequency Identification (RFID) tags or other identification bar-codes that can be sensed by the smart sensor devices [6]. The sensors communicate object specific information over the Internet to the computational and processing unit. A combination of different sensors can be used for the design of smart services. The result of processing is then passed to the decision making and action invoking system that determines an automated action to be invoked.

The IoT is a hot research topic that is getting increasing popularity for academia, industry as well as government. Many European and American organizations and multinational companies are involved in the design and development of IoT to achieve different type of useful and powerful automated services [1]. The IoT has to face many challenges in its deployment especially in the field of security, governance and standardization.

2. IOT

IOT has been described or defined in various perspectives, thus IoT is explained in different ways. The main reason behind these many definitions is because of the two words "Internet" and "Things". Internet points towards a combination of networks and things mainly consist of generic objects. When the two words Internet and Things are combined it leads to whole new level of advancement in the ICT world.

The Internet has tremendously evolved in the last few years connecting billions of things globally. These things have different sizes, capabilities, processing and computational power and support different kind of applications [4]. Thus, the traditional Internet merges into smart future Internet, called IoT [1]. The generic scenario of IoT is shown in Fig. 1. The IoT connects real world objects and embeds the intelligence in the system to smartly process the object

specific information and take useful autonomous decisions [2]. Thus, IoT can give birth to enormous useful applications and services that we never imagined before [1].

With the advancement in technology, the devices processing power and storage capabilities significantly increased while their sizes reduced. These smart devices are usually equipped with different type of sensors and actuators. Also these devices are able to connect and communicate over the Internet that can enable a new range of opportunities [3]. Moreover, the physical objects are increasingly equipped with RFID tags or other electronic bar codes that can be scanned by the smart devices, e.g., smart phones or small embedded RFID scanner. The objects have unique identity and their specific information are embedded in the RFID tags. In 2005, the International Telecommunications Union (ITU) proposed that "Internet of Things" will connect the real world objects in both a sensory and intelligent manner. The things connect and communicate with other things that implement the same service type. The basic simplified workflow of IoT can be described as follows:

1) Object sensing, identification and communication of object specific information. The information is the sensed data about temperature, orientation, motion, vibration, acceleration, humidity, chemical changes in the air etc depending on the type of sensors. A combination of different sensors can be used for the design of smart services.
2) Trigger an action. The received object information is processed by a smart device/system that then determines an automated action to be invoked.
3) The smart device/system provide rich services and includes a mechanism to provide feedback to the administrator about the current system status and the results of actions invoked.

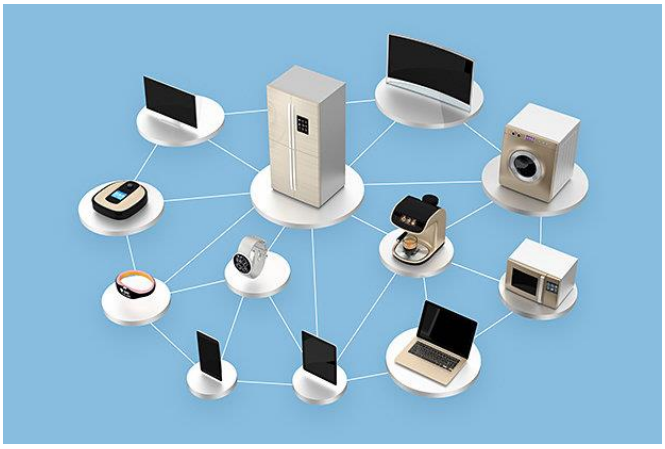

Fig -1: IOT General Structure.

Within 2020 the number of things connected to the internet will be about 50 billion.

The top applications of IoT include:

- Traffic monitoring
- Health
- Security
- Transport and Logistics
- Daily life and Domotics

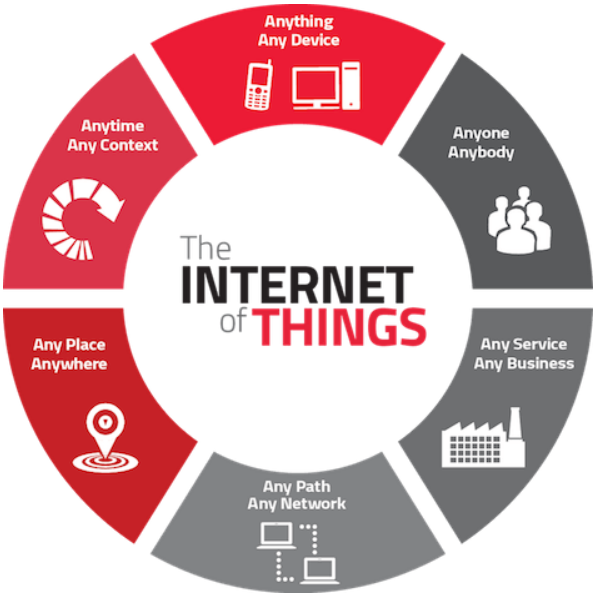

Fig -2: Scope of IOT.

3. ARCHITECTURE OF IOT

The general architecture of an IoT system is shown in Fig.3. There are mainly six layers in the architecture of IoT and are briefly described below:

1) **Perception Layer:** The Perception layer is also known as 'Device Layer'. It consists of the physical objects and sensor devices. The sensors can be RFID, 2D-barcode,or Infrared sensor depending upon objects identification method. This layer basically deals with the identification and collection of objects specific information by the sensor devices. Depending on the type of sensors, the information can be about location, temperature, orientation, motion, vibration, acceleration, humidity, chemical changes in the air etc. The collected information is then passed to Network layer for its secure transmission to the information processing system.

2) **Network Layer:** The Network layer can also be called 'Transmission Layer'. This layer securely transfers the information from sensor devices to the information processing system. The transmission medium can be wired or wireless and technology can be 3G, UMTS,Wifi, Bluetooth, infrared, ZigBee, etc depending upon the sensor devices. Thus, the Network

layer transfers the information from Perception layer to Middleware layer.

3) **Middleware Layer**: The devices over the IoT implement different type of services. Each device connects and communicates with only those other devices which implement the same service type. This layer is responsible for the service management and has link to the database. It receives the information from Network layer and store in the database.

4) **Application layer:** This layer provides global management of the application based on the objects information processed in the Middleware layer. The applications implemented by IoT can be smart health, smart farming, smart home, smart city, intelligent transportation, etc.

5) **Business Layer:** This layer is responsible for the management of overall IoT system including the applications and services. It builds business models, graphs, flowcharts etc based on the data received from Application layer. The real success of the IoT technology also depends on the good business models. Based on the analysis of results, this layer will help to determine the future actions and business strategies.

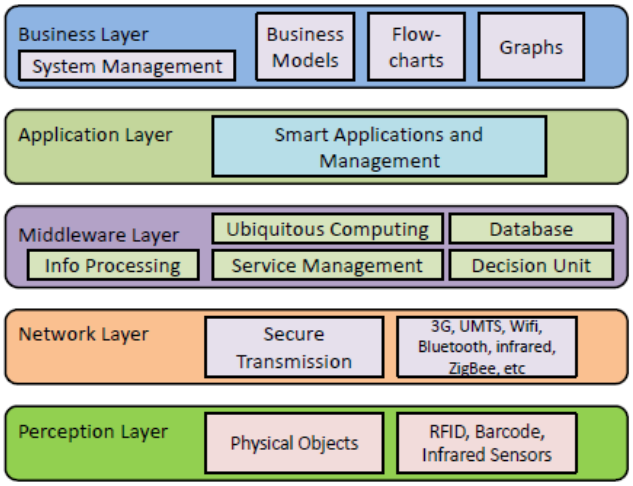

Fig -3: IOT Architecture.

4. CONCLUSION

This paper describes about a study on the emerging future form of Internet called "Internet of Things" that will connect everything and everyone. The IoT embeds intelligence in the sensor devices to autonomously communicate, exchange information and take intelligent decisions. Simply, IoT transitions human-human communication to human-human, human-device and device-device communication. This paper described briefly the evaluation of Internet, proposed the generic structure for IoT, described possible future applications. The IoT deployment could be hard and require large research efforts to tackle with the challenges but it can provide significant personal, professional and economic benefits in the near future.

REFERENCES

[1] J. Zheng, D. Simplot-Ryl, C. Bisdikian, and H. Mouftah, "The Internet of Things," in *IEEE Communications Magazine, Volume:49 , Issue: 11, pp:30-31*, 2011.

[2] Y. Huang and G. Li, "Descriptive Models for Internet of Things," in *IEEE International Conference on Intelligent Control and Information Processing (ICICIP)*, August 2010.

[3] T. Fan and Y. Chen, "A Scheme of Data Management in the Internet of Things," in *2nd IEEE International Conference on Network Infrastructure and Digital Content*, Sept. 2010.

[4] Y. Huang and G. Li, "A Semantic Analysis for Internet of Things," in *International Conference on Intelligent Computation Technology and Automation (ICICTA)*, May 2010.

[5] Q. Zhou and J. Zhang, "Research Prospect of Internet of Things Geography," in *19th International Conference on Geoinformatics*, June 2011.

[6] J. Li, Z. Huang, and X. Wang, "Countermeasure Research about Developing Internet of Things Economy," in *International Conference on E-Business and E - Government (ICEE)*, May 2011.

[7] Y. Yu, J. Wang, and G. Zhou, "The Exploration in the Education of Professionals in Applied Internet of Things Engineering," in *4th International Conference on Distance Learning and Education (ICDLE)*, October 2010.