Impact Factor (SJIF): 3.632

International Journal of Advance Research in Engineering, Science & Technology

e-ISSN: 2393-9877, p-ISSN: 2394-2444

(Special Issue for ITECE 2016)

OVERVIEW ON INTERNATE OF THINGS (IoT)

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Abstract — The Internet, is one of the great innovation among all the innovations. Now days, the Internet is basic requirement of every human beings. In today's world we can see different types of communication like human-human or human-device. By attaching the information with things (devices) and using the Internet we can achieve the communication between devices to devices. This paper's aim is to provide overview of Internet of Things (IoT) and it also describes six layered architecture of Internet of Things.

Keywords: Internet of things, IoT, IoT Architecture, IoT vision, IoT Application.

I. INTRODUCTION

With the recent advancement in technology a potential innovation, Internet of Things is coming down the road which is growing as a global computing network where everyone and everything will be connected to the Internet [1]. Internet of Things is growing rapidly and the possibilities it can form are infinites. The number of machines require internet services is increasing every day. The concept of allowing interaction between intelligent devices is a recent technology but the technologies composing the Internet of Things are goes back [2]. Internet of Thing is the approach of gaining data from different devices operated on different platform, and uniting them on any virtual platform existing [3]. Internet of things ages back to 1982 when a modified coke machine was connected to the Internet. It has an ability to report the numbers of drinks contained within and that whether the drinks were cold or not [4]. In 1999, Bill Joy passed information about machine to machine communication [5]. In 1999, Kevin Ashton suggested the term "Internet of Things" to describe a communication between devices with the help of the internet [6].

In the 2nd section vision of the IoT is described. In 3rd section IoT architecture is described. In 4th section IoT applications are described.

II. VISION OF INTERNET OF THINGS

ITU reported about a networking period in which all the networks are connected and everything will be a part of this huge network during 2005[7]. Imagine you lost your watch in your house and internet does the job for you for finding it. So it is basic vision of IoT, a platform where things connected with internet are able to talk with each other [8]. A practical implementation of IoT Twine, which is available on market. Twine is a low-power hardware working together with real-time web software to make IoT reality [9]. Different organizations have their own diverse visions for the IoT [10]. Network World published an article about IoT strategies of Information Technology sellers. HP has a vision, they want a world in which publics are always connected to their content. Cisco has a vision of an industrial automation. Intel has a vision of enabling billions of existing devices with intelligence. Microsoft consider IoT as an achievable technology; they believe it is already exists in recently developed powerful devices and the only thing is remaining is to connect this devices to the information. IBM believes in a world where remotely managing the devices via secured servers [11]. In spite of of having different objectives, they all come to an agreement about a network of interconnected devices, therefore lots of developments during the next decades are expected to be seen in the area of Internet of Things [12].

III. ARCHITECTURE OF INTERNET OF THINGS

More than 25,000,000,000 devices are expected to be interconnected by 2020 [13] which is a very large number so the current architecture of Internet with TCP/IP protocols [14], cannot manage a network as big as Internet of Things, hence to support that huge IoT network we need a new architecture that has an ability to handle various Quality of Service (QoS) and security issues in addition it has also capability of handling an existing network application [15]. Without addressing suitable privacy promise, Internet of Things is not expected to be approved by many [16]. Therefore security of data and isolation of users are crucial challenges for Internet of Things [17].

For advance growth of Internet of Things, a number of "*multilayered security architectures*" are proposed. Wang Chen has proposed a 3 level architecture of Internet of Things [18] while Hui Suo proposed a 4 level architecture [19]. Miao Wu has proposed a 5 layered architecture using Internet and Telecommunication management networks architectures based on TCP/IP and TMN models individually. Similarly a 6 layered architecture was also projected based on the network hierarchical structure [20]. So basically it has six Layers as shown in the Fig. 1.

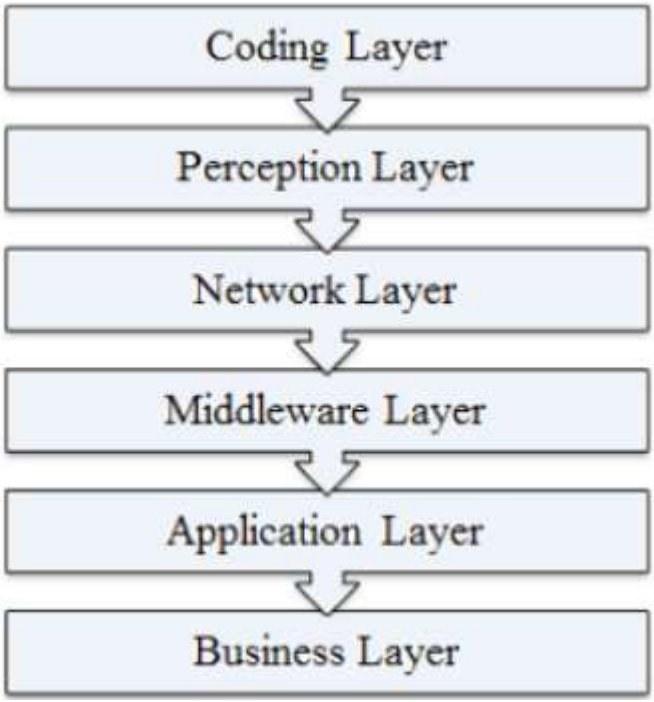

Figure-1 Six-Layered Architecture of Internet of Things

3.1 Coding Layer

Coding layer is the base of Internet of Things which gives essential identification to the devices that are part of Internet of Things. In this layer, each devices are assigned with "*unique ID*" which makes it easy to distinguish the devices [21].

3.2 Perception Layer

Perception layer of Internet of Things, which provides a physical meaning to each device. It consists of data sensors in different forms which could sense the humidity, temperature, location and speed of the device. This layer collects the information of the device from the sensor connected with them and translates the information into digital signals which is then delivered onto the Network Layer for advance action.

3.3 Network Layer

The objective of Network Layer is accept the useful information in the form of digital signals from the Perception Layer and transfer it to the processing systems in the Middleware Layer through the trans-mission mediums like Bluetooth, WiFi, Zigbee, WiMaX, 3G, GSM, etc with protocols like IPv6, IPv4, DDS, MQTT, etc [22].

3.4 Middleware Layer

Middleware layer processes the data expected from Network Layer [2]. It contains the technologies like Ubiquitous computing, Cloud computing which provides a direct access to the database to record all the essential information in it. Using some Intelligent Processing Equipment, the information is processed and a fully automated action is taken based on the processed results of the information.

3.5 Application Layer

Application layer recognizes the applications of Internet of Things for all types of production, based on the administered data. Applications promote the advance development of Internet of Things so this layer is very useful in the huge scale development of Internet of Things network [20]. The Internet of Things applications could be smart transportation, smart homes, smart planet etc.

3.6 Business Layer

Business Layer controls the services of Internet of Things and application and is liable for all the study related to Internet of Things. It makes different business models for different business strategies [1].

IV. APPLICATIONS

Most of the applications in today's world are smart but they are not capable of communicate with each other. By empowering those applications, they have a capability of communicate with each other and able to use shared information to create a large range of new innovative applications [23]. These developing applications with some self-directed capabilities would certainly advance the quality of our lives. A few applications are already available in the market [24], Google Car is one of the best IoT application in the market. It has a capability of a self-driving with real-time traffic, it also analyses a weather, road conditions and other information [25]. In future there is going to be a Hugh number of Internet of Things applications which will change our lives for better. In this section, few number of applications are described.

3.0.1 Smart Traffic System.

Now days, Traffic is a major problem part of a society therefore all the related problems associated with traffics must be analyzed. There must be a system that can improve traffic situation. The system can gain information related to traffic from devices, which has a capability of communicating with each other using the Internet [26]. For a smart traffic monitoring system, we need an accurate system for automatic identification of automobiles and other information related to traffic factors for which we need to have an IoT technologies [27]. The smart monitoring traffic system will provide a better experience by easing the congestion. It will also provide features like reporting of traffic accidents, theft-detection, less environmental pollution. The traffic lighting system will have a capability of weather adaption to save energy. People will have access to the information related to the parking space available in the city.

3.0.2 Smart Home.

IoT has a capability of providing solutions for Home security. By using this we will have an ability to control our home appliance remotely. By using this Iot application we will be able to save resources like energy, water, etc. It will also able to detect unauthorized activity which will prevent burglaries.

V. CONCLUSION

In near future there will be a lots of Internet of Things (IoT) applications which will have a great impact on our life. The IoT applications will range from smart home to smart healthcare with advance technology. In this paper we have focused on IoT Vision, IoT Architecture and IoT Applications. Hugh amount of research is carried out in this area. However we have not addressed the security concerns with IoT applications.

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