Internet of Things In Modern Era

Jaya Abarna.S[1], Dharini.A[2], Jeeva.M[3], Ashwini.M[4]
[1, 2, 3, 4] Dept of Information and Computer Technology
[1, 2, 3, 4] Sri Krishna Adithya College of Arts and Science, Coimbatore

Abstract- *IOT- INTERNET OF THINGS is an upcoming technology in the new era. IOT is the transformation of physical objects that surround us into an eco-system of information which will enrich our day to day lives. From refrigerators to parking spaces to houses, IOT is bringing more and more things into the digital world everyday. IOT will be a multi-trillion dollar industry in future. Internet of things is a new internet application which leads to an era of smart technology. It is based on thing-thing communication but not human-human communication. Here steps are taken without human intervention. Internet of things refers to the product's information. The Internet of Things is considered as the Third Wave of Information Technology after internet and mobile communication network. Hence this paper gives a detailed analysis of Internet of Things (IOT) and its applications and enabling technologies for IOT. It emphasizes the fact that objects are connected over the internet rather than human beings.*

Keywords- Internet of Things, Connected devices or Smart devices, Smart Homes, Sensors, Controllers, Actuators, Smart Cities.

I. INTRODUCTION

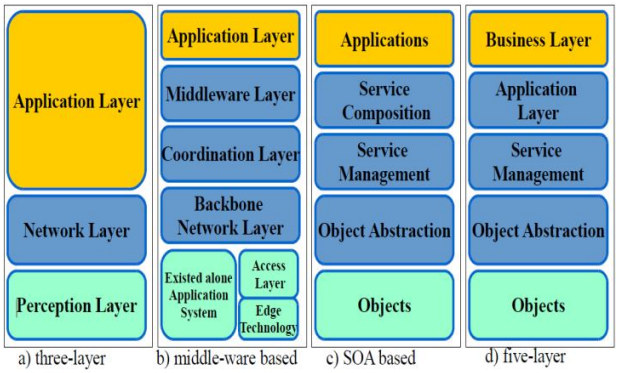
The term INTERNET OF THINGS was coined by Kevin Ashton of Procter & Gamble, later MIT's Auto-ID Center, in 1999. The term Internet of Things (IOT) refers to the use of internet protocols for interaction between human to things or things to things in an embedded network. It is a system of interrelated computing devices, digital machines, objects, people and animals that has the ability to transfer data over a network without the help of human to human or human to computer interaction. They are provided with unique identifiers. IOT is argumented with sensors and actuators. This way of connecting the physical world with cyberspace led to internet being called as "Internet of Things". It simply means that powerful information will be at our fingertips. IOT changes the connectivity view from "any-time, any-place" for "any-one" into "any-time, any-place" for "any-thing". These things once connected to the internet provide beneficial to the society and environment. Experts estimate that the IOT consist of about 30 billion objects by 2020. It is also estimated that the global market value of IOT will reach $7.1 trillion by 2020. This paper discusses the growth of IOT.

II. HISTORY

The concept of a network of smart devices was discussed as early as 1982, with a modified Coke machine at Carnegie Mellon University becoming the first internet connected appliance. Between 1993 and 1996 several companies proposed solutions like Microsoft's at work or Novell's NEST. However only in 1999 did the field start gathering momentum? Bill Joy envisioned Device to Device communication as part of his "Six Webs" framework, presented at the World Economic Forum at Davos in 1999. The concept of the Internet of Things became popular in 1999, through the Auto-ID Center at MIT and related market-analysis publications. If all objects and people in daily life were equipped with identifiers, computers could manage and inventory them. The thought model for future interconnection environment was proposed in 2004.

III. IOT ARCHITECTURE

Common architectures are the 5 layer model. Object layer, object abstraction layer, service management layer, application layer, business layer are the 5 layers of this 5 layer model. Here we provide a brief explanation on these 5 layers:



1) Object Layer: This is the first layer. It is also called as perception layer. It represents the physical sensors of the IOT that aim to collect and process information. This layer includes different functions such as querying location, weight, temperature, motion, vibration, acceleration, humidity, etc. The big data created by the IOT are initiated at this layer.

2) Object Abstraction Layer: This layer transfers data produced by the objects layer to the service management layer through secure channels. Data can be transferred through various functions like cloud computing. Data management processes are handled at this layer.

3) Service Management Layer: Service management is also called as middleware layer. It pairs a service with its requester based on names and addresses. This layer processes received data, makes decisions, and delivers the required services over the network wire protocols.

4) Application Layer: The application layer provides the services requested by the customers. The importance of this layer for the IOT is that it has the ability to provide high quality smart services to meet customer's needs. It covers numerous vertical markets such as smart home, transportation, smart healthcare, smart building and industrial automation.

5) Business Layer: This layer manages the overall IOT system activities and services. This layer builds a business model, graphs, flowcharts, etc based on the received data from the application layer. Monitoring and management of the underlying four layers is achieved at this layer. This layer compares the output of each layer with the expected output to enhance services and maintain user's privacy

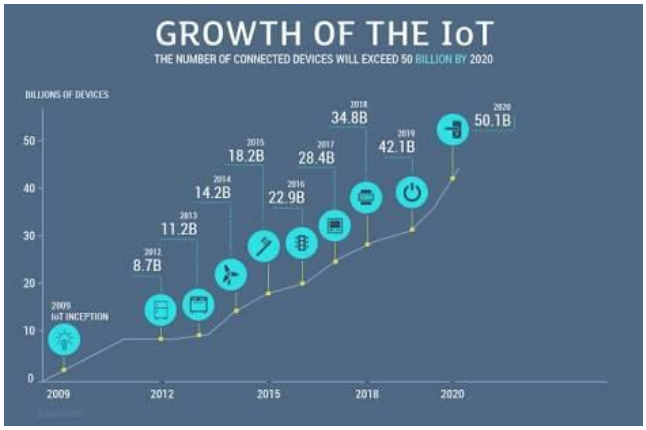
IV.CLOUD COMPUTING FOR THE IOT

IoT CLOUD PLATFORMS AND THEIR CHARACTERISTICS

Platform	Gateway	Provision	Assurance	Billing	Application Protocol			
					REST	CoAP	XMPP	MQTT
Arkessa	-	+	+	-	+	-	-	+
Axeda	+	+	+	+	+	-	-	-
Etherios	+	+	+	-	+	-	-	-
LittleBits	-	-	-	-	+	-	-	-
NanoService	+	+	+	-	+	+	-	-
Nimbits	-	-	-	-	+	-	+	-
Ninja Blocks	+	-	-	-	+	-	-	-
OnePlatform	+	+	+	-	+	+	+	-
RealTime.io	+	+	-	-	+	-	-	-
SensorCloud	+	+	-	-	+	-	-	-
SmartThings	+	+	-	-	+	-	-	-
TempoDB	-	-	-	-	+	-	-	-
Thingworx	-	+	+	-	+	-	-	+
Xively	+	+	+	+	+	-	-	+

Cloud computing (CC) offers a new management mechanism for big data that enables the processing of data and the extraction of valuable knowledge from it. Employing Cloud computing for the IOT is not an easy task due to the following changes: Synchronization, Standardization, Balancing, Reliability, Management, and Enhancement. Nimbits is an open source platform as a service (PaaS) that connects smart embedded devices to the cloud. It also performs data analytics on the cloud, generates alerts, and connects with social networks and spreadsheets. It connects to websites and can store, share and retrieve sensors data in various formats including numeric, text based, GPS, JSON or XML. The core of nimbits is a server that provides RESET web services for logging and retrieval of raw and processed data.

V. GROWTH OF IOT



Internet has been part and parcel of the social animal's life. It's a huge space of information and people. The internet first evolved as "internet of computers". It is a global platform where many services like the World Wide Web could be implemented on top of it. It was an era of information exchange. As the days passed by, people started emerging into the internet- "Internet of people". Many social websites came into picture which kept people connected all the time. This has led to internet being filled with people rather than information. On the other hand, technology has been advancing day by day and simultaneously. An era of "Mobicomp" (mobile computing) had begun. Mobile helped man to be always connected to the internet on the move. Nowadays 3G and 4G mobile internet connections have led to faster internet access and deliver better quality in video calls. Wireless technologies and mobile computing have become cheap and have gained more popularity. Hence a new computing had emerged-ubiquitous computing. This computing focuses on smart, intelligent space and minimal user involvement. Advancement in technology led to mobile and other hand-held devices to diminish in size. Smart phones, IPads, tablets and notebooks

replaced ordinary mobiles and PCs. Hence there was a change in the device with which people access the internet. This inturn resulted in sophisticated features being configured in devices such as sensor, global positioning system (GPS) and actuators. In such a scenario devices were not only connected to the internet but also sense, compute and perform intelligent tasks. The way of connecting physical world with internet with the help of smart devices is then termed as "Internet of Things". It connects the physical object in an intelligent way. The objects are read through sensors and RFID reader and uploaded into the internet. The physical objects may be anything from smart phone to the objects at home. Therefore IOT has its roots from ubiquitous computing, mobile computing and information technology.

VI. APPLICATION

1) Agriculture: The IOT contributes significantly towards innovating farming method. Farming challenges caused by pollution growth and climate change have made it one of the first industries to utilize the IOT. The integration of wireless sensors with agricultural mobile apps and cloud platforms help in collection vital information pertaining to the environment conditions such as temperature, rainfall, humidity, wind speed, pest infesting, soil humus content or nutrients, besides others – linked with a farmland, can be used to improve and automate farming techniques, take informed decisions to improve quality and quantity, and minimize risks and wastes. The app-based filed or crop monitoring also lowers the hassles of managing crops at multiple locations.

2) Environmental Monitoring: This application of the IOT typically use sensors to assist in environmental protection by monitoring air or water quality, atmospheric or soil conditions, and can even includes areas like monitoring the movements of wildlife and their habitats. Development of resources-constrained device connected to the internet also means that other application like earthquake or tsunami early-warming systems can also be used by emergency services to provide more effectives aid. IOT brings to wireless sensing will revolutionize this area.

3) Medical and Health Care: IOT device can be used to enable remote health monitoring and emergency notification systems. This health monitoring device can range from blood pressure and heart rate monitors to advanced device capable of monitoring of specialized implants, such as pacemakers, fit bit electronic wristbands, or advanced hearing aids. Some hospitals have begun implementing "smart beds" that can detect when they are occupied and when a patient is attempting to get up. It can also adjust itself to ensure appropriate pressure and support is applied to the patient without the manual interaction of nurses. Healthcare in the past, decision making was merely based on doctor's personal experiences, domains knowledge patient's physical signs and symptoms and diagnostics laboratory reports. Most of the time, due to negligence of hospital staffs, excessive number of patients or inattentiveness of relatives it may happen that saline bottle is not monitored properly and it may lead to cause heart attack due to AIR EMBOLISM. Here the device from the patient send the information to the cloud and the device in the hospital fetch the data from the cloud, if any changes occur in patient's body immediately the information is sent to the hospital and they provide ambulance to the particular spot and starts the treatment. This saves many lives.

4) Transportation: Digital variables speed-limit sign. The IOT can assist in the integration of communication, control, and information processing across various transportation systems. Application of the IOT extends to all the aspects of all transportation system. Dynamic interaction between these components of all transport system enable inter and intra vehicle communication, smart traffic control, smart parking, electronic toll collection systems, logistics toll fleet management for example, the IOT platform can continuously monitor the location and condition of cargo and assets via wireless sensor and send specific alerts when management expectations occur (delays, damages, thefts, etc.)

V. CONCLUSION

The emerging idea of the internet of thinks (IOT) is rapidly finding its path throughout our modern life. It is aiming to improve the quality of life by connecting many smart devices, technologies, and applications. Overall, the IOT would allow for the automation of everything around us. This paper presented an overview of IOT and its architecture, growth, applications, this in turn, should provide a good foundation for research and practitioners who are interested to gain an insight into the IOT technologies and protocols to understand the overall architecture and role of the different components and protocols that constitute the IOT. Moreover, the interplay between the IOT, cloud computing has been discussed. We finally presented the need for new- smart autonomic management, data aggregation, and protocol adaptation services to achieve better horizontal integration among IOT services. Finally a detailed view on IOT is presented.

REFERENCE

[1] Mehdi mohammadi, Internet of things: A survey on enabling technologies, protocols and applications, Western Michigan University.
[2] Mohammed aledhari, Internet of things: A survey on enabling technologies, protocols and applications, Western Michigan University.
[3] Luigi Atzori, The internet of things: A survey, university deglistudidi Cagliari.
[4] Antonio lera, the internet of things: A survey, Mediterranean university of Reggio Calabria.
[5] Giacomomorabita, The internet of things: A survey, university of Catania.
[6] Yinghui Huang, Guanyu Li, "Descriptive models for Internet of Things", InternationalConference on Intelligent control and Information Processing August 2010- Dalian, China.
[7] DaqiangZhang, Laurence T. Yang, Hongyu Huang, "Searching in Internet of Things: vision and challenging", ninth IEEE International Symposium on parallel and distributed processing with applications, 2011.
[8] YinghuiHuang, Guanyu Li "A semantic Analysis for internet of things", international conference on intelligent computation technology and automation, 2010
[9] LuTan, Neng Wang, "Future Internet: The Internet of Things", 3rd international conference on Advanced computer theory and Engineering (ICACTE), 2010.
[10] Astudy on Internet of Things based applications, Deeksha Jain, P.Venkata Krishna and V.saritha, VIT University, Vellore, TN, India.