A Survey on the Internet of Things Security Challenges and its Application

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***Abstract*:-**The Internet of Things in simple words can be described as the network of real or virtual objects or things embedded with electronic components such as sensors, software and network connectivity, which enables these objects to collect and exchange data, thus providing connectivity at anytime, anyplace for anything..This survey paper study will give good for the new researchers, who will doing research in this field of Internet of Things and facilitate knowledge accumulation in efficiently. This paper also forecast the security challenges and various applications, associated with the development of IoT.

Keywords:*cloudcomputing,iot,m2m,rfid etc.*

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I. INTRODUCTION

Information Technology is Internet of Things . The future is Internet of Things, which will transform the real world objects into intelligent virtual objects. Internet of things encourages communication and integration of physical objects interact with each other and people to automate tasks and improve efficiency. The IoT aims to uniquely everything in our world under a common infrastructure, only not control of things around us, but also keeping us informed of the state of the things. The main objective of this paper is to provide an overview of Internet of Things, architectures, and virtual technologies and their usages in our daily life The Internet of Things (IoT) is rapidly evolving. The next generation wave in the era of computing will be virtual and the real world . In the Internet of Thing (IoT) architecture consist of many of the objects that surround us will be on the network in one for more another. Radio Frequency Identification and sensor both the network technologies will new challenge in which information and communication systems . This results in the generation and large amounts of data be stored, processed and converted in a seamless effective and easily display form. The Internet of Things express as connecting things to the Internet and using that connection to control of those things. Understanding Internet of Things has enormous breadth that can be difficult . But it can be broken up into five key such as Connected Wearable Devices, Connected Cars, Connected Homes, Connected Cities, and the Industrial Internet. The numbers of Internet connected devices are increasing at the rapid rate. These devices include personal computers, laptops Many of the mobile devices embed different sensors and actuators that can sense, and perform computation take decisions and transmit essential collected information over a network .Using a network of such devices with different sensors can give birth of new technology to create enormous amazing applications and services that can used personal, professional and economic benefits [6]. IoT can help organizations reduce cost through improved process efficiency, asset utilization and productivity. The growth and convergence of data, processes and things on the internet would make such connections more opportunities for people, businesses and industries.

II. LITERATUER SURVEY

CLOUD COMPUTING

IOT enables to connects devices and sensors to create new and innovative applications. These applications are a reliable, elastic and agile. Cloud computing is one of the enabling platforms to support IOT. Cloud computing is seeing growing adoption cloud service models name as Cloud Software as a Service (SaaS), Cloud Platform as a Service (PaaS) and Cloud Infrastructure as a Service (IaaS).For example, in IaaS, the use of hardware devices such as sensors and actuators . PaaS can provide a platform from which to access IOT data and on which custom IOT applications .SaaS can be software as a service provided on top of platform such as PaaS solutions to offer the provider's own SaaS platform for specific IOT domains[16].

WIRELESS FIDELITY (Wi-Fi)

Wireless Fidelity (Wi-Fi) is a networking technology these technology allows computers and other devices to communicate over a wireless signal. The first wireless products were brought on the market under the name Wave LAN with speeds of 1 Mbps to 2 Mbps. Today everywhere used Wi-Fi that delivers the high speed Wireless Local Area Network (WLAN) connectivity to offices, homes, and public locations such as hotels, cafes, and airports. Now a days used the integration of Wi-Fi into notebooks and Consumer Electronics devices has accelerated and used in various devices[24]. Technology contains any type of WLAN product and used one of the IEEE 802.11 together with dual-band, 802.11a, 802.11b, 802.11g and 802.11n.

NEAR FILED COMMUNICATION (NFC)

Near Field Communication technology specially used for a short range wireless technology and operated at 13.56 MHz and requiring a distance of 4 cm. NFC technology makes life easier and more convenient for consumers around the world by making it simpler exchange digital content one location to another location and connect electronic devices with a touch. That allows intuitive initialization of wireless networks and NFC is complementary to Bluetooth and 802.11 with their long distance and capabilities at a distance up to 10 cm. It also works in dirty environment, does not

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require line of sight, hence easy and simple connection method used for device connectivity.

WIRELESS SENSOR NETWORKS (WSN)

A WSN is a wireless network consisting of distributed autonomous devices using sensors to cooperatively monitor control with the help of attribute such as temperature,sound, vibration, pressure, motion and pollution at different locations. A WSN is an important element in IoT paradigm. Sensor nodes may not have global ID because of the large amount of overhead and large number of sensors. WSN based on IoT used in many area such as military, home and security, healthcare, precision agriculture monitoring, manufacturing, forest fire and flood detection and so on [2].

INTERNET PROTOCOL VERSION 6 (IPV6)

IPv6 is the next generation Internet based addressing protocol that is used to replace IPv4. With IPv6, there are approximately 3.4×1038 means 340 trillion and unique IPv6 addresses, allowing the Internet to continue to grow and innovate. The huge number of connected devices 50 billion IPv6 can be used to generate address all these devices and systems eliminating the need of network address translation and promoting end-to-end connectivity and control.

III RELATED WORK

NEED

- To increase their safety or the safety of their family members.
- To make it possible to execute certain activities in a more convenient.
- To generally improve life-style
- To decrease the cost of living
- To ensure public safety
- To protect the environment

SCOPE

.Scope of IOT will future potential possibilities and issues how would it bring change in the lives making it better and better. More people would be connected through the world. The world is going to become a much better place to live with more and more communication with everyone across the world. Commute and connectivity would become easier[17].

VISION

To improve human health and well-being is the ultimate goal of any economic, technological and social development. The rapid growth of population is one of the macro powers that will transform the world healthcare systems all over the world and the emerging technology breakthrough of the Internet-of-Things shown in Fig 1

1 Things oriented vision
2 Internet oriented vision
3 Semantic oriented vision

Fig 1 Vision of IOT

Market Trends

In today's IT industry and private companies are staying competitive by adopting new technologies, automate a new innovating services to increase productivity and save costs.

Technology Trends

Several technology trends will help TO shape IOT. Such as RFID technologies, Internet Protocol version Six improvements in communication throughput and real-time technologies such as cloud technologies and security.

EVALUATION OF INTERNET OF THINGS

The IoT consists of various different such as objects, sensor devices, communication infrastructure, computational The Internet is an emerging technology evolved in the last few years connecting billions of things globally. These things are different capabilities, processing and computational power and support different kind of applications [4]. Traditional Internet merges into smart future Internet, called IoT [1].

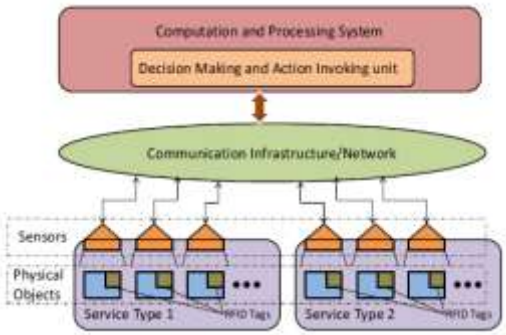

Fig 2 IOT Basic Architecture

The Basic scenario of IoT is shown in Fig. 2. 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]. The objects have a certain unique features and are used uniquely identifiable and accessible to the Internet. These physical objects are equipped with 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 types of sensors that can be used for the designing of smart services.

IOT ARCHITECTURE

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One of the main problems with the IoT is that it is so vast and such a broad concept that there is no proposed, uniform architecture. In order for the idea of IoT to work, it must consist of an assortment of sensor, network, communications and computing technologies, some of IoT architectures or models are given by several researchers ,authors and practitioners

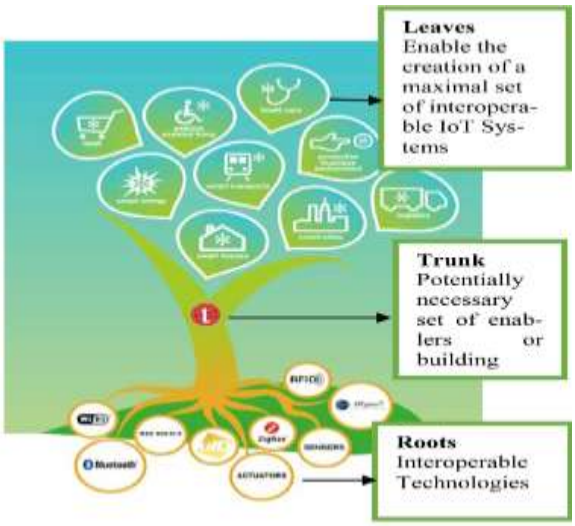

Fig 3 IOT Hierarchy

IOT Architecture

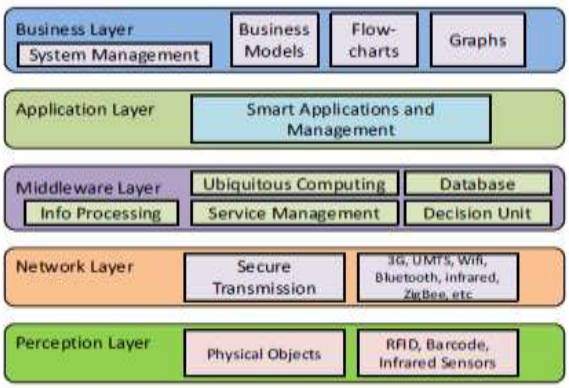

Fig 4 IOT Architecture

Proposed Architecture of IoT is divided into five layers as shown in Fig. 4. These layers are briefly described below:

1) **Perception Layer**: The Perception layer is also some time known as‘ Device Layer’. It consists of the physical objects and sensor devices. The sensors can be either RFID, barcode and Infrared sensor depending upon objects identification method. The collected information is then passed to Network layer for its secure transmission to the information processing system.

2) **Network Layer**: The Network layer some time known as a ‘Transmission Layer’. By using this layer securely transfers the data 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 etc depending upon the sensor devices[18].

3) **Middleware Layer**: In this layer 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 establish connectivity with the database. It receives the information from Network layer and store in the database. It performs information processing and computation that takes automatic decision based on the results[18].

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[18].

APPLICATION OF IOT

Fig 5 Applications of IoT

IV APPLICATIONS

The IoT applications can be used in almost of our daily life. Below are some of the examples. Fig 4 shows applications

1**) Natural disasters** : The combination of sensors and their autonomous coordination and simulation will help to predict the occurrence of land other natural disasters and to take appropriate actions in advance.

2) **Industry applications**: The type of applications in industry e.g., managing a fleet of cars for an organization. The IoT helps to monitor their environmental performance and process the data that need maintenance.

3) **Water Scarcity monitoring**: The IoT can help to detect the water levels at different places. The networks of sensors, tied together with the relevant simulation based activities is used to monitor long term water interventions .

4) **Design of smart homes**: The IoT can be help to design smart homes e.g., energy consumption and detecting emergencies, home safety and finding things easily for home security etc.

5) **Medical applications**: The IoT can used in medical sector for saving living and also improving the quality of life example monitoring health parameters, monitoring medicines etc.

6) **Agriculture application**: A network of different sensors can sense data, perform data processing and inform the farmer through communication channel e.g., mobile phone text message about the portion of land that need particular attention.

This may be include packaging of seeds, fertilizer and pest control mechanisms that respond to specific local conditions and indicate actions.This will significantly increase the

agricultural productivity by avoiding the inappropriate farming conditions.

7) **Intelligent transport system design**: The Intelligent transportation system will be used to control transportation using advanced technology of sensors, information and network. The intelligent transportation can have many interesting features such electronic highway toll, mobile emergency command and scheduling, transportation vehicle rules, reducing environmental pollution, anti-theft system, avoiding traffic jams, reporting traffic incidents, minimizing arrival delays etc

8**) Design of smart cities:** The IoT can help to design smart cities e.g., monitoring air quality, discovering emergency routes, efficient lighting up of the city, watering gardens etc.

9) **Smart metering and monitoring**: The IoT design for smart metering and monitoring will help to get accurate automated meter reading and issuance of invoice to the customers. The IoT can also be used to design such scheme for wind turbine maintenance and remote monitoring, gas, water as well as environmental metering and monitoring.

10) **Smart Security***:* The IoT can also find applications in the field of security and surveillance e.g., surveillance of spaces, tracking of people and assets, infrastructure and equipment maintenance, alarming etc.

SECURITY CHALLENGES

The rapid growth of small Internet connected devices as the Internet of Things. Security and privacy in the Internet of Things. One of these challenges has to do with DDoS of attacks in a distributed architecture hackers to hijack unsecured network devices such as sensors and routers and using them as bots to attack third parties.

V CONCLUSION

In This Survey Paper study various challenges and weaknesses of IoT technology use everyday life IoT has been turn helps to making our life simpler and more comfortable, though various technologies and applications. There are various areas used IoT applications into all the domains including medical, manufacturing, industrial, transportation, education, governance, mining, habitat etc. Technologies are varying from vendor-vendor, so needs to be interoperable.

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