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Involvement of Latest technologies In IoT

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ABSTRACT: Internet of things is always developing field for sharing data and communication and from this present reality objects such as Actuators, RFIDs, Sensors, Machines etc. whereas each object has a one of a kind framework for data sharing, data processing and communication. IOT inserts splendor in inside connected objects for decision making, communication, giving serviceability according to the need and sharing information. Nowadays, millions of things as objects are associated together employing various mediums, produces data with various formats and follows the various models to offer the various services. In this way, the architecture heterogeneity, network protocols employed objects or things and data produced by objects or things prompts the few problems like privacy and security issues, complexity in network, standardization, scalability etc. This paper demonstrates the brief concept regarding different challenges and issues of IOT and prompting technologies that could be connected with IOT for providing the solution of these issues.

KEYWORDS: Internet of things, Network layers of IOT, Privacy, Security.

I. INTRODUCTION

Modification is only one thing in this world which is constant. Smaller modification in technology changes the life of humans and its way of life. E.g. in previous years ago, there were no devices of telephone, individuals were employed to share information or to communicate with one another through letters. At the point when the telephone invention was successful, life of human has changed. Individuals can convey effectively from their home and afterward comes the mobile phone invention, by which individuals can communicate with one another from anyplace. In the same manner, nowadays to make life comfortable and easier of humans, a latest emerging technology in this period is Internet of Things (IOT). The technology name itself speaks that it is employed to bind the various things ultimately to offer huge level of services for the business and society[1]. Therefore, IOT provides a stage to devices not exclusively for communicating with one another yet, in addition, facilitate to perform computation, sense and process at whenever from anyplace through connecting the various devices with one another.

IOT provides various type of applications such as smart transportation, smart home, smart parking, smart city etc. that can be employed in various areas for e.g. agriculture, factory, home automation, transportation, healthcare, etc. IOT offers numerous advantages and makes life of human more comfortable and easier yet it likewise expands numerous challenges with the development of associated devices in network. Expanding associated devices rates prompts consumption of energy which increments the CO2 emission in environment, connectivity issues, privacy and security of shared information, standardization of various devices, network complexity, heterogeneity of information, interoperability of associated devices manufactured by various communication protocols and firms employed by them, etc. which gives guidance for numerous researchers for working to it[2]. This paper is sorted out in a few segments in which it includes architecture of IOT and its basics, present challenges and issues of IOT, solutions of main challenges and finally it concludes the paper.

ISSN- 2394-5125 VOL 7, ISSUE 1, 2020

II. OVERVIEW OF IOT

IOT can be characterized like a worldwide network of physically associated machines or devices that could communicate with one another. According to the definition, IOT is nothing yet associated things or objects that coordinates with one another to provide the intelligent services without involvement of human. Internet scope is extended by IOT. Nowadays, internet scope disguises the connection among computer devices and computing while IOT grows this for interconnecting physical objects or various things [3]. These physical things or objects can be whatever it sees around itself such as air conditioners, lights, fans, etc. These physical objects or things are fitted with information technology, embedded electronics, embedded systems, so it have fundamental computing stage in them, connected to them and afterward these are going about as various nodes of that specific internet in which nodes communicate with one another and share data for performing specific errand[4]. This is the means by which IOT works basically.

In view of associativity and sharing of information among various nodes. Basic IOT workflow is appeared in Fig.1. Objects associated with another object communicate for providing same type of service. Physical objects are sensed or recognized by sensors. The sensors sense various parameters such as pressure, temperature, light, etc. based on sensor being employed. The sensed data will be send over the network or over the connected system that data will be transmitted, it can likewise include cloud lastly, the data is passed dependent on which one has been sensed dependent on the needs, a few physical activity captured by an actuator.

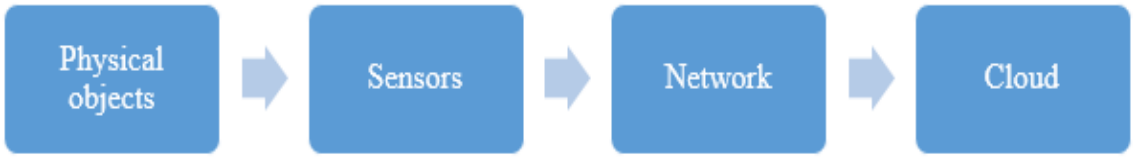

Fig. 1: Basic system of IOT.

Fig. 2 (1) depicts the summed up 3 layer architecture of the IOT which demonstrates the IOT methodologies[5]. "International Telecommunication Union" prescribes 5 layer architecture of the IOT as appeared in Fig. 2(b). Researchers proposed to partition the architecture of IOT, system of IOT into 3 main layers such as service layer, perception layer and network layer. The perception layer gathers information from physical objects. In the architecture of 3 layer, network layer is presumed for providing the connectivity between application layer and perception layer.

It securely or safely transfers information to application layer from perception layer. Be that as it may, in the architecture of 5 layer access gateway layer involved which is employed for providing connectivity between network layer and perception layer[6]. It deals with the communication systems and objects and also in the environment of IOT. There is also one modification in the architecture of 5 layer is Middleware layer that provides progressively flexible interface between equipment and applications.

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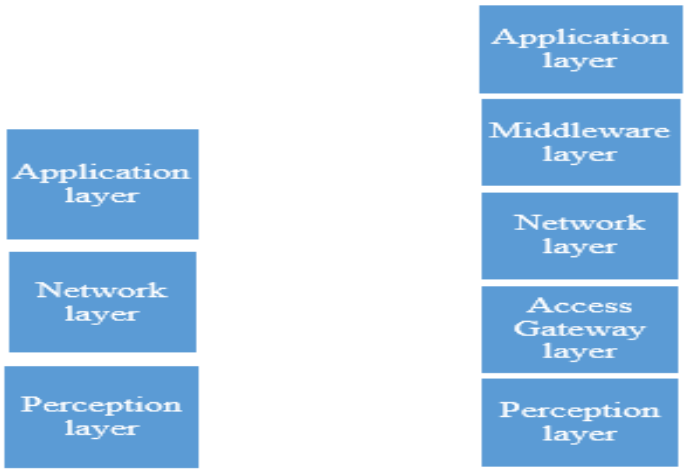

Fig. 2: IOT Layered Architecture

a) 3-Layer Architecture b) 5-Layer Architecture

The upper application layer gives applications or services that examines the data which received from rest of the layers. The factors like privacy & security, networking & communication, intelligence of devices, scalability, data processing, business modelling must be involved at designing time of the IOT architecture in Fig. 4. The idea of IOT should look like that it provides interoperability, respectability, portability, versatility, measured quality, security. SOA is a Service Oriented Architecture which considered as a better approach to manage accomplishes all of the characteristics recorded already[7]. It can in like manner address SOA of IOT shown in fig. 4 in 4 layered architecture shown in fig.3.

Fig. 3: IOT 4 Layered Architecture

❖ **Sensing layer**

In this layer, wireless or wired or remote systems with RFID and sensors tags can share information and sense among the various devices. In perspective on the application, distinctive sensors or labels are employed for sensing objects and sharing of information[8].

ISSN- 2394-5125 VOL 7, ISSUE 1, 2020

❖ **Network layer**

The second layer which is Network layer also known as Transmission Layer. The key job of transmission layer for connecting everything with each other[9]. It is also capable for data sharing among the various devices because of providing the availability and employed to exchange the data to the data processing from the sensor.

❖ **Service layer**

This Layer is responsible for coordinating applications and services in IOT and consists the middleware technologies. It consists of service APIs, service integration, service management, service discovery[10]. This layer moreover forms every service located issues, involving web index, data sharing, communication, data handling.

❖ **Interface layer**

With the help of this layer, user can communicate with the IOT. Just like IOT is inter association between anything and it gives various kinds of communication for e.g. machine to people, machine to machine, machine to application, etc. Along these lines, this layer has significant impact in SOA of the IOT. As it as a whole realize that numerous devices is associated in the IOT and these devices are presumably manufactured by the various organization so it doesn't adhere to a similar standard or protocol[11]. For this situation, there can be issue emerge while information exchanging and while communicating with the various devices. These types of problems are taken care of by this layer. Finally, process analysis is done for evaluating the process as explained in figure 4.

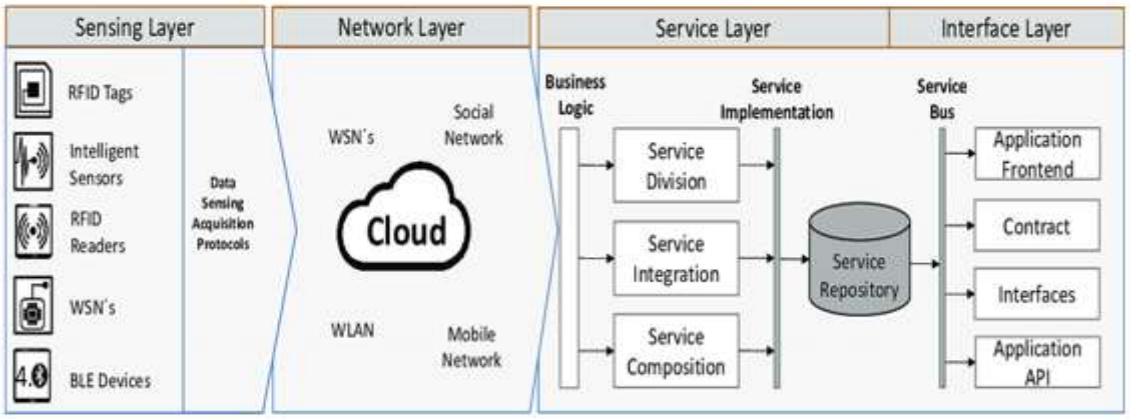

Fig. 4: IOT Based Service Oriented Architecture

III. CHALLENGES AND ISSUES OF IOT

Standardization

The ISO is an "International Organization for Standardization" resulted from the investigations directed by them in most recent ten years that the standards are important for economical and organizational improvement of any type of businesses that utilizes developing technologies. It concentrates on environment friendly policies, quality and safety. It disperses awareness among users with respect to potential risks because of the utilization of inconsistent methods for management and production[12]. In IOT evaluation, standards are the main challenges. Also, because of the deficiency of IOT devices standardization another issues such as interoperability increases, consequences of network assets and security. Henceforth, IOT devices standardization, architecture and objects are fundamental part for achievement of IOT frameworks.

Privacy And Security

Privacy and security are significant part of the IOT. It is needed to secure different IOT network activities for e.g. storage, personal, data processing and transportations activities. The principle 3 security objectives are Confidentiality, Integrity and Authentication should be engaged for providing overall privacy and security.

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Security of IOT must be employed at all the IOT architecture layers such as middleware layer, perception layer, application layer, network layer. Because of this explanation, evolvement of security IOT architecture and development of various privacy and security mechanism is as yet needed to resolve privacy and security issues[13]. Authentication is the significant part of the IOT ecosystem and it must be actualized at every IOT layer architecture to provide entire security. For secure data transmission among numerous devices, authentication encourages the IOT devices for making secure the communication device identity.

Thus, deficiency of implementation of efficient and appropriate authentication mechanism at every layer of the IOT system may prompt a few potential attacks. On the network, confidentiality is likewise empowered for secure communication of message among devices. Encryption techniques or control mechanism must be implemented to provide confidentiality. During the transmission, integrity and privacy of information must guarantee that information ought not to be changed in any case. During transmission of message on the network, data injection will modify entire data.

Interoperability

Analysis says that expanding rate of devices would be more than 55 billion in closer future that would be broad issue of present scenario of the IOT. Like more devices expands in a network, it prompts the issues for e.g. management and security of connected devices, recognition of specific device, and connectivity. It divided interoperability into two classifications such as semantic and technical[14]. Technical interoperability is identified with protocols and communication technologies whereas semantic interoperability is identified with information produced by the sensors.

Scalability

It is defined as a capacity to remove or include devices from framework without influencing the system performance. Presently IOT design architecture so that assists the scalability with the interoperability is a broad challenge. Edge computing or cloud based architecture can be employed as a stage to accomplish cloud like a thing scenario for resolving the scalability problem yet edge computing doesn't assist accessibility to enormous users that is available with the cloud[15]. Consistent associativity is other challenge for solving the scalability issue while including the devices in present network so architecture of network should be implemented which gives consistent associativity, distributed scalability and security.

Energy Consumption

In the present period, the utilization of the IOT devices expands every day and thusly energy consumption is increasing every day and it emits enormous Carbon Dioxide in the atmosphere. Energy needed to charge the IOT devices, by sensors, processing of data, gateways, IOT access points originating from the various sensors in infrastructures of the IOT would be the key fields in the future of energy consumption. Hence it is needed for designing self-sustainable devices and energy efficient that do not need replacement of battery once it is conveyed as replacement of battery after mobilization of object is further issue.

IV. CONCLUSION

IOT is an Internet of Things which is a framework or system of interlinked mechanical machines, objects, computing devices, animals or people, digital machines which are given with one of a kind identifiers and ability for transferring the information without needed interaction of human to computer or human to human over a network. IOT associates a wide range of objects employed in everyday life and enables them to interface with one another to encourage smarter and easier life.

IOT is the main leading technologies in present scenario provides services like smart city, healthcare, automation, smart classrooms, etc. In spite of the fact that it also provides the different kind of advantages in various regions, still numerous zones face challenges as far as privacy and security of data, connectivity, scalability, etc. Various organizations manufacture different kinds of machines, cameras, sensors, etc. that employs various kind of protocols and various kind of technologies.

Manufacturing of devices with low standards and low rates create risks which is related to interoperability, privacy, scalability, security, energy consumption, etc. Also, the expansion rate of the associated devices

increments the energy consumption or power consumption which impacts environment seriously. These risks open entryways for other researchers to go moreover for solving challenges to build smarter and easier life. Here, it demonstrated the different challenges and issues of IOT that requires to be concentrated.

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