Journal of The Gujarat Research Society
ISSN: 0374-8588
Volume 21 Issue 10, October 2019

Internet of Things (IoT) Technologies

Ms. Shilpa K S
Faculty of Engineering and Technology
Jain (Deemed-to-be University), Ramnagar District, Karnataka – 562112
Email Id: shilpa@jainuniversity.ac.in

Abstract

The Internet, a revolutionary innovation, is still becoming a revolutionary invention. A modern type of hardware and software that renders it unavoidable to everybody. The type of interaction we see now is either Human-human or human-device, but the Web of Stuff (IoT) promises a great future for the internet where the machine-machine form of communication is (M2M). The aim of this paper is to provide the IoT scenario is comprehensively summarized and its supporting technologies and sensor networks are reviewed. Also, it determines a IoT's six-layered architecture and highlights the associated main challenges.

Keywords: *Communication, Internet of Things (IoT), Technologies, Transformation, Wirless.*

I. INTRODUCTION

IoT is coming down the road, which is burgeoning as it is, with the constant advances in technology and potential innovation. A pervasive global computer network linking everyone and all to the Internet. IoT is constantly evolving and is a hot subject of study where prospects are limitless[1]. There are boundless imaginations that have put it on the verge of the transformation of the current form of the web into an updated and integrated version. The number of appliances that use internet facilities is every day growing and making all of them connected by wire or wire Wireless would place a strong source of data at our fingertips[2].

The notion of allowing intelligent machines to communicate is a cutting edge technology, but the IoT part technologies for us, they're not anything new. IoT's basic concept is to enable autonomous sharing of useful knowledge[3]. Data between numerous uniquely recognizable real-world devices around us that are invisibly embedded, fueled by leading technologies such as Radio-Frequency Identification (RFID) and Wireless ID Sensor Networks (WSNs) that are sensed and further processed by sensor devices for decision-making on the basis of The carrying out of an automatic action.

The paper is organized as follows. Analyzes the vision of the IoT describes the generic architecture of the IoT discusses the technologies that IoT is composed of forecasts the future applications. Discusses the privacy and security challenges posed by IoT and finally concludes the paper.

II. DISCUSSION

About 25 trillion connections are anticipated by 2020, a vast amount such that the current TCP/IP infrastructure of the Internet cannot support a network that's so wide as IoT that there has been the need for a new open architecture that can fix numerous security and service quality problems (QoS) issues as well as it could support the existing network applications using open protocols. Without a proper privacy assurance, IoT is not likely to be adopted by many. Therefore, protection of data and privacy of users are key challenges for IoT.

A. Perception Layer:-

It is the IoT interface layer that gives any object a physical definition. This layer collects valuable information of objects from the sensor devices connected to them, and transforms information into digital signals, which is transmitted into the network capability for further operation. It consists of data sensors in various ways, including RFID tags, IR sensors or other sensor networks, which may detect temperature, humidity, rate and position[4].

B. Network Layer:-

The aim of this layer is to receive useful data in digital signals from the Perception Layer and to forward it in the Middleware Layer via WiFi, Bluetooth, WiMaX, Zigbee, GSM, 3G etc. communication media with protocols such as IPv4, IPv6, MQTT, DDS etc[5].

C. Coding Layer:-

The IoT foundation for defining the objects of significance is a coding layer. Each object is provided in this layer a unique ID that enables the discernment of the objects.

D. Application Layer:-

The IoT application for all sectors is introduced in this layer. Depending on the data that has been analysed. Since apps are supporting IoT development, this is a very beneficial layer for large-scale IoT network development. The applications relevant to IoT may be clever houses, intelligent transportation, clever world, etc[6].

E. Middleware Layer:-

The information obtained from the sensor systems is stored in this layer. It contains technology such as Cloud storage, Ubiquitous computing which ensures that all knowledge required is directly accessible to the database. The data is analyzed and a fully automatic measure is taken using certain intelligent computing equipment based on the processed data findings.

F. Technologies:-

A mixture is required to create an all-embraceable computer system in which digital objects can be recognized and can think and communicate with other objects to gather data on the basis of automatic behavior new and efficient systems that only incorporate various technologies and can recognize and connect artefacts with each other. This segment addresses the necessary technology for the broad production of IoT[7].

G. Wireless Sensor Network (WSN):-

WSN is a multi-hop, bi-directional wireless network of sensors constructed from multiple nodes dispersed along each sensor field linked to one or more sensors that can collect the sensors relevant object data such as temperature, moisture, speed etc. are transferred and transferred into processors. Each sensor is a transceiver with an antenna, a microcontroller and a sensor interface circuit as a contact, actuation and sensing device, along with an electricity source that can either be a battery or other energy collection system.

H. Radio Frequency Identification (RFID):-

RFID is the most important technology for the special recognition of artefacts. It can be inserted into any item with reduced size and cost. It is a microchip like an adhesive tag Depending on the programme form, which may be both active and passive. Active tags are connected to a battery so it is still active and thus actively transmits data signals while passive tags are only activated when activated. Bar code is also a technology for authentication that is nearly identical to an RFID but, because of some of its advantages, RFID is more powerful than Bar Code. As a radio technology, RFID does not need a viewer, while the bar code is an optical technology that does not operate except in its own right. It's put in front of the reader. In addition, an RFID can be used to activate various events as an actuator and has modifying capacities that simply have no Bar codes[8].

I. Networking Technologies:-

This innovation has an important role to play in the success of IoT since they are responsible for the link between the objects. Potential apparatus. For widespread transmission networks, we also use 3G, 4G, etc., but as we know, telephone traffic can be expected so well, because it needs only to carve out ordinary functions, such as making the call, writing a text message and so on, so that we step into this new period of all-round computing[9].

J. Cloud Computing:-

The cloud appears to be the only technology that can easily analyses and archive all the data with millions of computers predicted to arrive by 2020. It is smart machine technology that allows the integration of numbers of servers into one cloud platform sharing tools that can be used anywhere at any time The biggest point about cloud computing is IoT component, which

not only converges servers but also processes an improvement in computing capacity, analyses and also good storage of useful information gathered from the sensors capacity.

K. Nano Technologies:-

This invention makes the interconnected stuff smaller and stronger. It can minimize machine usage by allowing software production in nano-meters that, like a standard unit, may be used as a sensor or actuator. This nano computer consists of nano components and establishes a new networking model, the Internet of Nano-Things.

III. CONCLUSION

The idea of the Internet of Things will soon be inexorably built on a very large scale with the continuous flourishing of the new IoT technologies. This new networking paradigm will impact every aspect of our lives by incorporating knowledge into the items around us, ranging from automated homes to smart health and environmental monitoring. We addressed the IoT vision in this paper and implemented a well-defined framework for its deployment. We then highlighted various enabling technologies and some of the security risks associated with them. And finally, we addressed a variety of IoT applications that are supposed to come from in our everyday lives, to facilitate us. For its broad spectrum adoption, research is already being performed, but without addressing it is extremely doubtful that the complexities of its creation and the confidentiality of the user's privacy and security would be an omnipresent technology. IoT implementation requires strenuous efforts to resolve and present solutions to its security and privacy challenges.

IV. REFERENCES

[1] L. Da Xu, W. He, and S. Li, “Internet of things in industries: A survey,” IEEE Transactions on Industrial Informatics. 2014, doi: 10.1109/TII.2014.2300753.

[2] A. Tzounis, N. Katsoulas, T. Bartzanas, and C. Kittas, “Internet of Things in agriculture, recent advances and future challenges,” Biosystems Engineering. 2017, doi: 10.1016/j.biosystemseng.2017.09.007.

[3] Y. YIN, Y. Zeng, X. Chen, and Y. Fan, “The internet of things in healthcare: An overview,” Journal of Industrial Information Integration. 2016, doi: 10.1016/j.jii.2016.03.004.

[4] P. Sethi and S. R. Sarangi, “Internet of Things: Architectures, Protocols, and Applications,” Journal of Electrical and Computer Engineering. 2017, doi: 10.1155/2017/9324035.

[5] F. Samie, L. Bauer, and J. Henkel, “IoT technologies for embedded computing: A survey,” 2016, doi: 10.1145/2968456.2974004.

[6] J. Gubbi, R. Buyya, S. Marusic, and M. Palaniswami, “Internet of Things (IoT): A vision, architectural elements, and future directions,” Future Generation Computer Systems, 2013, doi: 10.1016/j.future.2013.01.010.

[7] A. Al-Fuqaha, M. Guizani, M. Mohammadi, M. Aledhari, and M. Ayyash, "Internet of Things: A Survey on Enabling Technologies, Protocols, and Applications," IEEE Communications Surveys and Tutorials, 2015, doi: 10.1109/COMST.2015.2444095.
[8] S. Li, L. Da Xu, and S. Zhao, "The internet of things: a survey," Information Systems Frontiers, 2015, doi: 10.1007/s10796-014-9492-7.
[9] A. Zanella, N. Bui, A. Castellani, L. Vangelista, and M. Zorzi, "Internet of things for smart cities," IEEE Internet of Things Journal, 2014, doi: 10.1109/JIOT.2014.2306328.