INTERNET OF THINGS (IOT) APPLICATIONS AND IT'S DESIRED QUALITIES

Mrs. PARIMALA. S. SORATUR

Senior Grade Lecturer

Department of Electronics & Communication Government Polytechnic, Vijayapur

Mr. MUDDANNA. B. BHIMANAGAR

Senior Grade Lecturer

Department of Electrical & Electronics Engg.
Government Polytechnic, Vijayapur

Mrs. MALATI. B.SAJJAN

Senior Grade Lecturer

Department of Computer Science Engg.
Government Polytechnic, Vijayapur

Abstract

The Internet is a powerful global communication medium that provides instantaneous information across geographical, cultural, language, and time spheres. The significance of the Internet of Things (IoT) in current trends is continuously rising. IoT is a concept that encompasses various objects and methods of communication to exchange information. Today IoT is more a descriptive term of a vision that everything should be connected to the internet. IoT will be fundamental in the future because the concept opens up opportunities for new services and new innovations.

The applications of the IoT are varied and numerous; they range from relatively simple home automation scenarios to the much more complex scenarios of interconnected smart cities. IoT is expected to dominate the future with huge amounts of content oriented traffic that is a result of intensive interactions between the millions of devices that will be available by then. The rising popularity of IoT has been accompanied by a corresponding rise in the number of challenges. In this paper we focus on the current state of IoT, possible usage scenarios and challenges that influence the adoption of the Internet of Things.

Keywords: *Internet of Things, smart things, IoT applications***.**

1. INTRODUCTION

The Internet of Things (IoT) describes the network of physical objects—"things"—that are embedded with sensors, software, and other technologies for the purpose of connecting and exchanging data with other devices and systems over the internet. Internet is a network of networks that consists of millions of private, public, academic, research, business, and government networks, of local to global scope, that are linked by a broad array of electronic, wireless and wired networking technologies [2]. The internet brought marvelous changes into our daily life without leaving any field like day to day personal work, health, education, research, humanity, education, tourism, science, entertainment, government sectors, business, communication, service, manufacturing and so on. More than 180 countries are linked into exchanges of data, information, news and opinions. According to Internet World statistics, there was an estimated of 326, 72, 33, 742 Internet usersat global level. This represents almost 42.7% of the totalworld's population.

The next wave in the area of Internet will be Internet of Things. In the Internet of` Things (IoT) paradigm, many of` the things that surround us will be on the network in one form or another. Thing can be defined as an entity, an idea, a quality perceived, or thought to have its own existence in the world. When we are talking about things, they could be both Living Things and Non-Living Things.

Things, in this context, can be people, animals, plants, birds, servers, applications, shampoo bottles, cars, steering wheels, coffee machines, electronic devices, park benches or just about any other random item that comes to our mind, even which could be vicinity dust also. Everyday objects include not only electronic devices we encounter but also use daily, and technologically advanced products such as equipment and electronic gadgets, but "things" that we do not do normally think of as electronic at all - such as food, clothing, and furniture, materials, parts, merchandise and specialized items, landmarks, monuments and works of art and all the miscellany of commerce, culture and sophistication [3].

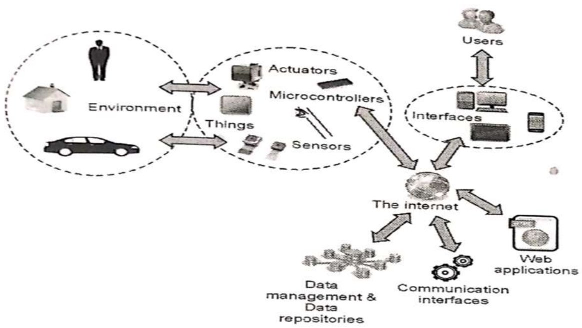
2.History of IoT

Here you will get to know about how IOT is involved and also from the explanation of each will let you know how IOT plays a role in this innovations.

- 1982 – Vending machine: The first glimpse of IoT emerged as a vending machine at Carnegie Mellon University was connected to the internet to report its inventory and status, paving the way for remote monitoring.
- 1990 – Toaster: Early IoT innovation saw a toaster connected to the internet, allowing users to control it remotely, foreshadowing the convenience of smart home devices.
- 1999 – IoT Coined (Kevin Ashton): Kevin Ashton coined the term “Internet of Things” to describe the interconnected network of devices communicating and sharing data, laying the foundation for a new era of connectivity.
- 2000 – LG Smart Fridge: The LG Smart Fridge marked a breakthrough, enabling users to check and manage refrigerator contents remotely, showcasing the potential of IoT in daily life.
- 2004 – Smart Watch: The advent of smartwatches introduced IoT to the wearable tech realm, offering fitness tracking and notifications on-the-go.
- 2007 – Smart iPhone: Apple’s iPhone became a game-changer, integrating IoT capabilities with apps that connected users to a myriad of services and devices, transforming smartphones into hubs.
- 2009 – Car Testing: IoT entered the automotive industry, enhancing vehicles with sensors for real-time diagnostics, performance monitoring, and remote testing.
- 2011 – Smart TV: The introduction of Smart TVs brought IoT to the living room, enabling internet connectivity for streaming, app usage, and interactive content.
- 2013 – Google Lens: Google Lens showcased IoT’s potential in image recognition, allowing smartphones to provide information about objects in the physical world.
- 2014 – Echo: Amazon’s Echo, equipped with the virtual assistant Alexa, demonstrated the power of voice-activated IoT, making smart homes more intuitive and responsive.

3.Working with IoT Devices

- **Collect and Transmit Data :** For this purpose sensors are widely used they are used as per requirements in different application areas.
- **Actuate device based on triggers produced by sensors or processing devices:** If certain conditions are satisfied or according to user’s requirements if certain trigger is activated then which action to perform that is shown by Actuator devices.
- **Receive Information:** From network devices, users or devices can take certain information also for their analysis and processing purposes.
- **Communication Assistance:** Communication assistance is the phenomenon of communication between 2 networks or communication between 2 or more IoT devices of same or different networks. This can be achieved by different communication protocols like: MQTT, Constrained Application Protocol, ZigBee, FTP, HTTP etc.



Working of IoTac

4.Characteristics of IoT

- Massively scalable and efficient
- IP-based addressing will no longer be suitable in the upcoming future.
- An abundance of physical objects is present that do not use IP, so IoT is made possible.
- Devices typically consume less power. When not in use, they should be automatically programmed to sleep.
- A device that is connected to another device right now may not be connected in another instant of time.
- Intermittent connectivity – IoT devices aren't always connected. In order to save bandwidth and battery consumption, devices will be powered off periodically when not in use. Otherwise, connections might turn unreliable and thus prove to be inefficient.

5.Desired Quality of any IoT Application

Interconnectivity

It is the basic first requirement in any IoT infrastructure. Connectivity should be guaranteed from any devices on any network then only devices in a network can communicate with each other.

Heterogeneity

There can be diversity in IoT enabled devices like different hardware and software configuration or different network topologies or connections, but they should connect and interact with each other despite so much heterogeneity.

Dynamic in Nature

IoT devices should dynamically adapt themselves to the changing surroundings like different situations and different prefaces.

Self-adapting and self configuring technology

For example, surveillance camera. It should be flexible to work in different weather conditions and different light situations (morning, afternoon, or night).

Intelligence

Just data collection is not enough in IoT, extraction of knowledge from the generated data is very important. For example, sensors generate data, but that data will only be useful if it is interpreted properly. So intelligence is one of the key characteristics in IoT. Because data interpretation is the major part in any IoT application because without data processing we can't make any insights from data. Hence, big data is also one of the most enabling technologies in IoT field.

Scalability

The number of elements (devices) connected to IoT zones is increasing day by day. Therefore, an IoT setup should be capable of handling the expansion. It can be either expand capability in terms of processing power, storage, etc. as vertical scaling or horizontal scaling by multiplying with easy cloning.

Identity

Each IoT device has a unique identity (e.g., an IP address). This identity is helpful in communication, tracking and to know status of the things. If there is no identification then it will directly affect security and safety of any system because without discrimination we can't identify with whom one network is connected or with whom we have to communicate. So there should be clear and appropriate discrimination technology available between IoT networks and devices.

Safety

Sensitive personal details of a user might be compromised when the devices are connected to the Internet. So data security is a major challenge. This could cause a loss to the user. Equipment in the huge IoT network may also be at risk. Therefore, equipment safety is also critical.

Architecture

It should be hybrid, supporting different manufacturer's products to function in the IoT network.

As a quick note, IoT incorporates trillions of sensors, billions of smart systems, and millions of applications.

6.Major IoT applications

Emerging economy, environmental and health-care

IoT is completely devoted to provide emerging public and financial benefits and development to the society and people. Tis includes a wide range of public facilities i.e. Economic development, water quality maintenance, well-being, industrialization etc. Overall, IoT is working hard to accomplish the social, health and economic goals of United Nations advancement step. Environmental sustainability is another important concern. IoT developers must be concerned about environmental impact of the IoT systems and devices to overcome the negative impact . Energy consumption by IoT devices is one of the challenges related to environmental impact. Energy consumption is increasing at a high rate due to internet enabled services and edge cutting devices .This area needs research for the development of high quality materials in order to create new IoT devices with lower energy consumption rate.

Smart city, transport and vehicles

IoT is transforming the traditional civil structure of the society into high tech structure with the concept of smart city, smart home and smart vehicles and transport. Rapid improvements are being done with the help of supporting technologies such as machine learning, natural language processing to understand the need and use of technology at home. Various technologies such as cloud server technology, wireless sensor networks that must be used with IoT servers to provide an efficient smart city. Another important issue is to think about environmental aspect of smart city. Therefore, energy efficient technologies and Green technologies should also be considered for the design and planning of smart city infrastructure. Further, smart devices which are being incorporated into newly launched vehicles are able to detect traffic congestions on the road and thus can suggest an optimum alternate route to the driver. This can help to lower down the congestion in the city. Furthermore, smart devices with optimum cost should be designed to be incorporated in all range vehicles to monitor the activity of engine .IoT is also very effective in maintaining the vehicle's health. Self driving cars have the potential to communicate with other self driving vehicles by the means of intelligent sensors. This would make the traffic flow smoother than human-driven cars who used to drive in a stop and go manner. This procedure will take time to be implemented allover the world. Till the time, IoT devices can help by sensing traffic congestion ahead and can take appropriate actions. Therefore, a transport manufacturing company should incorporate IoT devices into their manufactured vehicles to provide its advantage to the society

Agriculture and industry automation

The world's growing population is estimated to reach approximate 10 billion by 2050.Agriculture plays an important role in our lives. In order to feed such a massive population, we need to advance the current agriculture approaches. Therefore, there is a need to combine agriculture with technology so that the production can be improved in an efficient way. Greenhouse technology is one of the possible approaches in this direction. It provides a way to control the environmental parameters in order to improve the production. However, manual control of this technology is less effective, need manual forts and cost, and results in energy loss and less production. With the advancement of IoT, smart devices and sensors makes it easier to control the climate inside the chamber and monitor the process which results in energy saving and improved production.

Automatization of industries is another advantage of IoT. IoT has been providing game changing solutions for factory digitalization, inventory management, quality control, logistics and supply chain optimization and management.

7.Conclusion

The Internet of Things is playing an active role in our everyday life, and its applications are fabulous and countless. Projections for the impact of IoT on the Internet and economy are impressive, with some anticipating as many as 100 billion connected IoT devices and a global economic impact of more than $11 trillion by 2025. The best part of Internet of Things is that they are bringing the quality of life to human beings, operational efficiency and handles the situations where human being intervention is not at all possible. At the same time, however, the Internet of Things raises significant challenges that could stand in the way of realizing its potential benefits. In the future, we need to focus more on Internet of Things in terms of development, deployment, architectural, global level standardization, and ethical issues. We also need to concentrate on challenges associated with IoT in order for the potential benefits for individuals, society, and the economy to be realized.

8.REFERENCES

[1] S.-I. Hou, S.-A. R. Charlery, and K. Roberson, ―Systematic literaturereview of Internet interventions across health behaviors,‖ HealthPsychology and Behavioral Medicine: Open Access Journal, vol. 2,no. 1, pp. 455-481, 2014 .

[2] G. Nunberg, ―The advent of the Internet,‖ 2012.

[3] E. A. Kosmatos, N. D. Tselikas, and A. C. Boucouvalas, ―Integrating RFIDs and smart objects into a unified Internet of things architecture,‖

[4] Advances in Internet of Things, vol. 1, pp. 5-12, 2011.

[5] J. Antonio et al., ―Drugs interaction checker based on IoT,‖ Internet of Things (IOT), pp. 1-8, IEEE, 2010.

[6] T.Al- Rousan, ―Cloud computing for global software development: Opportunities and challenges,‖ in Transportation Systems and Engineering: Concepts, Methodologies, Tools, and Applications. IGIGlobal, 2015, pp. 897–908.

[7] E. Wasserman, ―Riding herd: RFID tracks live-stock,‖ 2009.

[8] E. Biddlecombe, ―UN Predicts 'Internet of Things',‖ July 6, 2009.

[9] D. Butler, ―2020 Computing: Everything, Everywhere,‖ Nature, vol.440, no. 7083, pp. 402-409, 2006.

[10] S. Dodson, ―The net shapes up to get physical,‖ Guardian, 2008.

[11] N. Gershenfeld, R. Krikorian, and D. Cohen, ―The Internet of Things, Scientific American, October, 2004.

[12] T. Al-Rousan, "Prospects of Cloud Computing In E-Government,"International Journal of Advanced Computational Engineering and Networking. vol. 3, no. 10, 2015.

[13] R. Lombreglia, ―The Internet of things,‖ Boston Globe, pp. 76–83,2005.

[14] A. Reinhardt, ―A machine-to-machine Internet of things,‖ 2004.

[15] G. Mark, and H. Haarstad, ―Transparency and development: Ethical consumption and economic development through Web 2.0and the Internet of things,‖ Information Technologies & International, 2011.

[16] B. Sterling, Shaping Things, Cambridge: Massachusetts Institute of Technology Press, 2005.

[17] G. Biamino, ―Semantic model for socially aware objects, advances in Internet of things,‖ vol. 2, pp. 47-55, 2012.

[18] S. Poslad, Ubiquitous Computing: Smart Devices, Environments and Interactions, John Wiley & Sons, Ltd., p. 75, 2009.

[19] G. Kortuem, F. Kawsar, D. Fitton, and V. Sundramoorthy, ―Smart objects as building blocks for the Internet of things,‖ IEEE InternetComputing, vol. 14, no. 1, pp. 44-51, 2010.

[20] T. Al-Rousan and H. A Al Ese, ―Impact of cloud computing oneducational institutions: A case study,‖ Recent Patents on ComputerScience, vol. 8, no. 2, pp. 106–111, 2015.

[21] D. Singh, G. Tripathi, and A. J. Jara, ―A survey of internet-ofthings:Future vision, architecture, challenges and services,‖ in Internet ofthings (WF-IoT), 2014 IEEE world forum on. IEEE, 2014, pp. 287–292.

[22] K. Habib, A. Torjusen, and W. Leister, ―A novel authentication framework based on bio-metric and radio fingerprinting for the iot in health,‖ in Proceedings of International Conference on SmartSystems, Devices and Technologies (SMART), 2014.