

Future and Obstacles of Internet of Things: A Brief Analysis

Ravi Kumar¹, Aditya Gautam², P.S Bhattacharya³

Students^{1,2}, Assistant professor³

Department of Computer Science Engineering

Shivajirao S Jondhale College of Engineering

Corresponding Author's Email: aadityaggautam@rediffmail.com²

Abstract

In today's reality, academics are very interested in IOT since it is an essential and exciting technology that allows communication and interaction between machines, gadgets, and humans. IoT is a technology that deals with the real world via the use of various types of sensors attached to equipment that are linked and operated over the internet, either wired or wirelessly. These sensors are used to communicate across a large area using various technologies such as GPRS, 3G, and LTE Volte by connecting via RFID, Wi-Fi, and Bluetooth. We may communicate information and the behaviour of any device in relation to its surrounding environment by using IOT. Because IoT automates gadgets so we can run any equipment using mobile phones or voice control, we grow smarter and our lives become easier. As a result, it saves time and energy because the task is completed automatically. It provides several benefits in the form of smart cities, smart homes, and smart buildings. The Internet, sometimes known as the "net," is a worldwide system of interconnected networks that employs the TCP/IP protocol suite. Our major goal in creating this article is to provide a broad understanding of this critical technology known as the "Internet of Things."

Keywords: - Internet of Things, TCP/IP protocol, GPRS, 3G, and LTE Volte, Several Benefits

INTRODUCTION

We have reached the point when living without the Internet is unthinkable. The evolution of Internet technology has brought us to the point where everything around us is interconnected, and this technology is known as IOT (Internet of Things). It is a vast notion that is always evolving. The number of IoT users and internet services in gadgets continues to grow, regardless of whether they are linked by wires or wirelessly. Prior to its inception, there were only two forms of communication: human-human and human-device, but the invention of IOT enabled communication between machines. This paper's goal is to showcase Internet of Things applications, future technologies, and challenges.

APPLICATIONS OF IOT

The Internet of Things offers various uses in our lives that will make our lives simpler, safer, and smarter, as outlined below.

A. Smart Cities

Smart cities will be considered cities of the future for smart living; consequently, using IoT technology in city development will become critical for constructing smart cities [1]. To do this, everyone must incorporate IoT technology into all aspects

of their lives. The IOT may enhance the state of cities on many levels, including increasing public transit, decreasing traffic congestion, improving infrastructure, and keeping inhabitants safe and healthy. IoT will connect all systems such as transportation, healthcare, and weather monitoring systems via the Internet in order to access the databases of airports, railroads, and hospitals via certain protocols, allowing cities to get wiser by being smarter.

B. Smart Home and Buildings

Wi-Fi technology is widely employed in home automation because of the networked nature of Wi-Fi-enabled TVs and mobile devices [3]. Because of the rising usage of mobile computing devices such as smart phones and tablets, Wi-Fi is becoming part of the home IP network. Many firms are exploring creating platforms that mix home and building automation with entertainment, healthcare monitoring, energy monitoring, and wireless sensor monitoring [4]. Homes and buildings can operate a variety of gadgets and things intelligently by utilising IoT. Smart media, air control and central heating, smart lighting, and security are examples of IOT applications in smart homes and buildings.

C. Smart Health

The care required by a patient whose physiological status should be checked on a regular basis can be provided through IoT technology. Many sensors are used in smart health to capture physiological information, which is then stored in the cloud and sent to the caregiver for further analysis. It simplifies the task of the health expert, who visited at regular intervals to check on the patient's status, but now he would have access to continuous data. This enhances care quality by lowering the cost of traditional methods of data gathering and analysis.

D. Smart Transportation and Mobility:

Transportation development is a factor that shows the country's evolution [6]. The basic idea behind smart transportation and mobility is to use crowd sourcing and participatory sensing concepts. IOT may also be employed in transportation in an electric car to lower both fuel costs and the environmental impact of global warming.

E. Smart Environment:

The environment is extremely important to human life. Polluted environments harm the health of all living things. Making a healthy environment is a difficult endeavour due to the garbage produced by companies and cars. [7]. As a result, the

environment requires sophisticated methods and technology for monitoring and management. As a result, "smart environment" is the technology created to solve various environmental problems such as water and air pollution, weather and radiation monitoring, waste management, natural disasters, and other environmental indicators. This technology is used for tracking, sensing, and monitoring environmental things that either help or harm our quality of life. [8]. IoT technology is used to monitor and manage air quality, assess levels of pollution in water, and anticipate weather by gathering data from distant sensors across the city.

CHALLENGES IN THE IOT

Apart from the various applications IOT are also faced with some challenges which are discussed below:-

A. Scalability: IOT differs from traditional computer Internet in that things are collaborated in an open environment. Communication and service discovery must perform equally well in small and large-scale contexts. As a result, IOT demands new strategies to provide efficient operation and scalability.

B. Data Volumes: IoT will collect information from various sensor networks

or large-scale networks and then store that massive quantity of data on a central node. "Big data" is the phrase used to characterise this phenomenon, which is utilised for storing, processing, and managing all databases.

C. Interoperability: Diverse IoT smart objects have different information, processing, and communication capabilities that are affected by various variables such as energy availability and bandwidth needs. Some protocols are essential for successful communication and collaboration among objects.

D. Software Complexity: Because the software system in smart objects will function with low resources, as in typical embedded systems, a large software infrastructure is required to operate them.

E. Fault Tolerance: Objects in the IOT are more dynamic on mobile devices than on PCs, and they change quickly. As a result, designing an IOT system in a solid and trustworthy manner necessitates redundancy and the flexibility to respond to unexpectedly changing situations.

FUTURE TECHNOLOGIES IN IOT

Future technologies, which form the foundation of IoT, must be properly

regulated and handled intelligently. Some of them are as follows:

A. Cloud Computing: The terms cloud and IoT are distinct yet frequently complementary. The cloud is utilised for IOT applications to enable data gathering and processing, as well as quick deployment and integration of new items [9]. On the other hand, IoT is employed in the cloud by broadening its reach to interact with real-world objects in a more dynamic manner. Many time clouds are employed as an intermediary layer between items and programmes, obscuring all the complexity and functionality [10]. As a result, it will become a future application in which a significant quantity of information collection, processing, and transmission will create a new issue.

Big Data: Approximately 2.5 quintillion bytes of data are created every day, and both the Internet and web servers' data volumes are expanding quickly. "Big Data" refers to the enormous amount of data that is produced by social media platforms like Facebook, Twitter, and Whatsapp, as well as physical observations [11]. Integration of data from various sources, including physical, cyber, and social resources, with the IOT, is used to develop applications and services that can

incorporate situational awareness and decision-making mechanisms, resulting in smarter applications and enhanced services. However, interoperability, automation, and data analytics issues with large volumes of distributed data will necessitate the use of common description and data representation frameworks in addition to machine learning.

C. Security and Privacy: The requirement for security for the IoT infrastructure is more critical as IoT becomes a vital component of the future internet. Large-scale IOT-based applications and services are becoming more susceptible to interruption from attack or data theft. Therefore, new security techniques are needed to protect IOT data from attacks, theft, and many other security issues like DOS and DDoS attacks, compromised nodes, and malicious code hacking attacks. The IOT is vulnerable to these attacks, so new security methods are also needed to ensure that infrastructures for transportation, energy, and cities cannot be disabled [13]. To do this, almost all of the IoT's operational nodes must be managed by the system without human intervention.

D. Distributed Computing: In distributed computing, several networked computers

are used to achieve a single computational task. Concurrent and parallel computing provide a number of challenges for distributed computing since they are all relevant to scientific computing. Today, a significant number of distributed computing technologies merge with service-oriented architecture, utility computing, and hardware virtualization. Distributed computing and IoT describe a concept that brings the Internet into the physical world. Although physical objects are linked to the virtual world, they may be managed remotely and serve as physical access points for Internet services [14].

E. Fog Computing: Cloud edge computing and fog computing are connected. Fog platforms are defined as dense computing architecture at the edge of the network, similar to cloud. These platforms have low latency, location awareness, and wireless access as features. A fog computing architecture does analytics on everything from the network centre to the edge, whereas edge computing or edge analytics refers to doing analytics at devices that are on, or close to, the network's edge. Fog computing, where processing, storage, control, and networking power may sit anywhere along the architecture, whether in data centres, the cloud, edge devices

like gateways or routers, edge equipment itself, like a machine, or in sensors, may be more likely to support IOT [15].

CONCLUSION

IOT is increasingly being used globally. According to the report, IOT will soon make people's lives simpler and easier than they are right now. Numerous intelligent apps made possible by the Internet of Things have entered our daily lives, allowing us to communicate with everyone and everything while also making many crucial parts of human existence easier.

IOT FACE TWO MAJOR CHALLENGES AND THEY ARE:-

1. Today different networks coexist
2. The big data size of the IOT.

Other current problems, like address restriction, automatic address setup, security features like authentication and encryption, and functions to efficiently deliver voice and video signals, will probably be impacted by implementing the idea of the IOT, but these difficulties will be resolved thanks to ongoing technological advancements. Future innovations in technologies like cloud computing, fog computing, distributed computing, big data, and security are promised by the internet of things. IOT

will be used to integrate all of these problems and create smarter apps right away. This study examined some of the most significant IOT applications, with a focus on [16].

Along with the difficulties, pay attention to what is actually being done.

REFERENCES

1. https://www.thingworx.com/ecosystem/markets/smart-connected_systems/smart-cities/
2. <http://www.7wdata.be/article-general/how-big-data-and-internet-of-things-builds-smart-cities/>
3. Fakheen Fatima, atel. Internet of things: A survey on Architecture, Applications, Security, Enabling Technologies, Advantages & Disadvantages. International Journal of Advanced Research in Computer and Communication Engineering vol.4, Issue 12, December 2015.
4. Jukka Suhonen Experiences and future plans for WSN-enabled service Development in Home Environment. Realin white paper 2013.

5. Bill Chamberlin. Healthcare Internet of Things: 18 trends to watch in 2016. IBM Centre for Applied Insights.
<https://ibmcai.com/2016/03/01/healthcare-internet-of-things-18-trends-to-watch-in-2016/>
6. Vahid Mirzabeiki. An overview of the Freight Intelligent Transportation Systems; Division of Logistics and Transportation, Chalmers University of Technology.
[http://www.bth.se/tek/intelligent_goods.nsf/bilagor/Mirzabeiki,2010,ITS%20World%20Busan_pdf/\\$file/Mirzabeiki,2010,ITS%20World%20Busan.pdf](http://www.bth.se/tek/intelligent_goods.nsf/bilagor/Mirzabeiki,2010,ITS%20World%20Busan_pdf/$file/Mirzabeiki,2010,ITS%20World%20Busan.pdf)
7. Bhattacharjee and R. Bera. Development of smart detachable wireless sensing system for environmental monitoring. International journal on smart sensing and intelligent systems vol.7, No.3, September 2014.
8. Nomusa Dlodlo. Adopting the Internet of things technologies in environmental management in South Africa. International conference on Environmental Science and Engineering, IPCBEE Vol.32, (2012) IACSIT Press, Singapore.
9. Isna Khan, Prof, S.D. Savant. A review on Integration of cloud Computing and Internet of Things. International Journal of Advanced Research in Computer and Communication Engineering vol.5, issue 4, April 2016.
10. Yu Liu, Beibei Dong, Benzhen Guo, Jingjing Yang and Wei Peng. Combination of cloud computing and Internet of Things (IOT) in Medical Monitoring Systems. International Journal of Hybrid Information Technology 8(12)(2015)367-376.
11. Hele-Mai Haav. Linked data connections with emerging information technologies: A survey, International Journal of computer Science and Applications vol.11, No.3, (2014)21-44.
12. Rebecca Sawyer. The impact of New Social Media on Intercultural Adaptation. University of Rhode Island, 2011.

<http://digitalcommons.uri.edu/cgi/viewcontent.cgi?article=1230&context=srhonorsprog>

13. <http://www.cloud-council.org/deliverables/csccloud-security-standards-what-to-Expert-and-what-to-Negotiate.pdf>
14. Virendra Dilip Thoke. Theory of distributed computing and parallel processing with applications, advantages and disadvantages. International Journal of Innovation in Engineering, Research and Technology.
http://www.ijiert.org/admin/papers/1452798652_ICITDCEME%E2%80%9915.pdf
15. <https://www.rtinsights.com/what-is-fog-computing-open-consortium/>