

Role of Internet of Things: Future Challenges

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ABSTRACT: A lots of research in academic and industry on Internet of Things (IoT) has carried out. Still there is need of focusing on controlling, actuating, communicating and sensing features of IoT which are more complicated and sophisticated issues. An overlap in these features makes trouble to understand and combine the technology in between the communities and centres from somewhat different perspectives. More collaboration among communities, researchers, ITs is encouraged for open research problems in IoT, to see the changes with IoT world in the future. Covid -19 is one open challenge to the IT industry and researchers where the use of IoT in anyform can be useful for the data collection and monitoring in healthcare area of research. The paper presents the key research topics, challenges in IT business world.

KEYWORDS: IoT, Security and Privacy, Connectivity, Sensing, Energy

I. INTRODUCTION

IoT makes the thing easier by use of affordable wireless technology. The data collected from the IoT device is stored in some cloud, whereas data can also be accessible at a component level. IoT provides easier way to use of many day to day appliances and various technologies. That's why IoT is the future of technology. Smart devices are and will be more important to our lives. The internet of things is the web of physical objects and other items embedded with electronics, sensors, and web connectivity that allow the objects to exchange and collect data. The sensors in the Internet of Things are taking information from real physics object that are in the world and then uploading it on the internet. Generally it is difficult to manage, cultivate and secure the data over the internet. It is a world where everything transforms because of technology. Therefore the researchers and IT has main goal in the coming era of future of IoT technology for monitoring and collecting data at every move. The constant changing world around us is full of new innovations and technologies with fusion of sensors in internet of things. The internet of things platform organizes the data from many devices and plays analytics that to share the most valuable data that address industries pacific needs. Dealing with large quantity of data and putting them for useful purpose is really a necessity of the society and community. In health, transport, office, home, research and testing, ITs, airport systems, banking, e-commerce with legal rights have the demand of IoT's platform. Internet of Things brings the whole information together and provides the common accepted language for the devices to connect together for the different purposes. The process starts with the device itself which securely communicates with Internet of Things platform. The Internet of Things is growing rapidly. Internet of Things or Internet of Everything refers to devices which can be linked to the Internet from anywhere, anyplace, anytime attributes. These devices can collect and send data through the Internet, devoting to our big data world. Smart gadgets are already changing our world and the competitive forces in business. It is revolutionizing products. IoT combines hardware, data storage, software, and connectivity in many forms. The smart products are made possible by large progress in converting power and devices through wireless networks in the world. An example of IoT applications is depicted in figure 1.

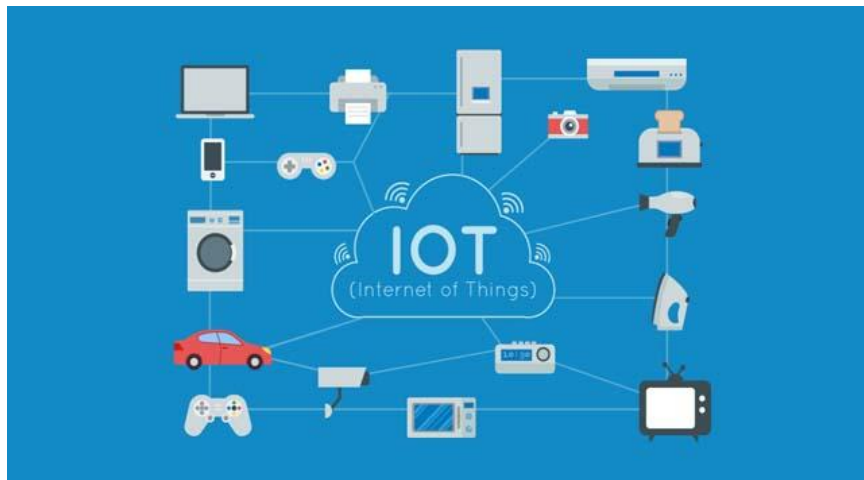


Figure 1: IoT Examples

Now a days during covid-19 pandemic the world is moving with lots of uncertainty. Every sector of business has affected by the growth of economic infrastructure. IoT can be somewhere solutions to the health sector. It requires lots of research and thinking to get the solution for human beings in a better way by the use of IoT technology. Some smart product can be made for monitoring and collecting data for future. Smart, connected products offer exponentially developing convenience for new functionality and greater reliability, higher product usage, and potential that cut across traditional product boundaries.

Paper is organized as follows. Section II describes the related work in the area of IoT. Security provisioning and accessing issues are given in Section III. Finally, Section IV presents conclusion and future work.

II. RELATED WORK

J. Gubbi, et al (2013) concluded the IoT vision by expanding on the need for convergence of WSN also described the Internet and distributed computing directed at technological research community. Authors have focused on Presents vision and motivations for Internet of Things (IoT) [1]. Cloud-centric IoT realization and challenges were also the key highlights in the paper.

A. Rymaszewska et al. (2017) highlighted the case study from value chain perspective. The authors have explained that Internet of Things can enable possibilities of servitization for manufacturing companies. The paper also proposes a framework that is aimed at proving a better understanding of how companies can create value, and add it to their servitisation processes with, the data obtained by the IoT based solutions [2]. In another paper of R.S. Sinha et al.(2017), a survey on LPWA technology has been presented. The authors have focused on LoRa and NB-IoT. The main aim of paper is to highlight the upcoming billion devices in future. In today's world of the internet of things (IoT) market, low power wide area (LPWA) technologies have become popular. In various LPWA technologies, narrowband (NB)-IoT and long range (LoRa) are two technology components. In this paper, the benefits of unlicensed LoRa have advantages with respect to battery lifetime, capacity, and cost. The licensed NB-IoT offers benefits in terms of QoS, latency, reliability, and range in wireless communication technology [3].

B. Guo et al. (2013) has discussed in their paper about opportunistic IoT. The main focus of the papers was interaction between human and Internet of Things. The paper focuses on bi-directional effects between human and opportunistic IoT, and proposed framework architecture for developing opportunistic IoT systems. This paper highlights the opportunistic mobile social networking, opportunistic marketing, and community service provision and technical solutions of opportunistic IoT [4].

L. Chetri et al. (2020), In the context of wireless technology, fifth-generation (5G) technology has become a most challenging and interesting topic in wireless research. This article provides an overview of the Internet of Things (IoT) in 5G wireless systems. IoT in the 5G system will be a game changer in the future generation. Authors have presented a review on low-power wide-area networks (LPWANs), security challenges, related issues in the 5G IoT scenario. This article introduces the role of AR too in the 5G IoT scenario [5]. Li, Y. Hu et al. (2020), The summary of this paper lies in the combination of Internet of things and block chain, and authors have proposed a secure location information storage system for Internet of things devices to promote the sharing of services and resources. The location information



storage system of Internet of things devices studied in this paper stores the location information in the form of blocks to ensure the security, non-tampering and reasonable sharing of information [6].

The Internet of Things is garnering deep interest in the press, articles, like many other high-tech innovations and covid-19 situations are headlines [7] [8] [9]. Some applications of IoT, pros and cons are given in table 1. The latest research suggests that the following issues could hinder its rise:

- Inadequate privacy protection
- Inadequate security
- A shortfall of consistent standards
- Technological restriction affecting Internet of Things functionality
- A lack of consistent standard
- Complication in building customer need
- Internet of Things (IoT) Toward 5G Wireless Systems
- Internet of Things For Smart Cities

Table 1: IoT Applications; Pros & Cons

Applications	Pros	Cons
a) Home Automation	a) Easy Access to information	a) Security
b) Smart City	b) Automation	b) Complexity
c) Smart Grid	c) Communication	c) Gathering information
d) Wearable Technology	d) Cost efficient	d) Connectivity
e) Industrial Internet of Things		e) Lesser understanding
f) Retail		
g) E-Agriculture		
h) Smart Cars		
i) Healthcare		

III. SECURITY PROVISIONING AND ACCESSING ISSUES

A. SECURITY AND PRIVACY

In security issues the things are highly resource constraint. The devices needs computational and memory resources to collect data and communicate it to the gateway in all the cases which roll out the application utilization of traditional resource intensive crypto-primitives. The concerns are raising that internet of things is developing vastly without discussion of the security challenges involved and the changes that might be necessary. According to a survey conducted by Business Insider Intelligence in the last quarter of 2014, approx. 39% of the respondents said that it is the biggest concern in adapting internet-of-things technology. Cyber-attacks are becoming physical threat. Computer-controlled devices such as brakes, engine, and truck discharge, heat, and dashboard are to be exposed to attackers who have entry to the onboard network. As the security concerns were increasing the Security Foundation was launched for Internet of Things with a mission to secure internet of things.

B. DATA CONTROL & ACCESS

In Internet of Things it isn't around who owns the data but who manages the data and receives connection to that data from a customer context this will be a big challenge. More and more consumers are enhancing known of the fact that free services such as social media's are getting money for the data services. So if customers have to pay for Internet-connected gadgets, the question raises is one who owns that data that is created with that gadget? For the Internet of Things to work smoothly, the more data that is shared the superior. Undoubtedly all benefit if managements can mix and associate the data for added observation. So, in a splendid world the holder of the data tells who gets access to the data and can even construct the data, because of the increased observations organizations develop from it. Unfortunately, in uncertainty of world this could be one of the more powerful boundaries to large-scale adoption of the automation.

C. FRAGMENTED ECOSYSTEM

Internet of Things is still in its early stages and is fragmented at several levels. Various things get connected over various transport layers, which uses a different protocols and support several configuration options but there are no central Internet of Things standards and no real research over development which makes development so much tougher for these connected devices than developing for tablets or phones with clear and precise ecosystems. This complication is more than the support to create apps because Internet of Things development suffers as there are no platforms such as IOS or Android. It's not just about technology, but these platforms like android or ios also connect developers with a user base.

D. INTERNET OF THINGS SOUNDS EXPENSIVE

The Internet of Things is so regularly perform as a huge network of connected devices. For someone who is new to the world of Internet of Things, this can be reasonably a little discourage. Representing a large network can give off the impact that a large investment involving a range of devices is needed to get an Internet of Things solution up and running. This is certainly not always the case: In this situation a real-life case study can make a big impact with customers. For example, the case of Microsoft connected cow. In this the case study shows that how a really simple idea along with a comparatively small investment has helped to convert the dairy-farming industry. It also inspires customers to use or add to the hardware they previously have for the Internet of Things solutions. This Internet of Things approach is an impressive way of lowering costs, although also letting customers to carry on using systems they're familiar with.

Internet of Thing is a double-edged sword for designers of all stripes because things, can take on a myriad of form factors. The changeability is a grace and expletive. Although working with IoT projects, five key features surfaced that make products naturally Internet of Things. The challenges lie in between the following issues in IoT.

A. INTELLIGENCE

Together algorithms software and hardware provides the "brilliant gleam" which makes the product involvement smart. Consider a xiaomi smart, a fitness tracker, compared to carrier thermostat. The smart experience divides tasks between a smart phone and the cloud. The carrier thermostat has more compute strength for the Artificial Intelligence that makes them smart. Making intelligent devices for different purposes is still difficult. The smart devices with AI features can help in making intelligent devices for IoT applications.

B. CONNECTIVITY

Connectivity in the Internet of Things is more valuable part of IoT. It facilitates network's usability and compatibility. Usability is getting on a network while compatibility provides the same intelligence to consume and produce data. Connectivity is most important for the applications from various fields. It's a challenge to provide connectivity to the IoT over internet.

C. SENSING

Sensing helps in collecting and making use of data in real world. Sensing gives the ways to create experiences that mirror a true awareness of the real world and the people in it. This is commonly the analog response from the real world, but it can give a rich understanding of our complicated world. How digitally sensing will be used among the devices and people is need to research for various applications.

D. EXPRESSING

Expressing enables the interactivity with people and the real world. Whether it is a smart home or agriculture with smart agriculture technology, disclosing provides a means to build products that connect smartly with the real world which means more than just translating beautiful UI's to a screen. Expressing allows to project into the physical world and directly communicates with people. It's a phase where everyone looks behinds the expressing features with smart devices so that it dealt with the benefits to the society.

E. ENERGY

Without energy growth in technology is not possible. The complication exists with billions of things that all work on batteries. Energy generating, power efficiency and charging frameworks are necessary feature to make a power smart ecosystem that comes in IoT picture. In today's scenario a shortfalls to the target of generating power, and energy in devices by many product teams has drawback in industry and market. There is need to focus on power and energy consideration with sensor devices for IoT applications.

IV. CONCLUSION AND FUTURE SCOPE

The future of IoT becomes a utility with increased complications in controlling, sensing, communicating, actuating and in creating knowledge from large amounts of data. The results will be unparalleled in next forthcoming year upto 2025 with different style of living from today by the use of IoT applications. The web, the internet, social networking, Facebook, Twitter, millions of apps for smart phones, etc., are the need of today's era and these all have equally changed societies' lifestyle. Thus the new research problems arises due to the huge number of devices, the connection of the cyber worlds with the physical world, the openness of the systems and continuing issues of privacy and security with IoT. It is hope during covid-19 pandemic that a new approach of IoT will support the community and researchers; industrialist so that the day to day life will be improved and better solutions will be achieved in coming years.

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