Internet of Things (IOT), Its Applications and Future Dependency: A Review

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ABSTRACT

Internet of things is a technology that has become slang in today's world. Presently the situation is that world without internet cannot exist. So due to lots of its use there are coming more updated technologies to make our life more comfortable. The main aim of this review article is to make the researchers guide through the path of Internet of Things. It will provide a comprehensive overview of this technology its further more updates, advantages, disadvantages and where it is being used presently. There are various types of fields where IOT can be implemented such as Robotics, Industry, Agriculture, Healthcare, Transportation, Smart sustainable cities and many more. In this review paper we discussed the above-mentioned fields about its present state where it is being used and based on that we made some future predictions related to IOT.

Keywords - Automatic, Implemented, Internet of things (IOT), Precision, RFID, Sensors, Smart.

1. INTRODUCTION

The full form of IOT is Internet of Things. IOT is a network of physical objects as well as software such as sensors and various other technologies with the aim to exchange data between devices and the systems with internet as a medium to share the data. Presently the number of devices which are connected are around 6.5 billion and is expected to grow up to by 24 billion by 2025.

Figure 1. Overview of IOT

1.1 What is need of IOT?

Every technology comes and gets priority only due to one reason it makes us more comfortable. The same answer applies here. With the use of IOT in all the devices the we get all its information over the internet and modify it or change its state virtually through the software's. Let's take an example: -You are tired from all the stuffs of your office and now you are coming back to your home and now you want that when you reach your house, your room should be properly cooled up and your garage gets automatically open to park your car when you reach near to it. And I want to tell you that all this is possible if we embed sensors and through the use of IOT connect it through the software.

1.2 Advantages of IOT

1. Firstly, and most important thing is that by using IOT Saves lot of time and because automation plays a major role here.
2. In field of healthcare it makes very easy to take care of patient because in absence of doctors it can monitor the patient's condition and through its dataset it can understand the patient deficiency.
3. It minimizes the chances of error because devices communicate with each other and it does require the less involvement of person.

1.3 Disadvantages of IOT

1. Overuse of Internet and Technology makes the people less intervention due to lots of automation. It makes the people lazier and reduces their intelligence because it requires less Work from human side.
2. The devices are connected through internet so it requires lots of internet and if it does not meet

the requirements the function does not work effectively.

3. Hackers can easily gain access to devices because all the data is being shared on internet so it probably it's easy for hackers to gain access to your devices

2. LITERATURE REVIEW

In this section the literature survey is explained which is taken from various papers. It represents the previous work which was done in the field of IOT. The below table shows the literature survey:

S.No.	Tittle	Findings
1.	A SURVEY ON OPTICAL TECHNOLOGIES FOR IOT, SMART INDUSTRY, AND SMART INFRASTRUCTURES	This paper discusses about the various types of applications and sensors for communication and smart infrastructure.
2.	A SURVEY OF INTERNET OF THINGS (IoT) IN EDUCATION: OPPORTUNITIES AND CHALLENGES	This article portrays the advancement of IOT in education sector and tells various future challenges and opportunities for future trials.
3.	AN IMPLEMENTATION OF IOT FOR HEALTHCARE	This paper discusses the how can implementation of IOT in healthcare can periodically monitor the patients in absence of staff.
4.	IOT-ENABLED SMART SUSTAINABLE CITIES: CHALLENGES AND APPROACHES	This article through various diagrams and graphs portrays knowledge such as optimized management of energy. They analyzed key infrastructure for smart cities.

3. APPLICATIONS OF IOT

There are many applications of IOT in various fields. Some of the applications are listed below:

3.1 IOT in Industry

The applications of IOT technologies in industrial applications would increase the efficiency in terms of production and communication between operators and humans, devices and machines. For example: Industries can plant sensors (such as RFID and break beams) on track of assemblies so that to automatically detect the parts position and progress [1]. Obviously, there would be increase in competition in markets but that will lead to increase in quality and minimization in losses. Also industries can implant the sensors to detect the quality of products manufactured which will reduce the time which is wasted in checking manually and also reduce the cost that is spend in QMS (Quality Management System). Environmental sensors can be used to monitor some natural parameters. Like in case of pharmaceutical operation temperature and humidity sensors can be planted so that Managers can monitor those parameters and get alerted when they cross the limits. This can help in saving the lives of people working in that organization and chances of serious hazards can be reduced to some extent. At last industries can conserve fuels, reduce cost up to some extent and increase machine efficiency by placing sensors that checks where all the parts of the machine are working perfectly.

3.2 IOT in health care

One of the major problems about healthcare has been solved through integration of IOT In healthcare. Increase in healthcare has gone to next level because it brought more safety and care which is required the most. There is vast potential in different smart medical devices for various types of purposes that can be used for various types of purposes that include heart rate, skin temperature, movement monitoring, and many more. Prediction of different diseases and more than that prevention of life can me made possible through the use of IOT in health management [2]. Remote monitoring is also some of the applications which can be used in various difficult situations. In past the situation wanted some of these concepts when COVID-19 made the country heart out. IOT has made the distance between doctors and patients limitless [3]. IOT made a major impact on decreasing healthcare cost and resulting in improving treatments.

IOT has made the treatment process change to much extent by giving the doctors the opportunity to keep the tract of patients even if they are far away. The doctor can keep the track the patient's health at every second and help him with the solution if the situation worsens.

People suffering from asthma often suffer from attacks so in that case IOT enabled inhalers can be used which give the warning when it gets little sensation of difficulty in breathing [2]. IOT enabled inhalers can collect the data from the surrounding to figure out the root cause that why the situation occurred and also the frequency of attacks. It can also remind the people by giving the warning if people leave it at home or anywhere else [3].

IOT enabled robotic surgery can be used to detect the problem of the patient and give the result to the best precision. They must be able to handle critical situations with creating less of disturbance. They won't get hectic even if they see complexities. They won't create more incision and will be able to manage with less of test required because the model will be trained on that basis that they can figure out the problems and the solutions to be aided [10]. With a collaboration with Vodafone's global IOT and IOT Connectivity platform, barcode and labeled system specialist System One sends the diagnostic data in real time to medical department so there can be better connectivity between the patients and health monitoring staff and can manage the diseases more effectively. System One has impacted the health industries to much extent and mostly the results for diseases like TB, Ebola and HIV. Apple Watch continues to advance its health features with each up gradation like its (FDA approved) electrocardiogram (EKG) implanted in the Series 4 and both a menstrual health-tracking feature and a dedicated Research app added to the Series.

IOT can make health related equipment's and cost of cure reduces to much extent. It can also be used in modification of every lifesaving equipment's IOT based. Thus IOT will make people all around the globe more precious, and provide utmost personalized care and thus leading to fewer visits to hospital.

IOT can be used in healthcare by utilizing most of the applications in making the best hospitals which include smart monitoring labs, in modern laboratory it can also check the temperature in the labs to check for the CO_2 leaks [10]. If any abnormality is detected the concerned authorities are immediately notified.

Like it can also be used in the way some patient is admitted in the hospital and he does not have any relative or medical staff at present and his breath is going up and down very quickly then it IOT can be implemented in the breath count machine that it sends the warning message to respective doctors and family members. IOT is vastly changing the today's field and is being used everywhere such that in future decades we may see a large emerging technology that will provide the new recognition to the better comfort zone around us. IOT has grown to the point where it has the ability to contact every people on the planet at some point during their lives. Gone are the days when a patient had to wait an extended period of time for their check-up reports. Now the reports will be ready and communicated to the patients the very next seconds only throw use of IOT.

3.3 IOT in education

The rise of IOT and mobile Technology allow schools to improve their safety of their campus. It can be used in the way like if there comes any visitor he must be provided by digital wrist bands which can be used to track his activity and location. GPS enables the authorities to be implemented in school bus to track their location and route taken by it so both parents and school authorities can be sure of the student's safety [9] .For instance there always comes a situation that students either leave the tube lights or projectors open so it can be monitored by anyone and can be closed sitting at their own place. With the numerous academic applications make it powerful learning tool as the teachers and students are willing to adapt to its evolving IOT technology. One of the most tremendous benefits is Communication. IOT allows students and teachers to interact with each other. For example, Blackboard impacts in delivering quality education in efficient and quick way. It also allows administration and staff to stay connected with each other [8]. Web-based conversations have also become a popular feature of study halls, allowing students to interact with students and lecturers from all over the world. Students can broaden their access to knowledge and relevant learning material by using this flexible e-learning environment. If students are unable to physically attend class, they can learn, take an exam, and receive feedback from the teacher through the internet.

3.4 IOT in Robotics

By using IOT and robotics in just few years they continue to gain popularity for their productivity because of its immense advantages to various corporates and peoples. Due to their high level of accuracy, precision, durability, and speed, robotics have long been successful in a variety of organized industrial applications. While robots have grown more economically in recent years, there was a high cost factor during the early phases of deployment in the supply chain, which meant robotics needed to be evaluated and integrated effectively to prevent losing their value.

Robots can be employed in all the cases stated above be it security, military, healthcare, rescue operations, industries or any field. Especially in case of Military and all when the life of thousands of soldiers is at risk [4]. Robots can also be used in agriculture field mainly for all the purpose required for preparing a end product such as soil preparing, planting, monitoring, harvesting and all. Scientist have researched and predicted that by the end of 2050 earth need to produce 20%-40% more food to meet the shortage demand of food for the people [4]. According to few results in all the fields we may predict that IOT along with Robotics may reduce labor work and will save countless hours.

Robots will be employed in various factories for the work. Infect now also they are used but in today's condition we may few only one or two and also in only big factories. But in coming few decades we may it see it as a need for the very tasks. Because the demand will be more and work load on people will also increase in directly. So people will be managing another important stuff.

3.5 IOT in smart sustainable cities

Since IOT is still in its initial phase there is need of new models Implementation. By deploying the sustainability goals during design of IOT, full potential and economic benefit can be achieved.

Embedding of IOT in building smart city will be something like that will use less environmental resources and focus on improving more and more of comfort for peoples. Governmental offers, monetary gains and tax credits are some of the ways to achieve sustainability goals [6] .An optimized business model is necessary for designing IOT Projects. Following this new prototype, some cities started a process of doing innovation in different fields such as health, tourism, mobility and transportation [5].

The distribution of lots of data through connected IOT projects is very common which is seriously a major issue.The collection, data ,storage , maintaining privacy and security are some of the issues that to be solved .

The hindrance starts in the path of smart cities through congestion or traffic on roads. You may be thinking how? I will you the reason when there is traffic on roads pollution level increases and causes health problems. Health problems caused to peoples causes indirectly or directly to all the sectors.

With the rise in technology of IOT now we will be able to get smart, sustainable approach for travelling because the dataset will be shared through internet on devices. All the smart shortcuts and approaches will be guided by how much speed you should move, by what time you should pass through this path that you will be able to save this much amount of time. By measuring everyone vehicle's speed the map will design automatically the congestion area and the for that thing a solution map will be displayed for designated destinations [6].

We may also introduce where a smart city may demonstrate its commitment to sustainable mobility is to increase the use of electric vehicles within its city bounds, which applies to both public and private transportation. For this reason we may also use electrics vehicles like cars and busses which will reduce pollution emissions such as PM10, PM2.5, NOx, O_3, CO, CO_2, CH_4, and N_2O thus providing various benefits to citizens of smart city [7]. Furthermore, this allows the municipality to create an integrated network of charging stations on top of which additional services can be defined, such as an overall infrastructure for paying for electricity refills while also receiving an incentive for using electric vehicles (e.g., to be discounted from the taxes to be paid by the citizen. Everyday objects in the IOT include items having intelligence, communication, sensory, and actuation capabilities, such as machine–to–machine, vehicle to vehicle, and people to things applications. These are few predictions which is only on ground level but further there will be coming up gradations which will be much better than these such things.

5. CONCLUSION

The paper concludes at the end that there are various fields for implementations of IOT. It will definitely make our life easier. Since number of opportunities in IOT infrastructures will increase the life of the upcoming generation will increase and will be more comfortable. In this view the combinations of devices with IOT for providing smart and automatic intelligent systems is one of the most fascinating future trend. Smart city citizens' rights should be protected by the IOT's functionality and capabilities, which include intelligent systems and sensors. Further for the type of technologies we will be facing some challenges in the recent year but these challenges will form base for future advancement and research focus in upcoming years. However, we tried to provide a comprehensive report on IOT for the readers who are not only willing to initiate their research but also make advancements in the IOT sector.

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