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The study on internet of things, the overview

Sarthak tyagi, Dr. Meena Chaudhary, Udit Bansiwal, Dr. Narender Gautam, Mukul Jain
Department of Computer Science and Technology Manav Rachna University Faridabad, India

Abstract
In today's world we are all dependent on internet for our needs and daily work. So, the concept of internet of things help us to get connected to internet through our various daily need devices. The foundation of IOT is just intelligence. This is amazing how internet help us to regulate the efficient use of various resources, which the biggest challenging task in front of humans to day. IOT is seen as various devices connected to ease our lives. Its potential is large. The idea of what we called smart cities is no thing but connectivity of internet to various devices in order to make our lives easier. Various machines are connected to each other. The IOT is connected with various sensors to extract data either save it or use in a fruitful manner. Today's generation can't imagine their lives without internet whether it comes in terms of social media or in terms of their homework pasted from Google, or any other activity so we can easily say that this new era is the era of internet, era of IOT. But since every positive act comes with some disadvantages same is with IOT. IOT as a technology comes with various challenges that needed to be taken care of. One of the most impotent is security since various devices are connected to the same network it as very obvious if our data gets leaked and this is what we need to take care of. In this project we are going to discuss about the applications of IOT in various fields, the challenges that comes with such a great technology and how to take this challenge in order to ease everyone's life.

Keywords: Internet of Things (IOT), Connectivity, Smart Cities Security, (0.5) Resources

Introduction

Internet of things has emerged as various technologies with a number of different applications. A key construct of internet of things is that it connects everything to the internet to simplify our lives. Internet of things has various definitions and not a single one. Almost all things that are associated with internet of things usually contain a small-scale device like sensors, that are either constructed within the infrastructure or on the body of the device connected to internet. These sensors collect data from surroundings and then this get uploaded to the web. They usually get worked with low maintenance and high dependability.

A decade before, it was supposed to be a big thing if you own a computer that too a personal computer, and only few were able to get a laptop and get connected to the internet but if we talk about today, number of people are connected to the internet or we can say almost everyone is connected to internet today. Every person owns his or her own laptop and ha s internet connectivity in it. The scope of IOT has increased with a big percentile of 31% till 2017 and is expected to rise up to 30 billion people using internet till 2020. This is in huge use because of its efficiency, it has decreased human efforts a lot. By using internet in various fields, it has also reduced the use of paper work and hence it is environment friendly as well. Also, all the file works are removed so it's easier now to manage various records of people and we can access any information by just a single click which is obviously a thing t o be appreciated. Today internet of things has acquired a high usage in various fields such as health care, architecture, solar power management, industrial systems and various sports. In hospitals it's now very much simpler to keep records of each and every patient, their progress, medicine record and their account balance. Even in banks now intern et banking is in great trend. Humans always wanted to get their work done with a help of some sort of shortcuts and so IOT serves this purpose very easily. It's hard to believe that a device knows more about our healthy diet than a doctor, but it's the truth. People are staying fit with the help of various fitness apps in their smart phones. Watches are becoming smart today. You can make a call with a help of your watch along with knowing time. All these things are getting possible because of internet of things**.**

Technologies Supporting IOT

Internet of Things is a huge infrastructure for IT society that connects various machines and humans to one another with the help of internet and existing and evolving technologies. Internet of things is not a single technology but a mixture of various technologies with software and hardware programs and devices. Internet of things has made our work much easier by providing the integration of information technologies as it very quickly helps us to retrieve, store and process data between individuals or groups or between individuals and groups. Thus, internet of things is much more than that a simple internet connection as it not only connects computer through connection instead it connects all the devices that we use in our houses such as mobiles, laptops,
refrigerator, ACs, and many more. Thus, it is obvious that internet of things provides us with much more than that of normal communications between machines to machines, wireless sensory network, 2g/3g/4g etc. These are all enabling technologies that help the IOT to run its applications in our daily lives. But internet of things requires much more things than normal usual internet. It requires much more speed, agility and also very strict security and privacy actions. Since it's not easy for our existing technologies to provide all these on one platform so we need to upgrade our technologies so that IOT can be come under work.

1. Connectivity
Internet of Things Provides Us with Huge connectivity over internet with various devices and machines. All the things can
get interconnected with global infrastructure.

2. Intelligence
The original concept of IOT was not ambient intelligence as these not necessarily required internet structures but ambient intelligence and autonomous intelligence was a driving force for autonomous IOT. IOT has influenced our lives in every aspect as tiny sensor are equipped in our daily use devices based on computational and communicational capabilities connected through internet. As a result, it provides important data to the users and increases their potential to do work making their lives more comfortable. As an emerging technology ambient intelligence is making IOT a dependable platform as it can sense the people around and give relevant information without much human effort and hence we can easily say that ambient intelligence is going to change the way users perceive internet.

3. Flexibility
IOT connects various devices through various networks. Its flexible enough to work on different platforms and connects the users together through different networks.

4. Rapid Changes
In just one click any of the devices connected to the internet can remove itself from the connection within seconds. IOT is capable of handling such changes within its network.

5. Complexity
Since IOT is a connected network of various devices among each other, it is usually considered as a complex network to study due to huge network links. But being a practical approacher all users are not getting connected globally instead they just get connected to sub networks for the security reasons of their data.

Space Considerations
The geographic location of any user of IOT is being critical. It's always being upon the user whether to disclose his information about its place or not but nowadays so many enabling technologies has made this possible to track one's location. This technology must get used by the officials to track the criminal's location but its widely used by the culprits which is not a good act in our country.

IOT Architecture [2]
IOT architecture consist of different layer of technologies that helps in inserting, editing, manipulating, processing data and at times analyse the situation and retrieve the information. The following are the layers of on which IOT works:

1. Data Sensors
The lowest layer of IOT is made up of various tiny devices known as sensors. These sensors collect data and interconnects the digital and real world. These sensors are embedded in order to sense data such as temperatures, air quality, speed, humidity, pressure etc. and hence keep a record of all these. These sensors can measure a physical property and then convert it into signals that can be understood by the instrument. These sensors required an internet connection to do all this task and this connection can be provided either by LAN (local area network) or wifi or bluetooth.

2. Gateways or Network [3]
Since huge data is being entered through sensors now they require a high-performance network infrastructure in order to transport this data. With increased demand, we need high speed applications to run our programs successfully.

3. **Management Service Layers It**
helps in processing data that is being captured by data sensors through analytics or security control etc. Data management helps in management of data information so that we can easily get access of relevant data within thousands of raw data files. This reduces the risk of data leakage as only relevant data is being considered. Its records data in the forms of events such as temperature of various states, traffic jam on roads etc. Some of these data require long processing terms so that it can get analysed afterwards whereas some require instant action to be taken like for a patient in emergency ward. The best example of these that we use in our daily lives is GPS tracking, when we move on roads using GPS it along with showing us the path shows us the traffic on the road. To analyse such data, various analytic tools are being used.

4. Application Layer
Smart applications are being invented these days in various fields such as agriculture, sports, aeronautics etc. All these applications help us to withdraw data with just one click. As said above GPS is widely being used by users today and it is the best example of smart application.

Applications of IOT
Applications of IOT in Various Fields
IOT is being widely used in various fields such as agriculture, lifestyles, hospitals, universities, sports management, etc. due to its various useful and simple applications. Since IOT has provide us with many shortcuts to access our relevant data and so it is in great demand today. Following are some applications of IOT in various fields.

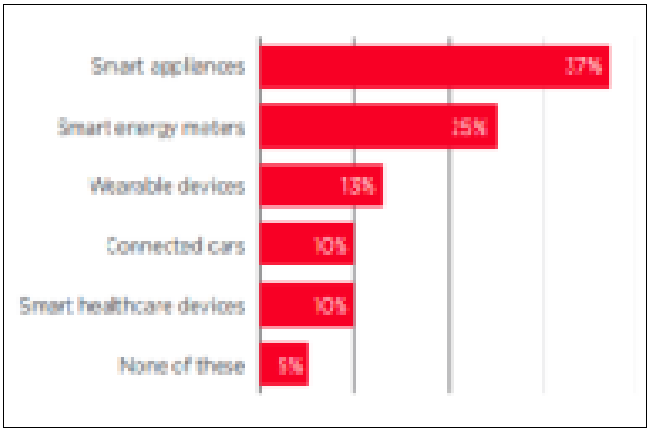

Fig 1: percentage of usage of IOT in various fields

1. Smart Appliances at Home
Don't be shocked if I tell you that you can now switch on your air conditioners before reaching home and can switch off your lights and fan after leaving the home!!! Yes, it's now possible with the help of IOT running smart

applications. It saves energy and also in case you forgot to switch off some of your appliances you can do it afterwards and saves lots of accident to happen. Now refrigerators with LED screen help us to know what's inside the fridge, what is going to expire and when, what are the things we need to purchase that are running out of stock available on the Smartphone app and that helps a lot to humans who are very much busy in their works. We can n ow get to know the temperature, humidity values with the help of various instruments.

Scared to be alone at home, now no need to be scared as there are various alarm systems, cameras available in the market now. With the help of IOT applications, without being at home we can keep an eye on our home by accessing the camera on our smart phones. We can control the activity of our children left alone at home, we can see if any stranger is entering the house. Also, if some item is missing from the home we can easily get to know with the help of camera recording all around our house.

2. Wearable Devices

These wearable devices are in a great trend nowadays. It's nothing but some devices that we can wear either on our hand as a wrist watch or somewhere else. They keep a record of our fitness by calculating the amount of exercise we have performed or the number of steps we have taken, can tell us the environmental conditions where we are standing by calculating the temperature, humidity etc. They are highly used by people because they are highly efficient, use low power and are small sized.

3. In Agriculture

Since population is increasing rapidly and so is the need for food. So the agriculture fields are highly being focused. With the help of latest technologies farmers can now monitor the climatic conditions and ensure their crops are given pro per fertilisers and nutrition. They can now access the locations where they can take their animals for grazing without being harmed. They can check the air quality and protect their crops from getting in a bad quality. By monitoring their crop production, they can minimise the wastage of crops and yield better and more good crops. They can also control the usage of water for their crops so that excess of water is not given to crops that can ruin them or less water is not given which can cause lack. Hence IOT is helping farmers in becoming smart farmers.

4. Smart Retailing

Retailers are now getting a chance to directly connect to their customers with the help of Smartphone apps (IOT). That has increased their productivity a lot. Customers are now not required to go to the shops and purchase, instead they easily sit at home and shop.

5. Healthcare [4]

IOT has brought a massive change in healthcare of people. Now with the help of these applications, health of people in hospitals or old age home can be monitored and can be taken care of. Now this activity doesn't require various humans to look after each and every person which makes it easier to take care of lot of peoples and also chances of missing any patient check up reduces a lot. Also, the medications and vaccinations kept under frozen conditions can be maintained at required temperature using IOT applications. They can monitor the temperature and maintain a well-defined temperature under which the medications are kept well. Also, nowadays toothbrush with bluetooth connectivity are coming with the help of which we can collect the statistics of our brushing habit and then show it to our dentist for proper verification. The bed on which when we sleep are connected with various devices that check our breathing, heart rates etc. and that can be shown to doctors for proper medications. Also, now from internet only we can get our medicines and doctor advice as well.

6. Smart Cities Implementation [5]

- **Track Location**

IOT is helping a lot in development of smart cities. With the help of IOT, now it possible to track location of various androids, for example if u want to send your address to your relative so that he can reach up to your house instead of typing the address which will cause problem to the relative as well to find the exact location in one time, you can now send your location through WhatsApp or any other application, google map will show him the route and he can easily catch up to your location.

- **Parking**

Also parking facilities have never been so easy as with IOT applications. It shows the available space to the one by whom the car needs to be parked and it also prevents illegal parking which is a very big issue in our capital, Delhi. In areas near Lajpat Nagar government has provided parking space to every house so that there is no clash in parking.

- **Monitoring Memorial Buildings**

  Since to maintain the memorial buildings for several years is not an easy task for humans because there are several cracks and vibrations, occurring in the building that might not be monitored by a local inspection officer. But with IOT applications it makes it easy to identify the cracks and vibrations in the buildings.

- **Energy Monitor**
- **The energy from various stations in our houses can be monitored and calculated with latest IOT applications.**

- **Smart Street Lights**

Nowadays smart street lights are being implemented which helps to save a lot of energy. It adjusts itself according to the intensity of light outside. It automatically switches off when not in use. In today's world where resources are limited and population is increasing day by day, we need such kind of applications that helps to reserve our resources.

Advantages of IOT

Advantages and disadvantages of

1. IOT [3] **more Data more Reliabilty**

Since because of IOT management systems more data is visible to us whether it comes in terms of grocery shopping or clothes shopping, when we have more items displayed on our computer screen without us being getting out of home in such a heat. Then obviously we could choose more wisely what we need to purchase and what not. Not only in terms of purchasing even if we want to rent a car or our house or want a hotel or loan, all of these can easily compare and then we can choose what we consider best for us.

2. Time
It is very obvious when we can do all of our work sitting at just one place. It saves a lot of time. In such a busy life of humans, internet of things helps us to save a lot of time whether it's about getting relevant information in one click or checking out what we need to purchase for our kitchen. IOT is doing its job very well.

3. Money
The work that earlier was used to do by many humans is now getting done with just one computer which saves the salary of lot of employers for the company. Also, it removes humans who were kept as in-charge to monitor things and appliances. Now this can be done with various smart applications.

4. Various Applications
IOT is being used in various applications that ease our work.

Disadvantages of IOT

1. Platform Fragmentation
Since IOT applications are being run on different various hardware and software, sometimes it becomes difficult for an application to run effectively and perform well.

2. Privacy
Privacy is a very big issue in terms of IOT because you have uploaded all your account details, your food habits, your social media account, all this data is not a common information that must be shared within your friend circle. There is a very big chance of your account being hacked and data get misused so using IOT applications, safety is at a big risk.

3. Data storage
It's a very big task to manage, interpret and store the vast amount of data that is being captured by the sensors. All the IOT producing companies need high storage requirements to store this data.

4. Loss of Jobs
Since now the work that was performed by various of humans is being done by just one computer. That results in the loss of jobs of various human. For the company, it is beneficial as it saves the salary of those employers but from the employer's perspective this is the disadvantage of IOT.

5. Environment Sustainability Impact: The IOT technologies are using heavy metals and highly toxic chemicals which are not recyclable and thus harms the environment.

6. Cost Vs Usage
The IOT applications are much expensive till now and so it is not easily accessible for many users.

Adoption Barriers [1]

1. Interopability
IOT is focused over connecting the virtual world with physical world and doing this is a not an easy task due to heterogeneity of various technologies, platforms and communicating medium. IOT can't be successful because in future multi vendors will come with their different ideologies and that will someday result in non interoperability. Applications used by IOT are designed for various purposed on various platforms which makes it difficult to reach on a globally accepted common platform.

2. Privacy and Security Concerns
This is mentioned many a times above that if we are dependent on IOT applications we are putting up our data on risk. So, to make it successful in future we really need to work upon the security and privacy issues of our data.

3. Expensive implementation
Since IOT applications are very expensive they can't be of much use to various companies. Companies want to design their data for cloud-based models where they can store their data but this method can take year without revenue.

4. Lack of Knowledge
Many people are not aware of the upcoming new technologies and all these coming technologies are of no use to them. We need to make them aware about these.

Conclusion
We can clearly see now that IOT has a lot of potential and it can change the lives of humans in upcoming years and the way people look over at web is also going to change. The concept of smart cities is soon going to be implemented all over world. It's a great topic for researchers as it has various applications, number of technologies associated, heterogeneous of various communication systems and a great architecture. But as everything comes with its own advantages and disadvantages this also has many disadvantages as discussed. The most relevant and important one is privacy issue. If we need to make our world a digital world we need to focus on such things. Many users today are scared of being a part of this digital world because they are scared of risking their data as well as many of them are not even aware of what their computers and smart phones are capable of doing. Also, many people are not financially stable enough to afford such expensive technologies and smart phones and personal computers. So, if we actually want this concept to get success we need to wok upon the drawbacks. If all the drawbacks are removed with the help of evolving technologies this world will surely become a better place to live in.

References

1. IOT-An Overview, Anupama Kaushik, 2016, 2. Internet of things-IOT: Definition, characteristics, architecture, enabling technologies, applications and future challenges, Keyur M Patel, 2015.
2. IOT and IT'S smart applications, Vandana Sharma 1, Ravi Tiwari2, 2016
3. Smart Hospitals Using IOT, Pooja Kanasa1, Sneha Gaikawad, 2016.
4. Smart City Implementation Models Based on IOT 6. Technology, Jachak Byun1, Sooyeop Kim2, Jachun Sa3, Yong -Tae Shin4, Jong -Bae Kim5, 2016.