

# Futuristic Scope Towards Iot

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**ABSTRACT:** Now a days IOT is very famous among the researchers and the so-called Computer Scientists as it allows a mode of communication between the objects and machine. IOT is basically a system real time objects are combined with the sensors and are attached/communicated with the internet via wired network or the wireless network. There are various connections which can be built by IOT sensors which are like RFID, ZigBee, WIFI and Bluetooth gives the scope of smartness such as smart city, smart home etc. In this paper we will discuss about the various applications of IOT and its future scope. Also, in addition we will face many challenges which are not allowing using IOT. [1]

**Keywords:-** Iot ,Client - server ,technology ,internet, communication, sensors

## I. INTRODUCTION

As the concept of a network of smart devices was discussed early so Let we start from 1950s when the first internet begins with the first connection of the electronic computer, initially the concept of the WAN (wide area networking ) oriented in several computers of US, UK and France[2]. Similarly we have a huge record of history which visualizes that how the IOT comes in trend, but here we are not going too far, our research is on current record for the same –

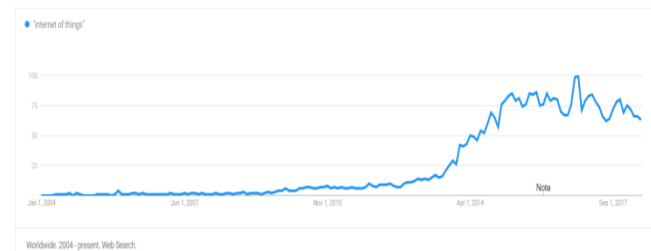


Figure 1 Internet of Things [1]

The above graph is able to visualise the variation that how much the IOT now in trend of education and use. The graph is use to show the consideration of usage of IoT from 2004 to 2017. There is lots of researches and evaluation in IoT which deals to the human efforts and reduce those all by there different protocols and infrastructures.

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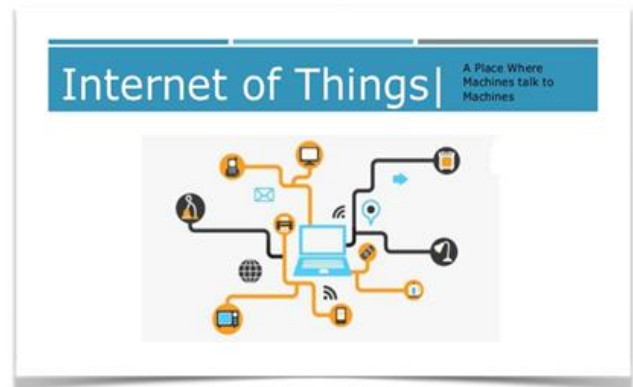


Figure 1 Internet of Things [4]

Technology is updating with new researches and ideas which was just a dream, now again a idea is in air but not new. In the early 2000's lots of scientist working and going for the different way to use the things which is IOT ( Internet of things ) But, What way could we use to use the things, By connecting with a world wide wed to make a smooth communication. How would we connect everything on earth, What type of connection helpful to communicate with devices, What changes would need to be made to the existing internet infrastructure to make communication in between billion of new devices. There is multiple questions which leads the curiosity to make and search something new. The IOT (Internet of Things) is the also known as the inter-network of physical objects in order to embedded the devices, equipment, building, vehicles and all other objects with software, sensors, actuators and all new technology in manner to make the smart communication between human-to-objects and object-to-human. IOT is the integrated future of internet that will be referred the properties of internet as a dynamic global network infrastructure and will have own configuring ability across the standard and with differ-differ communication protocols. Based on the traditional information carriers including the telecommunication network, IOT is a network that interconnects ordinary physical objects with the identifiable addresses that provides intelligent services.[1] IOT enable the sensors and ICs to sense and control the things remotely on the existing network, which enables the communication and exchange data between objects-to-object and human-to-object. These each things is uniquely identifiable through its systems but is able to inter-operate within the existing internet infrastructure. According the CISCO the on changing time the number of users will join the internet and hence the number of objects to be connected on network will also increase and the use of IPs and on seeing this the IPv6 will help to introduce the number of devices connect to internet. Now a days the IPv4 is also there but according to IEEE the total remaining IPs will finish soon and can't fulfil the requirement of IOT and connecting devices. According the global technology reports 12.5

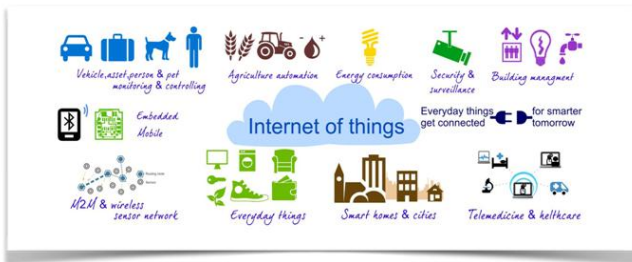


## Futuristic Scope towards Iot

billions of devices are already embedded in 2010 and about 50 billion devices will be connected by 2020 to the internet to make the use of things comfortable. As IOT is the fresh here in India so the new coming students and researchers are excited to join the IOT soon even the new students are ready with new ideas and thoughts. However, From the consumer point of view every technology hold both positive and negative points, But somewhere it is very close to reduce Human effort. There is many research data on IOT in India, it is now in practise to make it a education subject of developing country. There are some studies on IOT business models that were directly applicable to national and regional development in India.

### II. APPLICATIONS OF IOT

Now-a-days IoT (Internet of Things) is used in various fields. It is now become very common that every company launches some IoT applications nearly everyday. Some of the applications are given below:-



**Figure 2 Applications Of IoT [2]**

**Airlines:-** To track the locations of the equipment which needs maintenance an equipment tracking apps are used. Also IoT has made the communication easy for the airlines. For e.g.:- Virgin Atlantic are making Boeing 787 planes and cargo equipment connected to sIoT devices. Also JetBlue has taken technology into action by using IoT which is used to automate the process. As the IoT is in trend and came to give a new face to the technology, so here in airlines, it would be safe to say that the internet of thing will be able to play a vital role in airline operations, even it is already in use and have a very good impact on the industry. As it is being used for everything from baggage tracking to cabin climate control. By IoT the airline effectively reduce or even eliminate some of the common complaints in the industry. Such as the customer service issues, flight delays, lost bags. Automate the process. Similarly the Delta's Baggage Tracking also comes in market in 2015 to reduce this headache by using Frequency Identification (RFID) baggage tracking technology, Delta has achieved 99.9% success rate that time and become the best among US global airlines.

2) **Pharmaceutical :-** As we know the older technology for synchronization was time-consuming and highly susceptible to human error. Different data formats used in manufacturing plants for different processes to make data access, so here the IoT technology use to get real time access and transparency of operation throughout the manufacturing process from product through distribution. Johnson & Johnson was the oldest company which use to adopt these technology of IoT, the sensor technology was used to eliminate the need for separate testing and sampling step in the manufacturing process.

There are various apps which use the principle of IoT to track the delivery of the supplies. Many companies use IoT technologies to get the access to real-time data so as their work becomes easy. Visibility of operations had become very easy with the help of IoT. For e.g.:- Many hospitals and Pharmaceutical companies use Connected Inhalers, Ingestible sensors, Connected contact lenses and Coagulation testing.

3) **Media and Entertainment:-** As the IoT is in the early stage of development, the media and entertainment industry already in race to adopt the techniques of IoT in, Large publishers and broadcasters which control the content and its delivery has switched to digital business models and have the network to support high-speed transmission. According to a latest report in there was an approx. \$47.2 million expenditure on IoT. Now, it is projected that in 2018 there will be \$72.6 million expenditure on IoT. The same study founds that by using of apps on smartphone and tablets or on other digital devices were involved in this market to raise the percentage of usage and interaction of people to media.

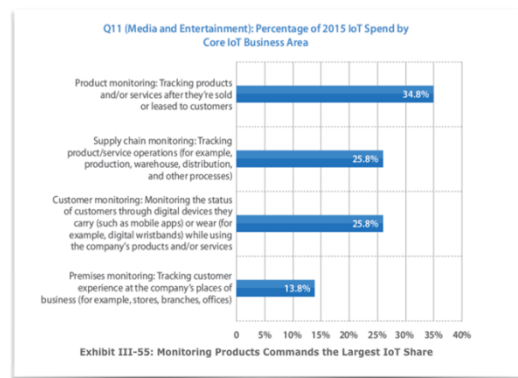
4) **Building & Home Automation:-** When we use to talk about Automation a concept known as Wireless Sensor networks (WSN's) came into our mind. IoT is used in the field of automation as it have the following feature:-

- Energy Efficiency
- Safety and Security
- User comfort

Building and home have that all thing which is need of human either from window to doors, from fans to light, even the detachable roof and imported furniture. These all things are very important part of any building and home according to human so here the IoT came in this field to reduce those all effort which use in opening of door, window and roof. Even in 2015 there was a lock introduced which totally operated by internet from anywhere at anytime, to prevent from unauthorised peoples. Even now a days the home appliances are use to by internet e.g. – AC, TV, Anti-Theft door lock, All home electric circuit. [4][5]

### Recent Trends in IoT

3.1) **Smart Home Devices :-** It is being notice that their is an increasing trend in Smart Home Devices. It is very difficult for everyone including youngsters and elders to resist the loveliness that IoT provides. Their are many examples in Smart Home like:-



**Figure 3 Exhibit III [6]**



<http://sites.tcs.com/internet-of-things/industries/media-and-entertainment/>

Recently there is a product which is a hair dryer which tells us that warn us when the heat of the dryer goes up so that fire is prevented.

There is also a product known as Curb energy: Monitoring device which is a coolest way to save energy as it gives real-time energy consumption.

-A company named Sonos developed wireless music system so that we can play it anytime and anywhere. No need of wire.

-Philips developed Hue Smart Light bulbs which can be programmed so as that when anyone sends a message the bulb turns Red or something else.

**3.2) Healthcare :-** There is a recent increase in Healthcare using IoT. Healthcare providers have become more tech-savvy in recent years. The expected rate in the medical things can grow @ 26.2% in nearly 4 to 5 years. Many examples of Healthcare are :-

There are many connected inhalers which are used with immediate reference to allow doctors to keep an eye on the treatment status of their respective patients.

Ingestible sensors are a good example. In this case a pill dissolves in our stomach which sends a signal to the sensor on the body and sends the result on the smartphone app.

Depression-fighting apple watch helps patients with major depressive disorder (MDD). It is designed to monitor the cognitive function. In this both passive and active data is collected.

This is a first device named as coagulation testing which helps patients to stay in the range and lower the risk of any major stroke or bleeding.

**3.3) AI and Big Data :-** AI stands for artificial intelligence and has grown immensely in the recent years.

Some examples are:-

iRobot Roomba developed the first automated vacuum cleaner in 2002 founded by MIT roboticist. It also has a feature like to remember a home layout.

-There is a device by Nest's which learns the regular temperature and also adapts to their schedule by lowering down the energy use.

There is one of the largest shipping companies UPS, which has been using this big data analytics to make the efficiency good and to save the money.

**3.5) IoT Security :-** As applications of IoT is increasing day by day in the recent years so the security is also an issue which is not to be dealt carelessly. As the network is expanding the volume of the data is increasing and there is one of the major problems is that their information is at risk. Some examples are:-

There are many systems named as traditional identity and access management which was developed to identify humans and not the machines.

As the number of IoT devices are creating a large amount of data. Smart utility metering systems are already built which have the ability to generate extra bytes.

-Recently there was a Ransomware in 2017. For example:- The WannaCry and NotPetya caused widespread disruption to many organisations in the world. So many IoT devices are improved with security features to make it difficult for the hacker to be turned into botnet recruits.

### III. CHALLENGES IN IOT

**Security In IoT :-** As we all know that with the increase in IoT many devices are being connected to IoT. So with the increasing number of users the privacy of the customers are also being decremented. So to prevent the leakage of data and to assure that security is not at all compromised. There are basically 5 types of Security. To give a complete overview, we should summarise some of the security requirements in IoT and should explain these requirements as the properties in the IoT. For this, we will divide the requirements into five groups which are as follows:-

- Network Security
- Identity management
- Privacy
- Trust

#### 1.A) Network Security

Network Security is a large topic to speak on. Hence we can divide it into Confidentiality, authenticity, integrity and availability.

**Confidentiality:-** Interconnecting the things with the IoT requires confidentiality as a key feature so as to prevent the loss of sensitive and confidential data via Internet Transmission. For this basically there are basically two technologies known as IPSec (Internet Protocol Security) and TLS (Transport Layer Security) which helps us in maintaining the confidentiality.

**Authenticity:-** When our resource connects to IoT then how to decide whether the connection is right or wrong. Authenticity helps us in providing the proof that the connection which is established is authentic or not. E.g. TCP (Transfer Control Protocol) and TLS (Transport Layer Security).

**Integrity:-** Integrity is helpful as it ensures that no data is lost whether the transmission is going on or has done its completion. So as to provide no loss to the customers. In this TCP and TLS may be suffice.

#### 1.B) Identity Management

Identity management plays a specific role in IoT as the connections with the devices are getting increased day by day. This is also because the complex relationship that IoT possesses between the users, owners, devices and the services. Therefore there is the crucial need to pay attention to the authentication, authorization including revocation and lastly accountability.

The mere quantity of devices in the IoT may exceed the capabilities and responsibilities of direct authentication, e.g., If a user possesses many devices with his or her service credentials. Hence, there should be methods to claim ownership and take control over the devices which are required.

In the IoT scenarios, interactions are over multiple domains. For e.g. Kerberos assumes a single domain that encloses devices, owners, users. Therefore the solutions authorise with untrusted devices, which allows access across the domains.

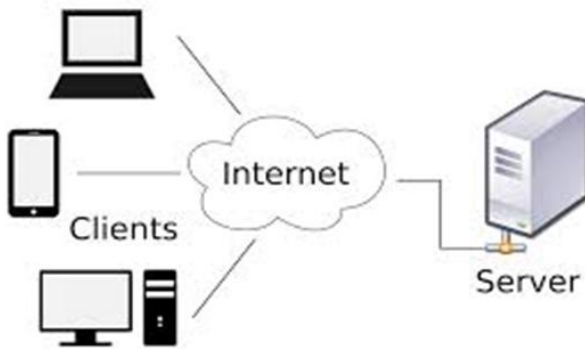


Figure 4 Client Server Paradigm

Accountability assures that every action is an authenticated entity. It is a major challenge due to reuse of devices, services and for many purposes.

### 4.1.C) Privacy:-

The most dominant challenge which is to be considered in IoT is privacy. It is because of the involvement of many citizens and loads and loads of data collection. We define Privacy variously on Data privacy, anonymity, pseudonymity and unlinkability.

Data privacy is confidential data transmission in that sense that stored data must not be leaked out such as identity of a person. Anonymity is the property which is described as that a single person is not being identifiable as one of the source of data or an action. Anonymity is desirable to comply minimisation laws.

### 4.1.D) Trust

Another crucial requirement in the IoT is trust and it is one of the most biggest challenge in IoT due to the known fact that is highly distributed and as well as on qualitative data. Trust can further be classified into Device trust, Entity trust and Data trust. Due to high dynamics and cross domain relations Device trust is the only hope on which we can rely on. Entity trust in IoT refers to the expected behaviour of the participants such as persons or services. Data trust occurs in the IoT in two manners. firstly, Data is started from many and potentially untrusted devices and secondly IoT services derive new data. [18].

2) **Connectivity in IOT :-** As the users are increasing and IoT stands for Internet Of things which means all the devices are connected to The Internet. So to make the things work clearly we all have to contribute in making the stability more effective. So connectivity is the main issue which is a challenge. The biggest challenge in the near future and at currently present scenario is of connectivity which may defy the present structure of current communication models and their technologies. Currently we rely or use the centralised, server/client model to authenticate, authorize and connect different nodes in a network.

### 2.1 Server/Client Paradigm.

The Client server model is a distributed system that divide the tasks between the providers of a service which are known as Servers, and those who requests those services which are called as clients. Clients and servers communicate between a computer network on different hardware. It is

possible that both the client and server may reside in the same system. In this model a server hosts can run one or more programs which share the resource with the clients. A client does not have access to share its resources, but it requests server to provide the resources server function. The major role of clients is to initiate communication sessions with the servers which waits for the incoming requests.

Examples:-Emails, Network printing and the World Wide Web.

**For Example :-** When a customer access services like online banking with the client, the client initiates or start a request to the bank's server. The login credentials are stored in the database, and the server accesses the database server as a client. The application server interprets the data by applying the logics according to the bank, and finally gives the output to the web server. Finally the web server returns result to client for display. In each step of execution the client-server message exchanges, computer requests and return the data. This pattern is known as request-response messaging pattern. The above example illustrates a pattern applicable to the client-server model. This model is enough for the current communication between the devices and Iot, where hundreds or even thousands of devices are involved. But with the increasing network i.e. when the network grow to be billion or hundreds of billions of devices, centralised brokered systems might fail. Such types of system will be requiring huge investments and maintaining the cloud servers that can handle large amounts of Information Exchange. And if the server goes down the server will also go down. There might be many other solutions such as peer to peer communications where devices identify and authenticate each other without the involvement of a broker.

3) **Compatibility & Standards:-** Iot is developing in a great manner. It is getting in touch with many technologies and soon will get advanced to convention. This will become a serious problem to cope up with and will demand new additional software and hardware to communicate amongst the devices. Due to non availability of Non-unified cloud services, standard M2M protocols and many operating system which have some compatibility issues. Devices which use these technologies or are based on Iot will become outdated in the near future. We have to find new softwares and hardwares that can deal with it. As IoT needs a lot of devices which are used to interconnect with each other so as to fulfil this we need to make every device compatible with each other. As IoT does not have proper standards which leads to the poor design. In this case security are the major issues which need to be fulfilled. We believe in future many strong standards should be developed for IoT devices. Technology conventions incorporating communication protocols are the collection of activities that store various databases of many influential people. If the lose it it can be a great disaster so many standards are set by the committee so that the scale, scope, and frequency of the data is integrated.

4) **Intelligent Data Analysis:-** As to make the required actions their needs are to be analysed with the huge amount. It is very difficult to handle the unstructured data. IoT has changed the way for different industries and their way of doing their business. There are many industries like the transport industry, Agriculture, Manufacturing industries and logistics which are going for smart technology for increasing their businesses.

The final step in the implementation of IoT is the revelation about the data for analysis. The analysis procedure is based on cognitive technologies and models. There are certain parameters that cause intelligent actions to be incorporated in IOT, some of them being lesser device cost, enhanced device functionality, the machine "influencing" human actions through behavioral-science rationale, deep learning tools, machines' actions in unusual scenarios, information security and privacy and device interoperability.[3][11]

**IV. FUTURE SCOPE**

IoT is not that concept which is very new, Infact it is very old and is currently used in many of the Industries. Like in Army,Space research, automation and navy.As the time will pass on the techniques in IoT will also be advanced.

**Smart Home**

Now a days there are many applications which are available on IoT but in future there is a possibility that the things which we are using can automate with the faster decision will communicate instantly.Also there will be effective automating and will be energy efficient .



Figure 5 Smart Home [7]

**Smart Farm**

As we all know that Smart Farm is an idea which does good in agriculture business. In future there is a possibility that Smart Farm techniques can be used which are high precision crop control, data collection and automated farming techniques. This will be very energy efficient.



Figure 6 Smart Farm [8]

**Smart Transportation**

Companies like OLA,UBER has a great platform, which uses IoT linked



Figure 9 Iot Tracking

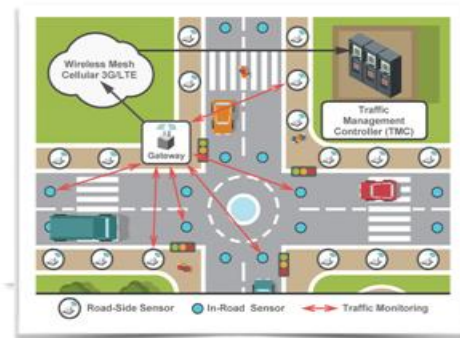
Figure 7 Smart Transportation [9]

with our cars, motorcycles and bikes etc .In future IoT will be to a great extent for the smart transportation . For e.g. Suppose if we are travelling in a bus to our home town and while travelling we get updates that where we have reached and other options like live tracking and support and many other.This will show safety and comfort in Smart Transportation.

**Personal Assistants** Our new trend in IoT is about Personal Assistants and bots. There are many bots in present which are Siri From Apple, Cortana From Microsoft and Alexa of Amazon Echo. Their responsibilities in today's era is to set an alarm or adjust thermometer or to make on /off the lights.Now-a-days IoT is a great breakthrough in web development. [2]



Figure 7 Personal Assistant[7]  
**Emergency Response time**



In this the Lively system aims to help people who may have medical problems.

The central hub connects to a smartwatch that will indicate to family members that the wearer might need help. It also enables the wearer to alert their family or an ambulance that they require assistance in case of a fall or other mishap. Passive sensors placed around the home can also track activity, enable medication reminders, and send out alerts for things like missed meals or decreased physical activity. The Android app even lets monitoring continue when the wearer is away from the hub. IoT products like the Lively system are helping more seniors live independent lives instead of requiring in-patient or assistive care.

### Iot Tracking

On a very large scale, the Internet of Things can help a great deal with logistics. For example, DHL provides shipping, warehousing, distribution, and supply chain management all over the world, and this requires a huge amount of communication. DHL released a report detailing some potential uses of IoT technology that includes vehicle monitoring and maintenance, real-time tracking of packages, environmental sensors in shipping containers, information-gathering on employees and tools, and a number of safety-enhancing features for vehicles and people. While it may take a while for all of these kinds of technologies to emerge, the efficiency of logistics and shipping could be significantly increased if they work as expected.

## V. CONCLUSION

The paper goes through the various aspects of recent trends in Iot and future scope of Iot. Though Iot is getting challenged by some major problems, the situation may get better in the near future. It will get better in the future because of the new protocols, new hardwares and new softwares. These techniques will help in making Iot better. The above paper also deals with the challenges in Iot. While using data collected from sensors wisely, dependency of IOT on mobile networks, significance of the data generated from different devices, importance of networks alongside datacentres, need of a secured service infrastructure with remote control options, evolution of interoperability standards, heterogeneity and openness are some of the issues that need to be addressed, security and privacy of data will play a major role in how the picture of IoT will look like in the coming decades. Parallel to it also comes the challenges faced by this technology that pose a threat to its success. Every aspect including technology, business, society and law resist the success rate of IOT. Acceptance of technology by people is also essential and should be taken into consideration during its development as people who are not fond of using gadgets, smart devices and do not feel comfortable dealing with technology will have a difficult time working with the complexity functionality IOT will engage them with. It's high time to deal with the factors that might significantly bring down the mighty future of IOT. [12]

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