

# Internet of Everything: Future Internet

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**ABSTRACT:** Nowadays Internet of everything (IoE) gained a great attention from researchers. It becomes an important technology that improves human being life, by allowing a communications between objects, machines and everything together with peoples. Technology analysts and research firms frequently used the term “Internet of Everything” over the past couple of years. The Internet of Everything (IoE) brings together people, process, data, and things to make networked connections more efficient and valuable. IoE turns information into actions that create new capabilities, richer experiences, and new economic opportunity for businesses, individuals, and countries. The real world things, connected to the Internet via wired or wireless network structure with sensors attached to or combined to these things. These sensors can use different types of connections such as RFID, Wi-Fi, Bluetooth, and to allow wide area connectivity using many technologies such as GSM, GPRS, and 3G in addition. IoE is generally viewed as the next phase of the “Internet of Things,” In this paper the concept of IoE applications and future possibilities for new related technologies in addition to the challenges that facing the implementation of the IoE are reviewed.

**Keywords:** IoE, IoT, IoE Applications, Future Technologies, healthy Environment, intelligent Manufacturing, Healthcare, Bigdata, Fog computing.

## INTRODUCTION:

When the Internet was developed, there was a desire to connect “everything” to it. From the handful of computers that made up the Advanced Research Projects Agency Network (ARPANET) the Internet now connects from 10 billion to 15 billion devices but it is the only 1 percent of things that are connected to the Internet today. As there is desire to connect more people and new types of information and these “things” add capabilities like context awareness, increased processing power, and energy independence, we enter the Internet of Everything (IoE) — a network of networks where billions of connections create unprecedented opportunities as well as new risks.

The term Internet of Everything (IoE) refers to devices and products connected to the Internet and outfitted with expanded digital features. It is a philosophy in which technology's future is comprised of many different types of

appliances, devices and items connected to the global Internet. The term is somewhat synonymous with the Internet of Things (IoT) Idea behind IoE is that the machines will generally become smarter by having more access to data and expanded networking opportunities and Internet connections will not be restricted to laptop or desktop computers and a handful of tablets, as in previous decades. [1]

## A. Factors that accelerate adoption of the Internet of Everything:

1. *Reduced Costs*
  - Network capacity is becoming affordable by removing bottlenecks on information flows.
  - Cost of connecting devices is decreasing very fast.
2. *Technology architectures are making adoption easier*
  - Numbers of workers that migrating to smart phones and connected devices are increasing vastly.
  - Networks have become more smart and intelligent.
3. *Different user with different expectations*
  - Next generation of workers expects video, mobile, visual, virtual, and social collaboration.
  - Number of consumer options is increasing rapidly.
4. *Disintermediation / reintermediation*
  - cutting out the middle man due to IoE
  - Intermediaries who had previously been removed will be reintroduced based on IoE

## I. COMPONENTS OF IOE

A. *People:* due to IoE people will be able to connect to the Internet in various ways. Mostly people connect to the Internet through devices like PCs, tablets, TVs, and smart phones and social networks such as Twitter, LinkedIn, and Pinterest. People will be connected in more relevant and valuable ways as the Internet evolves toward IoE. For example, people will be able to swallow a pill

that senses and reports the health of patient to a doctor over Internet, in the future. According to Gartner, people themselves will become nodes on the Internet, with both static information and a constantly emitting activity system.

B. **Data:** generally devices gather data and send it over the Internet to a central source, where it is analyzed and processed. As the capabilities of things connected to the Internet are becoming advance, they will become smarter by combining data into more useful information. Instead of reporting just raw data, connected things will stream higher-level information back to machines, computers, and people for further evaluations. So due to this transformation of data into information in IoE, people make faster, more intelligent decisions and can control environment more effectively.

C. **Things:** This component of IoE includes sensors, consumer devices, and enterprise assets that are connected to both the Internet and each other. These things will sense more data, become context-aware, and provide more relevant information to help people and machines in taking valuable decisions more effectively and faster.

D. **Process:** Process defines how people, data, and things (everything), works with each other in the connected world of IoE. It is important to define correct process so that connections become relevant and add value because the right information is delivered to the right person at the right time in the appropriate way. [2]

## **II. APPLICATIONS OF IOE**

Internet of everything proved to be very useful in human life, hence making life easier, safe and smart. There are many applications areas in our daily life for IoE like cities, homes, transportation, energy and smart environment.

### **A. Smarter Cities**

It will become necessity to employ IoT technology in cities development so that the cities can be viewed as cities of the future and smart life (smart city). It requires a careful planning in every stage, with support from governments and citizens to implement the internet of everything technology. By employing IoE technology, cities can be improved in many ways, by improving infrastructure, public transportation, managing traffic congestion, and keeping citizens healthy and safe[3]. All the systems in the cities like transportation system, healthcare system, weather monitoring systems and etc., should be fully

connected so that people can access the database of airports, railways, transportation etc. anywhere by the internet. So the cities will become smarter by means of the internet of everything. [4]

### **B. Advanced buildings and homes**

Homes and building are automated using Wi-Fi's technologies primarily due to the networked nature of deployed electronics like TVs, mobile devices, etc. these devices can be used as gateways for IoE applications. IoE can be used to develop platforms that integrate the building automation with entertainment, healthcare monitoring, energy monitoring and wireless sensor monitoring in the home and building environments. By the concept of the internet of everything, homes and building can smartly operates many devices and objects, like lighting, environment and media, air control and central heating, energy management and security[5].

The Internet of everything (IoE) will provide efficient building management systems which is a part of a large information system to manage energy use and energy procurement and to maintain buildings systems.

### **C. Better Healthcare**

Hospitalized patients should be monitored continuously and constantly, this can be achieved by using IoE monitoring technologies. Sensors are used to collect information and gateways and the cloud are used to analyze and store the information and analyzed data are streamed wirelessly to caregivers for further analysis and review. This will replaces the process of having a health professional come by at regular intervals to check the patient's vital signs, instead providing a continuous automated flow of information. It will also improves the quality of care through constant attention and lowers the cost of care by reduces the cost of traditional ways of care in addition to data collection and analysis. So a small, powerful wireless solutions connected through the IoE can be used for monitoring patients and These solutions can be used to securely capture patient health data from a variety of sensors, apply complex algorithms to analyze the data and then share it through wireless connectivity with medical professionals who can make appropriate health recommendations.[6]

### **D. Better Transportation and Mobility**

The transportation system should be fully developed for the wellbeing of the country. IoE includes a road condition monitoring and alert application which constantly monitors the condition of roads. IoE provides better control over transportation and efficient connectivity of all vehicles. IoE includes sensors which provide better

routing of vehicles and speed control and also aids in traffic management and overall governed by multi-technology dissemination. IoT can also be used in transportation is an electric vehicle, which is an important means to reduce both the fuel cost and the impact of global warming have also gained considerable attention from drivers. [7]

### ***E. Intelligent Manufacturing***

A smart factory will always seek changes in how products are invented, manufactured and shipped and also focus on improvement on worker safety and protection of the environment by enabling low emissions and low incident manufacturing. IoE system includes various ways in which machines and other objects can communicate easily and efficiently. As a result, the process of decision-making moves from humans to technical systems means that manufacturing becomes “intelligent”. IoE together with the Big data concept provides a M2M communications enabled by the “industrial” internet of everything will provides an intelligent manufacturing and smart factory. Big Data concept in this context refers to the analytical possibilities offered by the volume and variety of data that is generated by a networked economy to optimize the industrial processes to implying less maintenance downtime, fewer outages and much reduced energy consumption. [8]

### ***F. Healthy Environment***

Environment plays a major effect in human life. People, even animals, birds, fishes and plants all need a healthy environment. Many research efforts are being carried out to solve the problems of environmental pollution and waste resources. Industrial and transportations wastes, with irresponsible human activities and other such daily factors that make the environment unhealthy and it is very difficult task to keep environment healthy. A healthy environment needs a smart ways and new technologies for monitoring and management. Monitoring the environment to analyze the current condition of the environment to takes correct life decision according to collected data from monitoring systems, and management is needed to have an efficient use of various resources and also to decrease the factories and vehicles wastes. The IoE technology also helps in monitoring and managing the air quality by to collecting data from remote sensor across the city, and also provides a way for better management of urban traffic in major cities by providing full-time geographic coverage. IoE provides a high resolution, and accuracy for weather monitoring by data exchange and information sharing. [9]

## **III. Barriers to IoE Adoption**

The network and data is growing rapidly in the internet and this can be managed by using Internet of Everything (IoE); but there is also growth in threats to security and privacy. So the IoE technology must be combined with policies and processes designed to protect the information. IoE security can be addressed through network-powered technology: devices connecting to the network will take advantage of the inherent security that the network provides (rather than trying to ensure security at the device level). To ensure Privacy, the IoE technology must be combined with effective processes and policies. The key barriers to adoption of IoE:

### ***A. Intrinsic Barriers***

Intrinsic barriers include fundamental and inherent resistance to new technologies. IoE is actually a set of new interrelated technologies, making this resistance and inertia much bigger. It includes:

- Unmanaged data
- Increased security attack surface
- Physical security threats.

### ***B. Transformation Barriers***

These include barriers to adoption stem from the application of IoE and the transformation.

IoE will face many barriers until it is fully developed over the next 10 years. These barriers include security, privacy, and reliability etc. In addition to these barriers, there are many technical barriers that must be overcome to fully develop a IoE system in real world. For example, IPv6 must become a reality as the number of connections moves from billions to trillions. Other challenges include finding energy sources for powering the huge number of miniature (even microscopic) devices. To overcome these challenges, government organizations, standards bodies, businesses, and even citizens will need to come together with a spirit of cooperation [10].

## **CONCLUSION**

Internet of everything (IoE) is a new technology which provides many applications to connect the things to things and human to things through the internet. The internet of everything integrated with new technologies can lead to develop many smart applications to help in our real life. These applications help us to reach and contact with

everything to facilities many important aspects for human life such as better healthcare, smart homes, advanced cities and healthy environments.

Internet of everything is facing many challenges to provide constant network access. Today, there are lot of different networks with different underlined technology coexists and other barriers are related to the huge data size of the IoE. Other challenges include issues like address restriction, automatic address setup, security functions such as authentication and encryption, and functions to deliver voice and video signals efficiently. The internet of everything (IoE) can also be integrated with future new technologies like cloud, fog and distributed computing, big data, and security issues to develop various smart applications which assist humans in their daily work and manage everything smartly in a real world situation. This paper reviewed some important applications of IoE with focus on different barriers that IoE system is facing in its implementation.

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