



## INTERNET OF THINGS ITS ENVIRONMENTAL APPLICATIONS AND CHALLENGES

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### ABSTRACT

IoT (Internet of Things) has suppressed technology to utmost level by sensing a situation through sensors and reacting to that situation via actuators without human intervention. The term coined by Kevin Ashton in 1999 but the actual development started taking place a few years back. It is predicted that by 2020 billion of devices will be connected with each other seeming truer by now. Urban regions are growing steadily and urban living stances genuine challenges in our ordinary lives. Beginning at 2007, half of the aggregate people were living in urban networks rather than nation ranges. The United Nations Population Fund gauges that by 2030 around 60% of the aggregate people will live in an urban area. In this particular situation, Information and Correspondence Technologies (ICT) together with adjacent governments and exclusive organizations accept a key part to execute creative courses of action, organizations and applications to make astute urban territories a reality. In this commensage, the Internet of Things (IoT) perspective is expecting a basic part as an engaging specialist of a wide extent of usage, both for ventures and the comprehensive network. The growing pervasiveness of the IoT thought is moreover a direct result of the ceaselessly creating number of skilled gadgets like cell phones, tablets, portable PCs and brings down fit gadgets like sensors that can join the Internet.

#### KEYWORDS

IoT, RFID, ZigBee

### 1. INTRODUCTION OF INTERNET OF THINGS (IOT)

IoT (Internet of Things) is a new concept taken command on almost every domain by making things to connect and react according to the situation making environments more intelligent. The term coined by Kevin Ashton in 1999 but the actual development started taking place a few years back. It is predicted that by 2020 billion of devices will relate to each other seeming truer by now. This term is now also called as Internet of Everything (IoE) due to not only connection of devices with each other but also connection of everything involving human beings too, IoT elderly care locket, smart rings, for example [1]. With the help of sensors it is converting imagination into reality which once was impossible. It won't be wrong to say, it is taking over technology rapidly and swiftly. It is now extensively used all over the world and in many environments such as smart homes, smart wearables, smart retails, smart farming, smart health, smart building, smart parking, etc. Without human intervention everything is made possible to monitor the situation and take decisions smartly. The main reason of its wide adaption is the cost effectiveness of sensors and their deployment with in unfavorable environments such as monitoring volcanic environment sensor, heavy rainfall in forests, etc. Sensors play a vital role in sensing and collection of data which further is used for processing further. Different sensors embedded on different environments collects datasets on different formats, where processing on these datasets is one of the challenge overcome by this technology by supporting heterogeneous data from distributed environments. But along with this fast-growing idea it also has invited some different challenges including privacy issues, security concerns, system dependencies, etc. [2].

### 2. AN INTERNET OF THINGS (IOT) LIFE CYCLE

The internet of things having distributed services in which devices communicate with each other in order to complete IOT goals. The Internet of Things consist of 4 steps [3].

1. Collect
2. Communicate
3. Analysis
4. Act

#### 2.1 Collect

In everywhere IOT devices and sensors detect events and collect data in order to make ready to send data to another electronic machine. It can work in, EX: room, office, bus, train, mall, and factory.

#### 2.2 Communicate

The devices communicate in the network with each other by sending data privately to the cloud and from the cloud to the destination. They communicate in numeric and electrical signal.

#### 2.3 Analysis

Creating beneficial information from the data after visualizing the data and generating reports by using online analytical tools.

#### 2.4. Act

The devices are able to take an action also react to the data and communicate practically to other devices or machine by sending Emails,

Messages, Notifications, voice records and many more.

### 3. IOT WORKING

The IoT can work with the connecting devices that can communicate with each other and to the cloud through any sensor devices. The IoT can work through RFID, sensors, smart tech, and Nano tech [4].

#### 3.1 RFID

It is used to check the devices and to keep track of different devices on the cloud that are communicating.

#### 3.2 Sensor

The sensor can sense the things and they can detect the things and they can also make changes in the environment.

#### 3.3 Smart tech

The smart tech is used to check the capability of the network and can make the network of the system of utilizing its different network parts.

#### 3.4 Nano tech

The Nano tech technology is used in the IoT's to connect the smaller to smaller things to the internet and can also find the capacity of the network in which the different items are connected [5].

### 4. STRUCTURE OF IOT'S

The IoT's can be seen as a large area of networks in which different network and systems are connected to one on another through many technologies and through the sensor devices that can make communication of the devices enable to the network and also to the cloud [6].

The IoT can be explained into four major parts:

1. Sensors/devices
2. Connectivity
3. Data Processing
4. User Interface

#### 4.1 Sensors

The sensors can sense the things and also can detect the things and make them enable in the cloud. The sensors can be used for communicating different devices on the cloud and also these devices can communicate with each other through any network. The sensor can be any device that is used in the communication throughout the cloud.

#### 4.2 Connectivity

When different devices are enabled in the cloud network, so these devices can also communicate and interact with each other through any connectivity given to them through any wired and wireless medium used for them.

#### 4.3 Data processing

When devices are sensing to each other in the cloud, so it must be data that can be processed in the network when all the data is reached to the network then it can be used for processing in which by some software is used for processing of data and this data can be used by the users.

#### 4.4 User interface

The information and data are not raw data it is useful data and it can be made useful by using any interface that can visualize data to the end user and make data more useful to the user. This information and data are sending to the user by any method of sending data that by sending any email message and by any notification to the users.

### 5. TECHNOLOGICAL COMPONENTS IN INTERNET OF THINGS

1. Radio Frequency Identification (RFID)
2. Wi-Fi
3. QR Code
4. ZigBee
5. Sensors and Smartphones

#### 5.1 Radio Frequency Identification (RFID)

Is a method of wireless that combines use of electromagnetic link in radio frequency portion of electromagnetic range which individually recognizes an object or person? This is almost use in Conveyance and Logistics, it is easy to arrange, the communication variety and the frequency depends on type of technology [7].

#### 5.2 WIFI

Wi-Fi is capability which allows Pcs, Phones and other devices to connect to internet with wireless system within a specific area. It is use both in inside and outside surroundings. We can also use Wi-Fi to communicate with each other in a specific surrounding. Wi-Fi is typical method in which computers connect to wireless networks [8].

#### 5.3 QR Code

QR code is the type of 2D bar code which is used to provide access to the material through a phone or device. WhatsApp QR code is the best example of QR code. If we want to open our conversation in a web browser, we just scan the QR code from mobile and our WhatsApp conversation will automatically open in web browser [9]. The knowhow for QR codes was established by "Densa-Wave" a Toyota subsidiary. The codes were initially used for tracking record. Numerous policies can read a barcode [10].

#### 5.4 ZigBee

ZigBee is a wireless technology which is made to use low power digital radio signals for personal area network. It is used to make networks that wants a low data transfer rate, energy and secured network. It is actually designed to be very simple and not more expensive as compared to other networks. It is secure as compared to other networks. It use huge amount of nodes (up to 64770) and it can be used worldwide [11].

#### 5.5 Sensors and smartphones

Sensors are almost using everywhere now in world. If we see today's street lights, they also use sensors. It will automatically be ON in night and automatically will be OFF in day it works through sensors. Cars like BMW, AUDI, MARCEDES etc. uses a lot of sensors in their cars. Sensors are also used in house for example when we entered in room the lights will automatically ON and when we left the room the lights will automatically OFF.

### 6. APPLICATIONS OF IOT'S

#### 6.1 Smart Home

A Technique to use computer/smartphone and information technology in controlling home appliances and home features. Appliances (lighting, heating, air conditioning, TVs, Audio-Video systems, security) It is basically an application of smart technologies in creating a home comfortable & an effective life style.

1. Home Security System
2. Controlling Lighting of the House
3. Automatic Window & Curtain

#### 6.2 Wearables

The next big revolution which will transform the way we live. Wearable devices are worn by the user. Smart watches help in following communication: The watch has SENSORS, How many Calories burnt, Distance covered, Heart Rate and GPS, News, Weather, Read text [12].

#### 6.3 Smart Retail

Improving customer experience, optimizing supply chain operation, Retailers want to know more about their consumers to better reach them, Consumers want to know more about the products. It is a term used to describe a set of smart technologies which are designed to provide a consumer (faster, Smarter & safer experience when shopping [13].

## 7. CHALLENGES

Following are some key challenges faced in IoT.

### 7.1 Security and protection

When all of the information is gathered and separated in a commonplace IoT organize, the system can be subjected to a couple assaults (e.g., cross-site scripting, and side-channel). Also, such a system is introduced to imperative vulnerabilities. Besides, multi-inhabitation of this system can moreover draw out the security issues also; cause the spillage of information [14].

### 7.2 Heterogeneity

The IoT system has frequently progressed with perceived game plans in which every system fragment is weaved to the particular application setting. As necessities are, the specialists must analyse their goal circumstances, decide the required preparing gear and programming and after that facilitate these heterogeneous subsystems. The nearness of such establishments and the game plan of a sensible cooperating plan between them can be extremely a noteworthy testing task for the IoT system [15].

### 7.3 Dependability

There are some dependability issues that have developed in the IoT-based structure. For model, in perspective of the vehicles' flexibility, the correspondence with them isn't adequately dependable. Besides, the proximity of different brilliant gadgets will achieve some steady quality troubles similar to their mistake, maybe appropriated over wide range circumstances.

### 7.4 Huge information

Considering around 50 billion gadgets, it is irrefutably vital to center around trading, securing and surveying and besides looking at such an immense proportion of information made by them plainly the IoT frameworks will be a part of the genuine resources of tremendous information.

### 7.5 Sensor Systems

Sensor systems can be considered as a standout among the most crucial innovations to empower the IoT. This innovation can shape the world by giving the capacity of measuring, gathering, also, understanding regular markers Late progressions and improvements in innovations have given gadgets high efficiency and simplicity to use remote distinguishing applications in considerable scale Moreover, cell phones are connected with an arranged characteristic of sensors and, along these lines, they empower an arrangement of portable applications in a barely any scopes of IoT. To this end, the real testing task is to set up the broad scale information of the sensors with respect to essentialness and system limits and distinctive hazards [16].

## 8. CONCLUSION

The Internet of Things (IoT) is the network of physical objects connected with each other, the term Internet of Things is 16 years old. Internet of Things Life Cycle has Collect, Communicate, Analyze, and Act. An IOT has four components: sensors/devices, connectivity, Data processing, User interface. IOT has variety of Technologies Wi-Fi, Barcode, and ZigBee. Few Applications of IOT are Smart Home, Wearables, and Smart Retail. The IoT The term Internet of Things (IOT) has been around for quite a few years. Make devices exchange data, make heterogeneous devices connected with

each other. IoT is very helpful for creating smart environment in 21<sup>st</sup> century to a man kind.

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