

# A Review Study on Internet of thing and their Applications

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**Abstract**— The word “Internet” was developed a long time ago in 1999 and every year it is gaining heights in the modern world. The internet is upgrading and changing with time and evolution at the same time. In other words, with the passage of time, the internet has been changing. Different technologies with different features and properties are gaining people’s attention, this is the reason the internet of things gains this milestone in this very short period of time. According to studies and research we have to focus on the term “Internet of Things”. Current Iot technologies have improved in recent years, but still, we have to give attention to improve more. The future of the Iot is very good, changes are coming from time to time in the iot, which is known as the internet of things correcting the flaw. Many problems also need attention iot is searching for new updates of the research to be carried out.

**Index Terms**—history of Iot, application of Iot, hardware and software of Iot. Languages used in Iot

## I. INTRODUCTION

Iot stands for an “Internet of things. It is largely a network that can talk to each other about the uses of the internet. When people talk about the internet, they are usually referring to the electronic network that permits computers around the world to communicate with each other. Nowadays it is used so much that in upcoming years the internet of things devices will reach 50 billion which is a very big number and approx there will be 6 devices per user and all the devices will have the latest functions like they have IP cameras, sensors, electronic embedded systems, chips and many more. Through the internet of things, we can save lots of people and know when disaster is going to come. The Internet of things changes the communication method years by years. We can communicate at any time and anywhere irrespective of the geographical

This would not be possible without hardware like processors, sensors, transmitters, and receivers. Internet of things is composed of two words and concepts: “Internet” and “Thing”, where “Internet” can be defined as “The world wide web network of interconnected computer networks, based on a standard communication protocol”, whole “Thing” is “a virtual, real, mobile or steady object that continuously relays information to other objects”.

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Fig. 1: Internet of Things

## II. LITERATURE REVIEW

The concept of a network of smart devices was discussed in early 1982. Carnegie Mellon University published a report in which the Coca-Cola vending machine became the first ARPANET-connected appliance. The concept of IEEE Spectrum was described by Reza Raji in 1994 that small packets of data to a large set of nodes, so as to integrate and automate everything from home appliances to entire factories. This field gained momentum when Bill Joy envisioned device-to-device communication as a part of his "Six Webs" framework, presented at the World Economic Forum at Davos in 1999.

In Peter T. Lewis' speech, the concept of the "Internet of Things" and the term itself, first appeared. He viewed radio-frequency identification (RFID) as essential to the Internet of things which would allow computers to manage all individual things. The main theme of the Internet of Things is to embed short-range mobile transceivers in various gadgets and daily necessities to enable new forms of communication between people and things, and between things themselves. Cisco Systems estimated that the IoT was "born" between 2008 and 2009, with the things/people ratio growing from 0.08 in 2003 to 1.84 in 2010 because of the point in time when more 'things or objects' were connected to the Internet than people".

## III. APPLICATIONS OF INTERNET OF THINGS

Application of Iot(internet of things ) means is a device which can wearable and a useable as a device in our life:

- 1) **Wearable's Device:** - Wearable devices or electronic devices are small devices worn on the head, neck, arms, torso, the example of a wearable device is a smart watch, smart helmets, smart glasses, and smart speakers, and many more.

A smart watch like Fit bit can monitor our heart rate, calories burn, sense body temperature, and connect to the phone.

Smart glasses help us enjoy more of the media and services we value, and when part of an IOT system.

One of the wearable devices includes the guardian glucose monitoring device the device is developed to aid people suffering from diabetes.it detects glucose levels in the body, using a tiny sensor called glucose sensor placed under the skin, gives information via radio frequency to the devices monitoring device.

- 2) **Smart Homes:** - In a smart home the convenient home setup in which the appliances and devices can be automatically controlled remotely from anywhere through an internet connection using a mobile or other networked device. Devices in a smart home are interconnected through the internet, and it allows the user to control functions such as security access to the home, temperature, lighting, and a home theater remotely.



Fig. 2: Smart Home

- 3) **Health care:** - IOT applications can be used in medical-based systems into proactive wellness-based systems. Smart healthcare is a health care system that can use iot technology such as wearable devices like a smart watch that can show our heart rate, diabetes, glucose levels, and mobile internet to get information about the medical emergency.

The IOT also improves the current devices in power, precision, and availability.



Fig. 3: Heath Care

- 4) **Industrial Automation:** - This is one of the fields where both faster developments, as well as the quality of products, are the critical factors for a higher Return on Investment. With IOT applications, one could even re-engineer products and their packaging to provide better performance in both cost and customer experience. And IOT here can prove to be a game-changing with solutions for all the following domains:-

- ❖ Factory Digitalization
- ❖ Product flow Monitoring
- ❖ Inventory Management
- ❖ Safety and Security
- ❖ Quality Control
- ❖ Packaging optimization
- ❖ Logistics and Supply Chain Optimization



Fig. 3: Industrial Automation Services And Solutions

- 5) **Smart Cities:** - A smart city uses information and communication technology (ICT) to improve operational productivity; it shares information with the public and provides a better quality of government service and citizen welfare. The main goal of a smart city is to optimize city functions and it is very useful in economic growth while also improving the quality of life for citizens by using smart technologies and data analysis. A city's smartness is determined using a set of characteristics, including:

- ✓ An infrastructure based around technology.

- ✓ Environmental initiatives.
- ✓ Effective and highly functional public transportation.
- ✓ Confident and progressive city plans.
- ✓ People are able to live and work within the city, using its resources.

6) The global agriculture IoT market is estimated to grow from USD 11.4 billion in 2021 to USD 18.1 billion by 2026 at a CAGR of 9.8% during 2021–2026. Nowadays because of the Internet of things and artificial intelligence farmers and growers, growing focus on livestock monitoring and disease detection, high demand for fresh produce, population growth, loss of arable land, surging adoption of aquaculture monitoring and feed optimization devices in developing countries, and strong government support for precision farming practices.



Fig. 4: Agriculture with IOT

#### IV. INTERNET OF THINGS HARDWARE

In the IoT, there are lots of devices such as devices for routing, bridges, sensors, etc. in the Iot hardware work, and functions of these devices are system activation, security, action specification, communication, and detection of support-specific goals and actions.

IOT hardware components can low-power birds, single - board processors like Adriano, raspberry pi their size are small and easy to use

##### A. Sensors:-

Sensors are the most important hardware in IOT. These devices consist of energy modules, power management modules, RF modules, and sensing modules. Communications like signal processing, WiFi, ZigBee, Bluetooth, radio transceiver, duplexer, and BAW are done by RF module.

##### B. Wearable Electronics:-

Wearable electronic devices are small devices worn on the head, neck, arms, torso, and feet.

Current smart wearable devices are –

- **Head** – Helmets, glasses

- **Neck** – Jewelry, collars
- **Arm** – Watches, wristbands, rings
- **Torso** – Clothing, backpacks
- **Feet** – Socks, shoes

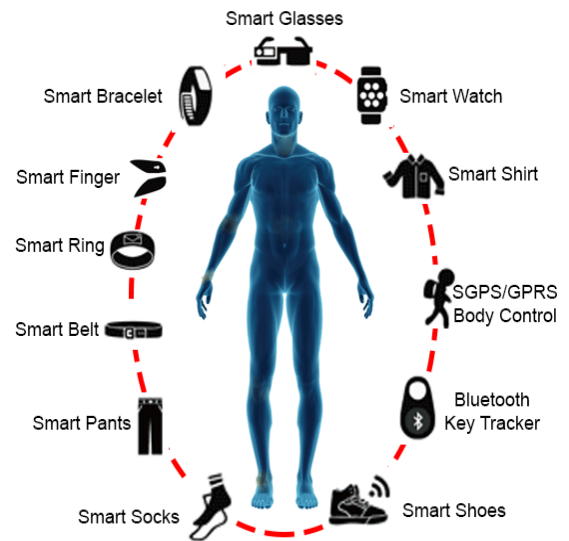


Fig. 5: Wearable Device

##### C. Standard Devices:-

The personal computer, smart mobile, tablet, smart speakers, and other smart devices remain integral parts of IoT as the command center and remotes.

- The personal computer provides the user with the highest level of control and features over the system and its settings.
- The tablet provides access to the key features of the system in a way resembling the personal computer, and also acts as a remote and it is less reliable than a personal computer.
- The smart mobile allows some essential settings modification and also provides remote functionality and easy to connect internet.

Other key connected devices include standard network devices like routers and switches.

#### V. INTERNET OF THINGS SOFTWARE

Software is a set of instructions, data, or programs used to operate computers and execute specific tasks. It is the opposite of hardware, which describes the physical aspects of a computer. Software is a general term used to refer to applications, scripts, and programs that run on a device

##### A. Data Collection:-

This software manages sensing, measurements, light data filtering, light data security, and does the whole process of data. It uses certain protocols to aid sensors in connecting with real-time, machine-to-machine networks. Then it collects data from multiple internet of things devices and distributes it in accordance with its settings. It also works in

reverse by distributing data over devices. The system eventually transmits all collected data to a central server.

**B. Device Integration:-**

This software supporting integration binds (dependent relationships) all system devices to create the body of the IoT system. It ensures the stableness of networking between devices. These applications are the defining software technology of the IoT network because, without them, it is not an IoT system. They manage the various applications, protocols, and limitations of each device to allow communication.

**C. Real-Time Analytics:-**

These applications take data or input from various devices and convert it into viable actions or clear patterns for human analysis. They analyze information based on various settings and designs in order to perform automation-related tasks or provide the data required by the industry.

**D. Application and Process Extension:-**

These applications extend the reach of existing systems and software to allow a wider, more effective system. They integrate predefined devices for specific purposes such as allowing certain mobile devices or engineering instruments access. It supports improved productivity and more accurate data collection.

**VI. LANGUAGES USE IN IOT**

Followings languages are use in Internet of Things:



**PROGRAMMING**

Fig. 6: Language use in IOT

**a) C & C++ Language:-**

The C programming language has its own roots in embedded systems—it even got its start for programming telephone switches and it is the basic language. It’s pretty ubiquitous, that is, it can be used almost everywhere and many programmers already know it. C++ is the advanced version, which means the object-oriented version of C, which is a language important for both the Linux OS and Arduino embedded IoT software systems. These languages were

written for the hardware systems which make them so simple to use.

**b) Java:-**

While C and C++ are hardware-specific, the code in JAVA is more portable. It is more like a write once and read anywhere language, where you install a library and invest the best time in writing codes once and you are good to go next time.

**c) Python:-**

There has been a recent surge in the number of python users and has now become one of the “go-to” languages in Web development. Its use is slowly spreading to the embedded control and IoT world—especially the Raspberry Pi processor. Python is an interpreted language that is easy to read, quick to learn, and quick to write. Also, it’s a powerhouse for serving data-heavy applications.

**d) B#:-**

Unlike most of the languages mentioned so far, B# was specifically designed for embedded systems; it’s small and compact and has less memory size.

**VII. DATA COLLECTION**

It is used for data filtering, data security, sensing, and measurement. The protocols aid in decision-making by sensing from real-time objects. It can work both ways by collecting data from devices or distributing data to devices. All the data transmits to a central server

**VIII. DEVICE INTEGRATION**

This software ensures that devices bind and connect to networks facilitating information sharing. Stable cooperation and communication between multiple devices

**IX. REAL-TIME ANALYTICS**

In this, the input from users provides potential data for carrying out real-time analysis, making insights, suggesting recommendations to solve an organization’s problems, things and improve its approach. This, as a result, allows automation and improves productivity.

**X. INTERNET OF THINGS OPERATING SYSTEM**

IoT operating systems allow users to perform the basic functions of a computer within an internet-connected device. With an operating system is a lite version of the mean os for iot devices, a system can’t work so it is very important. IoT operating systems are embedded within IoT devices and connect to a greater network of devices. These operating systems provide similar functionality to that of a computer by delivering processing capacity for memory and data storage purposes. These systems can run and process all software run on the device.

There some examples of Iot OS are:-

- Nucleus RTOS

- Windows 10 IoT
- Amazon FreeRTOS
- TinyOS
- Tizen
- VxWorks®

## XI. CONCLUSION

IoT is a technology that simplifies life and will continue to do so. That said, many innovative technologies have also been disastrous at the same time. Nuclear energy can be the best example to explain it better. However, in the current situation, it is necessary to live the standard lifestyle equipped with various modern technologies. Technological progress can be mixed, but the long-term effects must be analyzed before they are negative. The authors hope that this article would have provided a clear view of the IoT and its details. We hope that more research in the future will lead to the IoT trend

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