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# Study of Internet of Things (IoT) and its Characteristics

**[1]Dr.Tahir Ahmad Shiekh, [2]Dr.Sheeraz Ahmad Peerzada**

*Department of Education, Jammu and Kashmir, India*

[1] Shiekhtahir2@gmail.com [2]sheerazmphil@gmail.com

**Abstract**

In this paper a comprehensive study of Internet of Things (IOT) is carried out and some of the characteristics of Internet of Things (IOT) have been enlightened. The Internet of Things (IOT) refers to a type of network to connect anything to the Internet based on stipulated protocols through information detection equipment to carry out information exchanges and communications in order to achieve intelligent recognition, positioning, tracking, monitoring and administration.

***Key terms:*** *Internet of Things (IOT), IOT definitions, Radio Frequency Identification (RFID)*

## I. INTRODUCTION

The IOT concept was coined by a member of the radio frequency identification (RFID) development community in 1999, and has recently become more relevant to the practical world in large part due to the growth of mobile devices, integrated and ubiquitous communication, cloud computing and data analysis. [12]

Imagine a world in which billions of objects can sense, communicate and share information, all interconnected through public or private Internet Protocol (IP) networks. These interconnected objects have data collected, analyzed, and used regularly to initiate action, providing a wealth of intelligence for planning, management, and decision-making. This is the world of the Internet of Things (IOT). [12]

The common definition of the Internet of Things is defined as: Internet of Things (IOT) is a network of physical objects. The Internet is not just a computer network, it has become a network of devices of all types and sizes, vehicles, smartphones, home appliances, toys, cameras, medical instruments and industrial systems, animals, people, buildings, everyone connected, all the information communicated and shared based on stipulated protocols to achieve intelligent reorganizations, positioning, tracking, security and control and even

personal online monitoring in real time, online updating, process control and administration [1,2].

We define IOT in three categories as follows:

Internet of things is an Internet of three things: (1). People to people, (2) People to machines / things, (3) Things / machines to things / machines, Interacting through the internet.

Vision of the Internet of Things: Internet of Things (IoT) is a concept and a paradigm that considers the widespread presence in the environment of a variety of things / objects that through wireless and wired connections and unique addressing schemes can interact with each other and cooperate. with other things / objects to create new applications / services and achieve common goals. In this context, the research and development challenges to create a smart world are enormous. A world where the real, the digital, and the virtual are converging to create smart environments that make energy, transportation, cities, and many other areas smarter. [1, 2]


Figure1 Internet of things [5]

Internet of things refers to the general idea of things, especially everyday objects, that are readable, recognizable, locatable, addressable through an information detection device and / or controllable through the Internet, regardless of the medium of communication (whether via RFID, wireless LAN, wide area networks, or other means). Everyday objects include not only the electronic devices that we come across or the most technologically developed products,

such as vehicles and equipment, but also things that we normally do not consider electronic at all, such as food, clothing, chairs, animals, trees, water, etc. [1,2]

Internet of Things is a new Internet revolution. Objects become recognizable and gain intelligence by making or allowing decisions related to context because they can communicate information about themselves. They can access information that has been aggregated by other things, or they can be components of complex services. This transformation is concomitant with the emergence of cloud computing capabilities and the transition from the Internet to IPv6 with almost unlimited addressing capacity. [1, 2]

The goal of the Internet of Things is to allow things to connect anytime, anywhere, with anything and anyone, ideally using any route / network and any service.

II. Study of Internet of Things (IOT)

Today, the Internet has become omnipresent, it has reached almost every corner of the world and it is affecting human life in incredible ways. We are now entering an even more pervasive connectivity era where a wide variety of devices will connect to the web. The Internet of Things (IoT) has reached many different areas and has gained greater recognition. Out of the possible application areas of the Internet of Things, smart cities (and regions), smart cars and mobility, smart home and assisted living, smart industries, public safety, energy and environmental protection, agriculture and tourism as part of a future . IoT Ecosystem has gained wide attention.

We are entering an era of the “Internet of Things” (abbreviated as IoT).There are two definitions: First one is defined by Vermesan and second by Pe˜na-L´opez

1. The Internet of Things as simply an interaction between the physical and digital worlds. The digital world interacts with the physical world using a plethora of sensors and actuators.

2. Another is the Internet of Things is defined as a paradigm in which computing and networking capabilities are embedded in any kind of conceivable object.

We use these capabilities to query the state of the object and change its state if possible. In common parlance, the Internet of Things refers to a new kind of world where almost every device and home appliance we use is connected to a network. We can use them collaboratively to accomplish complex tasks that require a high degree of intelligence. For this intelligence and interconnection, IoT devices are equipped with embedded sensors, actuators, processors, and transceivers. IoT is not a single technology; rather it is an agglomeration of various

technologies working together in tandem. Sensors and actuators are devices that help to interact with the physical environment. The data collected by sensors must be intelligently stored and processed in order to derive useful inferences from it.

The term sensor, is broadly defined as a mobile phone or even a microwave oven can count as a sensor as long as it provides information about its current state (internal state + environment). An actuator is a device used to effect a change in the environment, such as the temperature controller of an air conditioner.

Data storage and processing can be done at the edge of the network itself or on a remote server. If any data pre-processing is possible, it is usually done at the sensor or some other nearby device. The processed data is normally sent to a remote server. The storage and processing capabilities of an IoT object are also constrained by the available resources, which are often highly constrained due to size, energy, power, and computational capacity limitations.

As a result, the main research challenge is to ensure that we get the right kind of data with the desired level of precision. Along with the challenges of data collection and management, there are also challenges in communication. Communication between IoT devices is mostly wireless because they are usually installed in geographically dispersed locations. Wireless channels often have high distortion rates and are unreliable. In this scenario, reliable data communication without too many retransmissions is a major issue, and therefore communication technologies are an integral part of the study of IoT devices. We can directly modify the physical world through actuators or we can do something virtually. For example, we can send certain information to other smart things.

The process of effecting a change in the physical world often depends on its state at the time. This is called context awareness. Every action is taken with context in mind because an application can behave differently in different contexts. For example, a person may not like messages from his office to interrupt him when he is on vacation. Sensors, actuators, computer servers, and the communication network form the core infrastructure of an IoT framework. However, there are many aspects of the software that need to be considered. First, we need a middleware that can be used to connect and manage all these heterogeneous components. We need a lot of standardization to connect many different devices. The Internet of Things finds

diverse applications in health care, fitness, education, entertainment, social life, energy conservation, environmental monitoring, home automation, and transportation systems.

## III. Fundamental Characteristics of IoT

The fundamental characteristics of the IoT are as follows [2, 6]:

**Interconnectivity:** With regard to the IoT, anything can be interconnected with the global information and communication infrastructure.

**Things-related services:** IoT is capable of providing things-related services within the limitations of things, such as privacy protection and semantic coherence between physical things and their associated virtual things. To provide services related to things within the limitations of things, both technologies in the physical world and in the information world will change.

**Heterogeneity:** Devices in IoT are heterogeneous, as they are based on different networks and hardware platforms. They can interact with other devices or service platforms through different networks.

**Dynamic changes:** The state of the devices changes dynamically, for example sleeping and waking up, connected and / or disconnected, as well as the context of the devices, including location and speed. Also, the number of devices can change dynamically.

**Huge scale:** The number of devices that need to be managed and communicating with each other will be at least an order of magnitude greater than the devices connected to the Internet today. Even more critical will be the management of the generated data and its interpretation for enforcement purposes. This is related to the semantics of the data, as well as its efficient handling.

**Security:** As we benefit from the IoT, we must not forget about security. As creators and recipients of the IoT, we must design for security. This includes the security of our personal data and the security of our physical well-being. Securing the endpoints, the networks, and the data that moves through it all means creating a security paradigm that will scale.

**Connectivity:** Connectivity enables network accessibility and compatibility. Accessibility is creeping into a network, while compatibility provides the common ability to consume and produce data.

## IV. Conclusion

Internet of things is a new Internet revolution and is a key research topic for researchers in the area of information Technology and integrated computing. Due to its very diverse application area and the heterogeneous mix of various communications and technology integrated into its architecture.

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