

CHAPTER 1 INTERNET OF HEALTHCARE THINGS

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1.1 INTRODUCTION

In recent years, the healthcare industry has experienced a transformative shift through the combination of advanced digital technologies. The Internet of Things (IoT) has emerged as a powerful enabler, facilitating real-time monitoring, data collection, and communication across various health-related systems and devices. This chapter explores the evolution and application of the Internet of Healthcare Things (IoHT), a specialized domain of IoT tailored for healthcare services. IoHT plays a critical role in enhancing patient care, streamlining hospital operations, and supporting remote and preventive healthcare models.

This chapter begins with an overview of IoT fundamentals, followed by an in-depth discussion of its adaptation within the healthcare sector, leading to the emergence of IoHT. The discussion highlights the components and application of IoHT along with the biotelemetry devices employing IoHT technology.

1.2 INTERNET OF THINGS

The Internet of Things (IoT) is a network of electronic devices embedded with sensors, software, cloud storage, and connectivity,

enabling them to constantly collect and share the data over the Internet. IoT devices span a wide range of applications—from smart homes and industrial automation to agriculture and logistics. The IoT network employs sensors for collecting essential information in terms of bit data that can be further categorized into two classifications based on the deployment of sensors which are device-based sensors and device free IoT networks (Yang et al., 2022). The source of bit digital data from the sensors may come from analog data with varying degrees of information in terms that's requires conversion from analog to digital by the sensors before forwarding the data for further processing.

The device based sensory technology deployed in the IoT network requires the user to carry the IoT integrated device with them to work for data collection and update for example the gyro sensor, bioelectrical impedance analysis, accelerometer, and bioactive sensor in a smart watch. On the other hand, device free sensory technology does not require the user to carry the device with them, for instance random forest enabled sensors and acoustic speakers.

There are four key characteristics of IoT as in Figure 1.1 which are connectivity, data sensing, and processing as well as automation and control. The fourth characteristic is the processing and application layer that involves applications employing IoT Network.

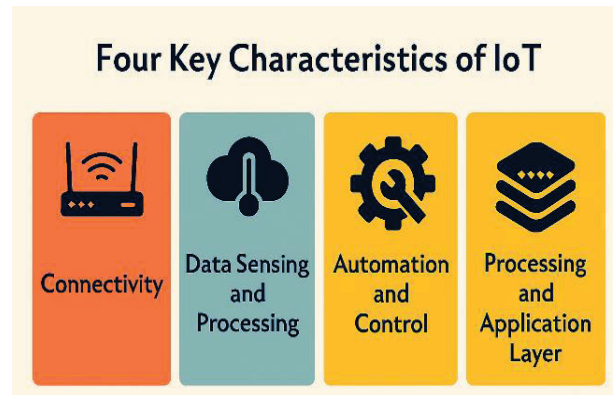


Figure 1.1 Characteristics of Internet of Things

1.2.1 Connectivity in Internet of Things Network

Connectivity refers to the linking of devices in an IoT network, which can be either wired or wireless, to enable data transmission and exchange, as illustrated in Figure 1.2. Examples of wired connectivity are ethernet local area network (LAN), power line communications (PLC), and serial communication.

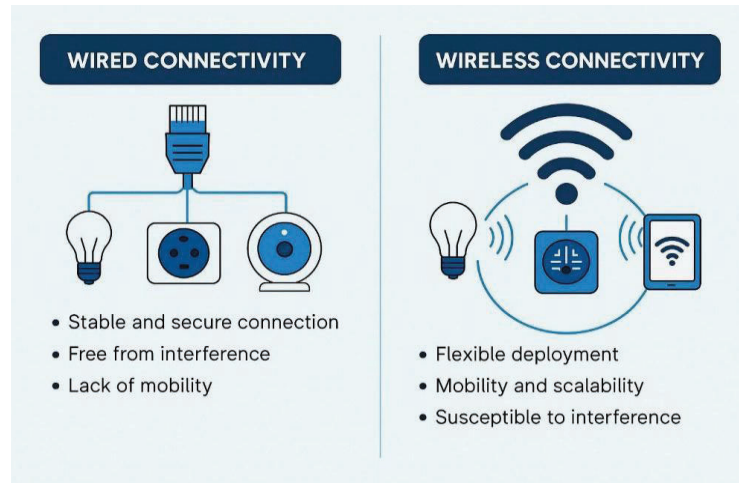


Figure 1.2 Comparison between wired and wireless connectivity

The advantages of wired connectivity in an IoT network are stable and secure connection over guided communication pathways, freedom from interference coming from radio waves that are transmitted wirelessly, and high benefit to applications that demand high data rates and minimal latency. However, there is a lack of mobility for users and devices or equipment due to wired connections. Besides that, wired connections often require higher costs of installation and maintenance. The deployment of wired connectivity for IoT networks is not suitable for outdoor large-scale applications or distributed environments.

On the other hand, wireless connectivity in an IoT network eliminates the need for physical cables and enables flexibility and mobility. Examples of wireless connectivity are Wireless Fidelity (Wi-Fi), Bluetooth (including Bluetooth Low Energy [BLE]), Zigbee, Long Term