

# Leveraging of the Internet of Things (IoT) Tools and Techniques in the Methodical Analysis of Health Care for Enhancing the Effectiveness of Early Detection and Diagnosis of Identifiable Diseases<sup>1</sup>

**Kanishka Kashyap**

*Vandana International Sr. Sec. School, New Delhi*

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## ABSTRACT

*Healthcare can only fit this paradigm because of the growing number of Internet of Things solutions, as this paper provides an overview of some of the implications of IoT for healthcare. Strategies for expanding global connectivity between medical environments and the Internet of Things (IoT) are presented in this paper. Integrating everything in a global environment presents a significant challenge for electrical and data engineers alike. From the tiniest sensor to the largest data set, this revolution is altering our perception of healthcare.*

## INTRODUCTION

The IoT is a technology that "provides an integrated approach for all these physical objects that contain embedded technologies to be coherently connected and enables them to communicate, sense, or interact with the physical world, as well as among themselves." This concept reflects a "connected set of anyone, anything, anytime, anywhere, any service, and any network." Healthcare is an absolute necessity. Unfortunately, modern healthcare systems are under significant strain due to the population's steady ageing and rise in chronic illness. Everything from hospital beds to doctors and nurses is in high demand. A solution is required to alleviate pressure on healthcare systems while simultaneously providing high-quality care to patients at risk.



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## IOT

The research conducted by the Auto-ID Center at the Massachusetts Institute of Technology (MIT) in 1999 [17] helped to popularize the term "Internet of Things." The Internet of Things (IoT) is the global network of smart objects connected by extended Internet technologies, which includes the supporting technologies required to realize this vision (such as RFIDs, sensors/actuators, machine-to-machine communication devices, and so on). There are two ideas in IoT: "Internet" and "Thing," with "Internet" refers to "The worldwide network of interconnected computer networks" based on a standard communication protocol and "Thing" referring to "an object that is not precisely identifiable" [6]. Because of these ideas, any object can be addressed using an IP (Internet Protocol) and behave in a smart space, such as a healthcare environment. "a self-configured dynamic global network infrastructure with standards and interoperable communication protocols where physical and virtual "things" have identities, physical attributes, and virtual personalities, and are seamlessly integrated into the information infrastructure" [3] is an additional definition of the Internet of Things.

## HEALTHCARE

It is one of all governments' top priorities because of population growth, rural urbanization, declining birth rates, population ageing, economic growth, and socially unbalanced resource utilization. Several social issues have emerged in the healthcare sector that the Internet of Things (IoT) has the potential to prevent or combat most effectively:

the level of health management and the inability to respond to an emergency;

– a serious shortage of medical personnel and facilities, particularly in rural areas; – a lack of medical facilities; – inadequate healthcare system;

– An imperfect disease prevention system cannot meet the requirements of the national strategy to protect citizens' health, putting a heavy strain on the economy, families, and the state;

– Inadequacy of disease prevention and early detection capabilities, but the Internet of Things can assist in addressing the following issues:

– Provide rapid clinical responses while breaking down geographical barriers;

– medical image and video data links for consultation and communication;

– a singular ontology for IoT-based healthcare in general. The use of smartphone capabilities as a platform for medical monitoring parameters that inform patients of medical issues is one of many potential applications in the healthcare industry.



## IOT HEALTHCARE SERVICES AND APPLICATIONS

The range of IoT healthcare services and applications can include, among other things, private health and fitness management, pediatric care, chronic disease supervision, and elderly patient care. This paper divides the discussion into services and applications to help readers better understand the subject.

These gadgets can talk to each other and do important things that could save someone's life immediately. The best illustration of this is the insulin pen's continuous glucose monitoring. After it was collected, this crucial data would be sent to the cloud by an IoT healthcare device so that doctors could act on it. This suggests that the Internet of Things (IoT) could be utilized to enhance a patient's health, the productivity of healthcare professionals, and the workflows of hospitals.

### SERVICES IN HEALTHCARE

Systems for Ambient Assisted Living Systems for ambient assisted living to have the potential to involve residents in their healthcare and address individual challenges in healthcare. The AAL systems provide an ecosystem of medical sensors, computers, wireless networks, and software applications for healthcare monitoring, an IoT service. As a result, a specific IoT service is required.

M-Health Things (m-IoT) The m-IoT is "defined as a new concept that matches the functionalities of m-health and IoT for a new and innovative future (4G health) applications" [12]. M-Health Things is a subset of the Internet of Things (IoT). Mobile computing, medical sensors, and communications technologies for healthcare services make up m-health, also known as m-IoT, as shown in [15]. A novel healthcare connectivity model is familiarized by m-IoT for upcoming internet-based m-health services that connect the 6LoWPAN to developing 4G networks. It is essential to remember that some particular characteristics are inherent to the global mobility of participating entities, even though the Internet of Things (IoT) for healthcare services is typically represented by m-IoT [15, 16].

### APPLICATION FOR HEALTH

The HIoT services and concepts are utilized to create various IoT-based applications. For humanity's benefit, researchers have proposed various ideas in these areas. Simply put, applications focus on the user, whereas concepts focus more on the developer. Wearable sensors, portable devices, and medical devices have become more affordable and user-friendly due to the rapid development of IoT technology. The figure shows how these systems can collect patient data, diagnose diseases, track patients' health, and send out alerts during a medical emergency. Some of the most current commercially available devices are discussed in the following section. In addition, single- and multi-condition HIoT-based applications have been addressed.

### CONCLUSION

The healthcare industry underwent a transformation brought about by the Internet of Things, which resulted in increased productivity, decreased expenses, and a reorientation toward providing superior patient care. Utilizing these concepts, the Internet of Things (IoT) has made it simpler for healthcare professionals to monitor and diagnose a variety of health issues, measure a variety of health parameters, and provide diagnostic facilities in remote locations. Consequently, the healthcare sector is now more patient-centred than ever. In the meantime, automation and machine-to-machine communication are being extended to the tiniest sensors by the Internet of Things (IoT).

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