A REVIEW ON CHALLENGES AND OPPORTUNITIES IN IOT

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Abstract

The Internet of Things (IoT) has garnered considerable interest in recent years because to its potential to ease the load on healthcare systems caused by an ageing population and an increase in chronic sickness. Because standardisation is a critical problem impeding development in this sector, this study suggests a standard model for use in future IoT healthcare systems. This survey report then summarises the state-of-the-art research on each component of the model, assessing their relative strengths and shortcomings, as well as their overall applicability for a wearable IoT healthcare system. The article discusses the challenges facing healthcare IoT, including security, privacy, wearability, and low-power operation, and makes suggestions for future research approaches.

Keywords: IOT, Opportunities, Challenges.

Introduction

Healthcare is a life-sustaining need. Unfortunately, the ageing population and the associated increase in chronic disease are putting enormous pressure on current healthcare systems [1], with a high demand for resources ranging from hospital beds to physicians and nurses [2]. Clearly, a solution is needed to alleviate strain on healthcare systems while maintaining a high standard of care for vulnerable patients.

The Internet of Things (IoT) has been widely recognised as a possible solution for relieving strains on health-care systems, and has consequently been the subject of much recent study [3]–[7]. A substantial portion of this study focuses on monitoring people with particular diseases, such as diabetes [5] or Parkinson's disease [6]. Additional research is being conducted to address particular objectives, such as assisting in rehabilitation by monitoring a patient's progress on a continuous basis [7]. Emergency healthcare has also been mentioned in related studies [8], [9], but has not been extensively investigated. Numerous prior publications have examined certain topics and technology associated with IoT healthcare. [10] provides an exhaustive assessment, with a particular emphasis on commercially accessible solutions, potential applications, and unresolved issues. Each subject is examined alone, rather than as a component of a larger system. [11] discusses data mining, storage, and analysis, but makes no discussion of system integration. [12] compares several sensor kinds, with an emphasis on communication. However, this article makes it difficult to visualise a full system. Finally, [9] focuses on sensing and massive data management, with no attention paid to the network that would enable communications.

Thus, this work is unique in that it defines all critical components of an end-to-end Internet of Things healthcare system and provides a general model applicable to all IoT-based healthcare systems. This is critical since there are currently no published end-to-end methods for remote health monitoring.

Additionally, this article presents an in-depth examination of the state-of-the-art technologies included in the suggested model. Sensors that monitor a variety of health metrics are highlighted, as are short- and long-range communication protocols, as well as cloud technology. This research separates itself from prior large survey contributions by examining each critical component of an IoT-based healthcare system both individually and collectively.

Additionally, a novel addition is provided by emphasising LPWANs and their unmatched applicability for application in IoT systems. The future licensed-band standards, such as NB-IoT, are contrasted against rival unlicensed-band standards, with a special emphasis on their applicability for healthcare applications.

IOT in Health

There are several definitions of the Internet of Things, but at its most basic level, it is a network of devices communicating with one another through machine to machine (M2M) connections, allowing the gathering and exchange of data [7], [10], [11]. This technology allows automation across a broad spectrum of businesses and facilitates the collecting of massive amounts of data.

Internet of Things technology, which has been dubbed the "driver of the Fourth Industrial Revolution" [13], has already found commercial applications in fields such as smart parking [14], precision agriculture [15], and water management [16]. Additionally, much research has been undertaken on the application of IoT to construct intelligent systems in areas such as traffic management reduction [17], structural health monitoring [18], crash-avoiding autos [19], and smart grids [20].

While the aforementioned sectors seem to be diametrically opposed to healthcare, research undertaken within them demonstrates the viability of an IoT-based healthcare system. Existing systems in other sectors have shown the feasibility of remote monitoring of things, including data collecting and reporting. This may then be enhanced and altered to monitor and report on people's health to appropriate parties such as caregivers, physicians, emergency services, and healthcare facilities.

Remote Monitoring

While research in adjacent domains has shown the feasibility of remote health monitoring, perhaps more significant are the potential advantages in a variety of scenarios. Remote health monitoring might be used to monitor non-critical patients from home rather than in the hospital, relieving hospital resources such as physicians and beds of burden. It might be used to improve rural residents' access to healthcare or to allow elderly people to remain independent in their homes for an extended period of time. Essentially, it may increase access to healthcare services while easing burden on healthcare systems, and it may empower individuals to maintain more control over their own health at all times [21-22].

Indeed, remote health monitoring has a surprisingly small number of drawbacks. The most significant disadvantages include the security risk associated with storing large amounts of sensitive data in a single database, the potential need for an individual's sensors to be calibrated on a regular basis to ensure they are monitoring accurately, and the possibility of patients being disconnected from healthcare services if they were out of cellular range or their devices ran out of battery. Fortunately, all of these concerns are fairly solvable and have been addressed in the literature, as noted throughout the rest of this work. As the limitations are mitigated, IoT-based systems for remote health monitoring will become a more realistic option for healthcare service in the near future.

Conclusion

Due of the many advantages of remote health monitoring, several recent studies have discovered the Internet of Things' potential as a healthcare solution. Several works have built IoT healthcare systems for a variety of applications, including rehabilitation, diabetes management, and aided ambient living (AAL) for senior citizens. While these systems were developed for a variety of distinct objectives, they are all inextricably linked by their shared usage of enabler technologies. Numerous scholars have focused their study on rehabilitation after physical damage. [23] describes the development of a system that provides an individualised rehabilitation plan depending on an individual's symptoms. This is accomplished by comparing the patient's condition to a database of prior patients' symptoms, diseases, and therapies.

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