Chapter 21
Wearable Devices in Smart Hospitals and Medical Applications Using Internet of Things

S. Kalpana Chittor
https://orcid.org/0000-0001-6702-8479
School of Science and Computer Studies, CMR University, Bangalore, India

L. Melita
https://orcid.org/0009-0002-4269-5480
School of Science and Computer Studies, CMR University, Bangalore, India

ABSTRACT

Internet of Things (IoT) wearables have emerged as rapidly expanding technologies, significantly altering the lifestyles of numerous individuals. Crucial factors (awareness, usage habits, and requirement specifics) are to be observed, despite the high demand for IoT healthcare products. The chapter explores the impact of context-sensitive IoMT wearables on healthcare in developing nations and conducts a survey among young and working-age adults to identify gaps and understand the disparity between comprehension and usage patterns. The awareness is despite facing risk factors and usage pattern variations. It also highlights the need for economic security measures and a lightweight design for IoMT wearables. Misconceptions and negligence regarding threats are also highlighted for IoMT wearable implementation.

INTRODUCTION

Wearable technology (WT) has gained significant attention for its potential in remote patient monitoring, diagnostics, and therapeutic applications. Initially proposed by mathematics professor Edward O. Thorp in the 1960s, WT has gained global attention. Wearable devices can be categorized into medical-grade wearables (MGW) like blood pressure and glucose monitors, and consumer-grade wearables (CGW) like watches and clothing articles. These devices have built-in sensors embedded in the body, tracking

DOI: 10.4018/979-8-3693-7112-1.ch021

Copyright ©2025, IGI Global Scientific Publishing. Copying or distributing in print or electronic forms without written permission of IGI Global Scientific Publishing is prohibited.

movements, biometric identification, and location tracking. Services are available round the clock for patient monitoring, drug management, diagnosis, and live tracking (Lu et al., 2020).

The Internet of Things (IoT) has revolutionized communication by connecting physical objects directly or virtually. It's increasingly used in smart healthcare, offering accurate and efficient disease treatments. The "Internet of Medical Things" (IoMT) is a rapidly emerging concept in medical sciences, involving a connected infrastructure of medical devices and health systems providing quick services and remedial measures (Haghi et al., 2017). IoMT networks connect medical devices, wearables, and sensors to the internet, collecting, storing, and transmitting patient's sensitive health data (Vishnu et al., 2020). The Internet of Medical Things (IoMT) connects sensors, communicates through networks, and captures data for Electronic Medical Records (EMR). However, this data is sensitive and requires privacy protection. Data privacy and security issues are crucial in smart healthcare. This chapter covers statistics on wearables, monitoring components, sensors, clinical trials, surveys, and the privacy and security of IoMTW, their threats, attacks, and challenges (Aekanth & Tillinghast, 2022).

The chapter is organized into several sections. The introduction provides background information and the motivation for the study. The second section discusses the Benefits of IoMT. The third section is a literature survey, which reviews existing research on intelligent IoMTW. The fourth section focuses on the impact of wearable technology in clinical trials. The fifth section explores open problems and challenges in the domain of IoMT. The sixth section provides various sensors used in IoMT.

The seventh section details recent statistics on wearables, followed by methods, results, and analysis in the eighth section. The ninth section analyzes questionnaires, while the tenth section discusses open problems. The conclusion and future directions section summarizes the review and provides directions for further research. Continuous tracking and companion applications in healthcare provide personalized support to patients, enabling them to set goals and understand their ongoing conditions. Providers gain a comprehensive view of patients' health beyond short appointments. MultiCare's success with wearables is particularly evident in Care-Management (CM) and Instant Remote Patient Monitoring (IRPM), which support both device purchases and remote monitoring. These models increase patient involvement in self-management and reduce re-admissions associated with chronic conditions (Tariq, 2024).

Wearables can monitor various health factors, including blood oxygen saturation, sleep quality, glucose levels, and asthma. These devices help healthcare providers make data-driven decisions and provide appropriate treatment. They can analyze trends, identify potential health risks, and tailor treatment plans based on individual patient needs. This data-driven approach leads to more personalized and efficient care, enabling healthcare providers to provide effective care for patients with various diseases and critical conditions (Anitha et al., 2023; Subha et al., 2023). Wearable activity trackers (WAT) utilize various sensors such as accelerometers, pulse oximeters, gyroscopes, altimeters, and GPS for measuring heart rate, respiration, blood oxygenation, and more.

Researchers are focusing on security and privacy protection in smart healthcare environments. The integration of IoMT systems in wearables will improve biomarker monitoring and healthcare management, offering insights into holistic health. This shift from "sick care" to "proactive healthcare" will be driven by wearables, which can be taken home and combined with Artificial Intelligence (AI), making healthcare more intelligent and effective (Pitchai et al., 2024; Sreedhar et al., 2024; Upadhyaya et al., 2024).

A research survey involves several phases, including defining the research scope, selecting relevant records from electronic databases deciding on inclusion and exclusion of records, screening records, and finalizing the number of final records considered. The data is then analyzed using a series of scientific

16 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage:
www.igi-global.com/chapter/wearable-devices-in-smart-hospitals-and-medical-applications-using-internet-of-things/374522

Related Content

Machine Learning for Software Development: Real-Time Communication System for Predicting Climate Condition
Anurag Vijay Agrawal, G. Sumathy, A. Maheshwari, K. Saravanan, K. Revathiand Sampath Boopathi (2025). *AI Frameworks and Tools for Software Development (pp. 287-306).*
www.irma-international.org/chapter/machine-learning-for-software-development/377684

Towards a Possibilistic Information Retrieval System Using Semantic Query Expansion
Bilel Elayeb, Ibrahim Bounhas, Oussama Ben Khiroun, Fabrice Evrardand Narjès Bellamine-BenSaoud (2011). *International Journal of Intelligent Information Technologies (pp. 1-25).*
www.irma-international.org/article/towards-possibilistic-information-retrieval-system/60655

A Review of Four Persuasive Design Models
Kristian Torning (2013). *International Journal of Conceptual Structures and Smart Applications (pp. 17-27).*
www.irma-international.org/article/a-review-of-four-persuasive-design-models/100450

Machine Learning Approach in Human Resources Department
Ishraq Abdulmajeed, Ghalia Nassreddine, Amal A. El Aridand Joumana Younis (2023). *Handbook of Research on AI Methods and Applications in Computer Engineering (pp. 271-294).*
www.irma-international.org/chapter/machine-learning-approach-in-human-resources-department/318069

Sustainable Resolution of Stalled Real Estate Projects: A Legal Examination of Green Finance, Insolvency, and AI Under the RERA–IBC Framework
Himanshi Sanjaykumar Sharma (2026). *AI Governance, Law, Policy and Ethics in Green Finance and ESG (pp. 229-246).*
www.irma-international.org/chapter/sustainable-resolution-of-stalled-real-estate-projects/409304