Chapter 10
Smart Homes for Independent Living:
IoT Applications for Differently-Abled Individuals

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ABSTRACT

IoT-enabled smart homes offer transformative opportunities to improve independence, safety, and quality of life for people with disabilities. By integrating connected devices such as voice control, sensors, and health monitoring systems, these smart environments reduce reliance on caregivers and improve their autonomy and dignity.

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Advances in technology highlight the importance of prioritizing accessibility, user-centered design, and affordability to ensure these benefits are universal and widely available. Addressing challenges such as diverse user needs, ethical considerations, and economic barriers is critical to creating practical and effective smart home solutions. This chapter focuses on how to maximize the potential of the Internet of Things in supporting the daily lives of people with disabilities and explores emerging technologies that have the potential to further revolutionize independent living.

INTRODUCTION

Smart home technology, built on the Internet of Things (IoT), is changing how people manage their households (Rock et al., 2024; Ahmad et al., 2024; Joshi et al., 2024). The World Health Organization reports that about 15% of people worldwide live with some form of disability (World Health Organization, 2022). For them, these systems are more than gadgets. They provide support, add safety, and make daily life easier. With sensors, voice commands, and automation, small tasks such as switching on lights or locking a door can be done without help. This gives people with physical, sensory, or cognitive challenges a stronger sense of independence.

Assistive technology has a long history. It began with simple tools and gradually moved toward digital systems (Brown, 1992; Anandaram et al., 2026). The growth of computing, tiny sensors, and artificial intelligence sped up this shift, making homes more responsive than ever before. Today's smart homes reflect years of work in accessibility, human–computer interaction, and automation.

IoT devices can now control lighting, set room temperatures, or run appliances with little effort (Aheleroff et al., 2020). For those with mobility issues, voice assistants can open doors, draw curtains, or even answer calls. Smart wheelchairs use navigation sensors to avoid obstacles and move smoothly around the house (Kim, 2016). People with vision loss can rely on AI-based tools that describe their surroundings or read text out loud.

Wearable devices have also improved health monitoring. They track vital signs and send alerts to caregivers or emergency services when something unusual is detected (Dunn, Runge, & Snyder, 2018). For those with hearing loss, smart doorbells with vibration or video signals ensure they never miss a visitor. Environmental sensors can pick up smoke, gas leaks, or water overflow and immediately notify residents and contacts. These timely alerts reduce risk and bring peace of mind (Joshi et al., 2024).

This chapter will explore:

- The fundamental role of IoT in creating accessible smart homes
- Key applications for people with different types of disabilities