Chapter 5
Computer–Assistive Techniques for Monitoring and Tracking Patient Healthcare and Engagement

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ABSTRACT

Assistive devices and technology reduce a person's dependency on others while also improving the overall quality. Wheelchairs, visual aids, hearing aids, and specialist computer software and hardware systems help the elderly and disabled improve their hearing, vision, mobility, and communication. Assistive technology, for example, provides enormous opportunity to improve the effectiveness of both health and social care delivery. 'Low-tech' products like memory aides and digital calendars, as well as 'high-tech' items like health tracking gadgets and wearables, are examples of assistive technologies. Assistive devices can be used to improve quality of life, improve lifestyle, and boost independence, depending on the type of device. Patient and caregiver acceptance of technology is influenced by a variety of factors, including perceived skills and competencies in utilizing the device, expectancies, trust, and reliability.

1. INTRODUCTION

Many scientific domains are strongly connected, and each health specialty is relying on the work of others. Academics, researchers, and practitioners, on the other hand, are frequently constrained to their

chambers of knowledge, language, and expertise. The prevailing availability of knowledge strangely magnifies this problem; massive quantities of big data and the cloud era have helped short-term study in a variety of fields. When it comes to assisting persons with limited mobility, poor cognitive capacity, or chronic illnesses that cause dependency, the connection between a smart environment, assistive robots, and the user is very significant, (Ktistakis, Goodman, et al., 2022). To ensure that robotic care and rehabilitation systems work properly, a system must be developed that ensures interactions between the patient, caregiver, assistive robots, and the IoT environment.

Assistive technology, according to the World Health Organization, is an umbrella word that encompasses all systems and services connected to the delivery of assistive products and services. Assistive technology facilitates elderly people's desire to age in place and enhances their quality of life, allowing them and their caregivers to improve their quality of life (Ktistakis, Goodman, et al., 2022), (Pugliese, Sala, et. al., 2022). Assistive technology needs to be usable and inexpensive to meet the goal of being produced in a highly accessible, compassionate, and ethical manner. This type of interaction is especially important for patients with special needs since it can help them enhance their quality of life dramatically (Pugliese, Sala, et. al., 2022), (Dratsiou, Varella, et. al., 2022). However, depending on the user's needs, multiple means of regulating the environment are required.

Given the aging population in developed countries, mobility assistance will become increasingly important. The employment of real-world trials – with actual users and real environments – to test the validity and suitability of assistive technology is a significant step forward in their implementation (Pugliese, Sala, et. al., 2022), (Dratsiou, Varella, et. al., 2022). In this discipline, the application of Agent Technology is enabling new forms of engagement and generating new solutions. The ultimate goal of the interaction between robots, Agent Systems, and users is to increase autonomy while also improving the quality and complexity of services provided. Agent Systems' adaptability and learning skills meet the needs of a community of users with a changing set of wants and profiles. Over time nonetheless, some critical issues like safety and security have been raised. The portion of the world's population aged 60 and up is the fastest expanding due to low birth rates and rising life expectancy (Anaya, Zhan, et. al. 2021).

More than one billion people, according to the WHO, require assistive technology. With a growing worldwide population and an increase in non-communicable diseases, this figure is expected to exceed two billion by 2050, with many older people requiring two or more items. There are expected to be 2 billion people in need of assistive devices by 2050, with only one in every 20 people having access to them. Like its predecessor, the WHO Priority Assistive Items List (APL), the new WHO Priority Assistive Products List (APL) will be a crucial instrument in making these products accessible to an aging population and people with disabilities all over the world.

This chapter uses smart wheelchairs as a case study to present an Internet of things framework for assistive mobility devices that incorporates latency and security, as well as a multi-sensor fusion pipeline for improved autonomous navigation. Future assistive technology solutions should be evaluated for satisfaction, medical contribution, and cost-effectiveness, among other factors (Anaya, Zhan, et. al. 2021), (Hachaj, Ogiela, et. al. 2015). Assistive technologies should be included in this concept of smart aging, which is a comprehensive and multidisciplinary approach to senior adults that are tailored to each individual. For elderly individuals, the ultimate purpose of assistive technology should be to improve their quality of life. (Hachaj, Ogiela, et. al. 2015).

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