Chapter 9
Security, Privacy, and Trust in Smart Systems for People With Visual Disabilities

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ABSTRACT

As smart systems become increasingly prevalent, ensuring their accessibility, security, privacy, and trustworthiness is paramount for individuals with visual disabilities. These users face unique interaction barriers. This chapter explores the intersection of smart technologies and these challenges, focusing on the heightened importance of security and privacy and their implications for user trust. It outlines essential design considerations for creating inclusive technologies, emphasizing multimodal feedback and compatibility with assistive tools. By highlighting case studies, best practices, and emerging trends, the chapter aims to provide valuable insights for researchers, practitioners, and policymakers dedicated to enhancing the quality of life for people with visual disabilities.

1. INTRODUCTION

The 21st century has witnessed a rapid and transformative evolution in technology, marked prominently by the advent and pervasive integration of smart systems into nearly every facet of daily life. These interconnected networks of devices, sensors, software, and artificial intelligence are reshaping how individuals interact with their

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homes, workplaces, communities, and the world at large. From sophisticated smart home automation that controls lighting, climate, and security with voice commands, to wearable technologies that monitor health and provide real-time feedback, and intelligent mobile applications that offer navigation assistance and enhance communication, smart systems hold immense potential to improve efficiency, convenience, and overall quality of life for the general population (Smith & Johnson, 2022).

Disability studies literature consistently underscores the centrality of lived experiences in understanding disability (Shakespeare, 2017). Robust policy frameworks are essential to address these disparities, ensuring that technological advancements translate into tangible benefits for all disabled people, rather than exacerbating existing inequalities (Shakespeare, 2017). "Disability: The Basics" by T. Shakespeare (2017) provides a comprehensive and accessible introduction to the field of disability studies, exploring its fundamental concepts, historical evolution, and diverse theoretical models. The book critically examines key issues such as the social construction of disability, identity, human rights, and the ongoing struggle for inclusion and equality for disabled people. This perspective is crucial when examining socio-technical systems and accessibility frameworks in Human-Computer Interaction (HCI), as it moves beyond a purely medical model to recognize disability as a social construct shaped by environmental and systemic barriers (Ellis et al., 2020). Effective accessibility frameworks, therefore, must be grounded in the direct experiences of disabled people, ensuring that technologies are not only technically compliant but also genuinely usable and empowering (Anwar et al., 2022).

For individuals with visual disabilities, this technological paradigm shift carries a particularly profound significance. Historically, many aspects of daily living—such as navigating unfamiliar environments, managing household tasks, accessing written information, or engaging in spontaneous social interactions—have presented significant challenges, often requiring reliance on human assistance or specialized, sometimes cumbersome, assistive devices. Smart systems, when designed with accessibility in mind, offer unprecedented opportunities to dismantle these barriers, fostering greater independence, autonomy, and active participation in society. A smart navigation app providing real-time audio cues, a voice-controlled smart appliance simplifying kitchen tasks, or a wearable device offering non-visual environmental information can be truly life-changing tools, enabling visually impaired individuals to perform tasks and access information previously inaccessible to them independently (Fairchild & Stuerzlinger, 2020).

However, as these powerful and interconnected technologies become increasingly embedded in the fabric of daily routines, a complex interplay of concerns emerges, particularly regarding security, privacy, and the foundational element of user trust. Smart systems, by their very nature, are data-hungry, constantly collecting, processing, and transmitting information about users, their environments, and their