Chapter 1
Designing for Blind Users: Guidelines for Developing Mobile Apps for Supporting Navigation of Blind People on Public Transports

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ABSTRACT

This chapter covers the guidelines developers should follow when creating mobile applications to support visually impaired people in their use of public transports. Technology has evolved in a remarkable fashion, mobile applications being the perfect example of a resource that has been solving problems for a vast array of users, including visually impaired people. These apps hold tremendous potential seeing as they present an accessible, multi-functioned, and cost-effective solution to the mobility issues impacting visually impaired people. In order to identify the best practices in the development of these apps, one should focus on the particularities, limitations, and concerns of visually impaired people regarding their mobility, orientation, and navigation on public transports. It's equally important to understand the existing technology and how these users interact with it, so that we can optimize the user experience, the accessibility, and usability in future endeavors.

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INTRODUCTION

In the last decades, technology has advanced at an astonishing pace. Technological progress has brought changes in many contexts, from the workplace to the classroom and even to daily life. The impact of these technological advances has been so pervasive that has extended to many different types of users, such as people who are visually impaired. Demographic trends reveal that this specific type of users, including those who are blind, are a wide audience of users and that their number will grow in the next years.

According to the latest information provided by the World Health Organization (WHO, 2018), based on the study of Bourne et al. (2017), there are approximately 253 million people with vision impairment, including 36 million who are blind. Visual impairment is defined in the International Statistical Classification of Diseases - ICT (2018), as deficits in the ability of the person to perform vision-related activities of daily living. Visual impairment ranges from moderate and severe vision impairment, both grouped under the term "low vision", to blindness. Blindness can be defined as having visual acuity less than 3/60 in the better eye (ICT, 2018).

Recent and prospective studies reveal that the number of visually impaired people has increased in the last years and is expected to increase. According to the data provided by Bourne et al. (2017), from 1990 until 2017, the number of blind people and people with moderate and severe visual impairment has increased, respectively by 17,6% and 35,4%. Furthermore, it is estimated that the number of blind people in the world will largely increase in the next decades, due both to population growth and aging. Indeed, WHO (2017) estimates that by 2050 there could be 115 million people who are blind.

Besides demographics, another relevant issue to consider regarding the visually impaired adults is their reported poorer or declining health in comparison to sighted adults (e.g,, Capella-McDonnall, 2007), a disparity in part caused by less physical activity in the visually impaired population due to real and perceived barriers, including walking alone (e.g., Rimmer & Braddock, 2002). Individuals with visual impairments face several difficulties in what concerns independent mobility, such as traveling and navigating in public spaces or using public transports, which considerably deprive them of a typical professional and social functioning (Tuttle & Tuttle, 2004), shaping their social inclusion and quality of life (Lubin & Deka, 2012; Long et al., 2016). Their social and professional exclusion, in turn, reinforces their experiences of disablement (e.g., Wong, 2018). Therefore, it is critical to examine and address the assistive technologies available for these users, especially the ongoing advances