

Development of a haptic navigation system for blind and visually impaired pedestrians

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Abstract

Blind and visual impairment affect over 285 million people globally. 246 million individuals worldwide have mild to severe visual impairment, and there are 39 million blind people. The navigation features supplied by smartphones, which are dependent on aural and visual cues, are hazardous for blind and visually impaired people to use as they do not have entire access to visual channels outdoors. The haptic conduit may be appropriate to provide information in certain circumstances. A system that provides navigational information to such pedestrians via haptic signals was developed in this study. The suggested system is designed as a vibrating navigation wrist band that makes use of two vibration motor modules that are managed by an Arduino nano board that is Bluetooth connected to an Android app which manages GPS navigation and provides directional instructions based on the personalized maps that were already provided to the app based on the users' requirements. When the power button is pressed twice on an Android phone, the mobile application opens. The app detects a user's current location when they swipe their smartphone screen and provides voice-over directions. The app then asks for the destination through voiceover and, using that information, determines the correct route for reaching it. The system was evaluated with a small number of users to assess its overall performance. Most of the participants provided favorable feedback when the system was initially evaluated. The navigation band effectively provided directional instructions and was thought to be intuitive and simple to follow. Moreover, the haptic wrist band was made to be lighter, more comfortable to wear, and more easily rechargeable using batteries. However, the downside of this system is that it is unable to warn users of potential obstacles as they approach a destination.

Keywords: *Blind and visually impaired, Haptics, Navigation band, Personalized maps*