TECH WALK: AN ARTIFICIAL INTELLIGENCE-BASED SMART AID FOR VISUALLY IMPAIRED PEOPLE IN SRI LANKA

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According to the World Health Organization (WHO), there are approximately 37 million people across the world who are visually impaired. Most of these visually challenged individuals use a white cane to help them avoid obstacles and navigate from one location to another. However, a traditional white cane has several significant limitations, such as the inability to detect obstacles above the knee level making the user more prone to falls and head injuries, the inability to identify an obstacle in advance, and the provision of limited information about the obstacle. A need for a more sophisticated supporting aid for the blind community has thus emerged. In this paper, an artificial intelligence (AI) based smart white cane is proposed to satisfy the aforementioned need. While such devices are available in foreign markets, they do not meet the requirements of the Sri Lankan blind community as these devices have limited functionality, are expensive, and are custom designed to match the prevailing technology and infrastructure of the foreign markets. The proposed smart white cane, named "Tech Walk," detects stationary and dynamic obstacles and terrain changes in advance using custom-designed hardware and software modules. Once the presence of an obstacle is detected, the information gathered from the sensors is analyzed using an AI algorithm, and the obstacle is correctly identified (e.g., chair, car). The processed information is relayed to the user using either voice commands or haptic feedback. While voice commands provide an overview of the obstacle and terrain, the haptic feedback conveys distant and direction information using intuitive vibration patterns. The smart white cane has several other features: face detection and text-to-voice conversion, navigation in bounded environments (e.g., university or a multistory complex) where conventional satellite-based navigation would fail, and the ability to store and retrieve frequent paths, and supplemented by an interactive mobile application. Most importantly, the proposed solution is lightweight, affordable, powered using a rechargeable battery, and comes in the form of a mountable device or as a wearable depending on the preference and convenience of the user.

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