REVIEW ARTICLE

# A Smart Assistive Technology for Visually Challenged

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## Abstract

In this modern era of globalization, the use of smartphones is increasing among the general population, but visually challenged individuals face many difficulties in their routine day-to-day activities to orient themselves to an environment. Visually challenged children pursue their education through Braille, in the form of printed dots, which is their medium of learning. Since these children lack visual coordination, they find it difficult to acquire good oral health. Although there are much accessible technologies available for visually challenged children to guide them in their daily day-to-day activities without depending on others, but there is no mobile user-friendly application available regarding oral health maintenance for these individuals. Hence, there is a need to develop a mobile application in understanding their difficulties and challenges faced by them so that these special need children get benefitted.

**Keywords:** Mobile application, User-friendly apps, Visual disability.

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## Introduction

In this digital era, the use of smartphones is increasing among the general population, but visually challenged individuals face many difficulties in their routine day-to-day activities to orient themselves to an environment. In today's Indian digital era, smartphones are less likely to be regarded as assistive technology for those who are blind or visually challenged. Unfortunately, the majority of the visual challenged still rely on Braille which is their method of learning and for communication purpose most of the individuals use basic mobile phones that are less functional than smartphones. Day-to-day routine activities of healthy individuals rely mostly on digital platforms for shopping, financial management, buying their day-to-day basic needs, reading news, booking tickets, and obtaining any sort of information are done through smartphones when compared to olden days. But visually challenged individuals lack very poor access to smartphones in our country, and it may be due to a lack of awareness and financial constraints in using these apps. Using these assistive technologies can be more comfortable for these individuals.

## Accessible Apps for Visually Challenged

Many accessible apps are available which can be downloaded free online for visually challenged individuals especially among low- and middle-income countries, which can be installed on Android and iOS-based mobile devices, but smartphones are still inaccessible for the visually challenged. There are numerous built-in accessibility features, such as Talkback for android and Voiceover for iOS smartphones, respectively.[1] Talkback is the Google screen reader that gives spoken comments on what you touch on mobile phones so that using the device is easier to use for the visually challenged without looking at it.[2]

There are also third-party accessible apps for people with visual impairment, such as "Kibo," which can read any electronic text or images (in English, Hindi, e-books, and portable document format), and "Supersense" for print materials or object identification with voice output to people with visual impairment and blindness.[1] One such app named "Be My Eyes" assist visually challenged children in a smart way which helps them in performing daily activities, access to a digital platform, educational facilities, and independent movement of the individual. It also helps sighted people in video-audio calling.[3,4]

There is also an app named "Lookout-Assisted vision," which can read any electronic text, currency, food labels, and also with an option to explore that helps visually challenged children in daily routine day-to-day activities without depending on others. Mobile assistive technology and assistive technology enhance the facilities for visually challenged individuals to be more independent and improves their quality of life.[5] "Mobile eye app" aims to help visually challenged individuals to understand the surroundings during their travels with the use of a mobile phone's camera and text-to-speech technology. It helps to recognize and distinguish color using a color channel mapper and identifies money using a pattern recognizer. Document retriever is also used with a snapshot of a page with the printed materials. Voice messages serve as a software's manual for every function.[6,7]

An audio browser is also an information access tool used with touchscreens, which allows the users to browse the information stored and command using speech and nonspeech audio.[8] Apart from these technologies, there are some more technologies like "Braille Tap" in the field of accessibility and usability of assistive smartphone devices where braille displays as a haptic, which is touch-based interaction for a visually challenged, but this is useful to those individuals who are already trained in the use of Braille.[9] In Braille tap, keys from the mobile will represent a letter of a Braille character, which helps the users to form messages.[9] V Braille is also

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similar to representing Braille through a touch screen along with vibration, which helps the user to interact with braille through smartphones.[10]

The Ministry of Health and Family Welfare, Government of India, launched a website "eDantseva," which is the national digital platform that was released in the form of a Braille booklet and voiceover on oral health education for visually impaired individuals along with oral health poster for pregnant women and children. Since Braille is the primary medium of reading for visually challenged individuals to read information and educate them independently, this dissemination of printed Braille oral health books along with voice-over will provide an opportunity to read and hear about oral health. This remains unaware for these visually challenged individuals. So, as dental professional, it is our responsibility to make them aware of such digital facilities available.

But these special need individuals lack in access for digital technologies since they are unaware of these facilities available and many individuals face difficulties due to financial constraints. Although major cost reductions had been done over the past few years, many users still cannot afford it. According to the World Health Organization (WHO) one of the main causes of limited access to assistive technology in low- and middle-income nations is financial limitations. Also, there is not much assistive technology mentioned in the program document of the National program for control of blindness and visual impairment, in the Ministry of Health and Family Welfare, Government of India.

## Recommendations for Better Assistive Technology

There is a need to develop a policy for these visually challenged individuals regarding assistive technology to improve the digital-related facilities in limiting not only to smartphones but also to computer-related technologies with job access with speech (JAWS) software. JAWS stands for "job access with speech" and is a popular screen reader for the windows operating system used by visually challenged individuals. It can also be implemented in government institutes because many visually challenged children pursue their education in government institutes. Also, the government can scrutinize whether these types of assistive technology are available for these individuals. According to the United Nation, the convention on the right of a person with a visual disability should not be left behind. So, it is their right to getall these smart assistive technologies. As a health-care professional, we must work collectively in addressing these issues and improve their skills in digital technology which is limited.[5]

The Government of India must take the initiatives to providing these assisted technologies to the visually challenged individuals and educate them on the usage of those facilities. Since these individuals lack visual acuity, digital technology must not be a barrier or hindrance for them in acquiring knowledge and attaining the skills. According to the WHO 2030 Agenda of Sustainable Developmental Goals, "Leave no one behind" and "Endeavour to reach the furthest behind first," these visually challenged individuals must also get all the assistive technology facilities like a sighted person using computer based and smartphones, and they should also in a part of digital evolutions in utilizing their potential and make a significant contribution to the society.[11] Developers who develop such type of apps must understand their difficulties, challenges faced by them and also their requirements and then further design in such a way that it must be simple for these special need individuals to get fully utilized to develop a user-friendly app.

There is no mobile application available for oral health maintenance for these individuals. So, there is a need to develop an eyes-free mobile application for educating the brushing techniques, information about dental diseases and about the importance of oral health for visually challenged individuals with help of voice recordings or in the form of voiceover/talkback. So with the help of developers such mobile applications can be designed and launched so that these special need populations can be benefited.

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