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Assistive Technology for Visual Impairment

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Abstract
In this day and age of cutting-edge science and technology, it's important to talk about technologies for people who are visually impaired. In this article, we'll look at assistive technologies that can be used by the blind. Some examples of assistive tech for the blind include smart cane, reading assist software, speech to text software (DAISY Player), graphing science calculator with speech and important things to think about.

Introduction

Near-sightedness or farsightedness affects at least 2.2 billion people globally, according to a new WHO report. A person's quality of life is significantly diminished when they are visually impaired. Delays in motor, verbal, emotional, social, and cognitive development, as well as academic difficulties, can result from early visual impairment in children. Anxiety, despair, and stress are more common among adults who are visually impaired, and they are also more prone to feel socially alienated. Both near-sightedness and farsightedness have monetary consequences. Annual global productivity losses owing to near-sightedness related to presbyopia and unrepaired myopia are estimated to be $25.4 trillion and $244 trillion, respectively, according to a paper published in The Lancet Global Health. So, as a provider of healthcare technology solutions, how can we leverage current technology to ensure the safety, independence, and ease of life of individuals with visual impairment? Here, we will discuss our findings after researching the topic.

Definition of Visual Impairment

The limitation of the activities and functions of the visual system is referred to as "visual impairment". According to the National Eye Institute, low vision is a visual impairment that makes it difficult to carry out daily tasks and cannot be improved by traditional glasses, contact lenses, medicine, or surgery.

Types of Visual Impairment

The following categories for visual acuity and impairment are defined by the CDC and the World Health Organisation: Visual acuity below 20/400 with the best available correction, or a visual field of 10 degrees or fewer, is considered blindness; visual acuity between 20/70 and 20/400 with the best available correction, or a visual field

of 20 degrees or less, is considered low visual acuity. Low vision or moderate visual impairment is described as having a visual acuity of 20/70 to 20/400 (inclusive). In the United States, 20 degrees or less of visual field or visual acuity of 20/200 or worse with the greatest available correction is considered legal blindness.

Classroom Environment

Instructional resources for kids with mild visual impairments must be both visible and audible. In addition to preferential seating, the student should receive copies of the notes for any materials presented in front of the class (such as PowerPoint or a white board). The teacher should provide additional explanations for any written content. Larger notes or handouts may be required as an accommodation for students who cannot see regular print size, whether or not they are using assistive technology. Standard font size is at least 18 points, yet each student's demands will determine how much larger the font should be. It is advised to use Times New Roman or another simple, standard typeface with extra line spacing (i.e., 1.5). Tools such as magnifying lenses and books

Assistive Technology

Assistive technology is any apparatus or gadget that makes it possible for you to carry out duties that are beyond your capacity because of a disability. Making use of assistive technology can also help you do chores more quickly or safely. Assistive technology (AT) is any apparatus, programme, equipment, or product system that maintains, improves, or expands the functional skills of individuals with disabilities. Without assistive technology, a blind or visually impaired person's life would be incomplete. With assistive technology for the blind, which varies from simple 20/20 markers to sophisticated GPS-enabled gadgets, you can feel more liberated and autonomous. To assist the blind and visually impaired, corporations, governments, and non-governmental organisations (NGOs) are increasing their efforts.

Smart Canes

The use of smart canes, which have sensors and a computerised brain, helps those who are blind or visually handicapped feel more secure when exploring urban areas. Smart canes can be connected to smartphones in addition to detecting and warning users of possible risks. New possibilities emerge, such as voice-activated GPS navigation and the ability to receive real-time descriptions of objects and locations as the user walks by. With a smart cane, a person can thus choose a destination before leaving the house and receive audio directions while walking. The user can set the cane to notify them when they are near certain locations, like their favorite Starbucks or the bus stop. The We WALK model is the smart cane that has the most fans. In the same vein as We Walk.

Reading Assistance Software

The use of smart canes, which have sensors and a computerised brain, helps those who are blind or visually handicapped feel more secure when exploring urban areas. Smart canes can be connected to smartphones in addition to detecting and warning users of possible risks. More options become available, such as voice-activated GPS navigation and ongoing object and location descriptions. With a smart cane, a person can thus choose a destination before leaving the house and receive audio directions while walking. The user can set the cane to notify them when they are near certain locations, like their favourite Starbucks or the bus stop. The We WALK model is the smart cane that has the most fans. Very much like the We WALK.

Transcribing Audio into Text

For the visually impaired and the blind, speech-to-text software opens new worlds of communication, education, and writing. True to its name, speech-to-text technologies are able to reliably convert human speech into text with an accuracy rate of 99% or above. The software decodes an audio communication into its component phonemes and then searches a database for the best written representation of each phoneme. Speech adaption is one of the additional characteristics included in modern voice recognition systems. Users have the ability to alter the speech recognition algorithm to accurately translate numbers into other formats, like dates, currencies, and phone numbers, or to precisely transcribe unusual and domain-specific terms. Prominent speech recognition applications that blind or visually impaired people enjoy using include Windows Speech-to-text, Dragon Dictation, Dragon Naturally Speaking, and J-Say Pro.

DAISY Player

Books differ from other course materials such as articles, teacher-prepared documents, and web-based texts in that they typically have more structure and information. This is the reason that reading books in particular formats and on particular devices is beneficial to a large number of blind or visually impaired people.

For chapter navigation and bookmarking, the talking book format DAISY (Digital Accessible Information System) is very helpful. Although many software programmes are available for reading DAISY books, Plextalk also manufactures handheld devices that are specifically made for DAISY books. The Victor Reader is another popular device that plays DAISY format in addition to MP3, MP4, EPUB, and many other media formats.

Graphing Scientific Calculator with Speech

The Sci-Plus 3500 Graphing Scientific Calculator with Speech is the only large display calculator designed especially for people with low vision. This big button scientific graphing calculator can compute science, trigonometry, statistics, and fractions. It also has a large display. It has the ability to analyse values along a curve, locate poles and y-intercepts, plot equations, assess functions, and assess mathematical expressions. It can speak through the included earbuds.

TapTapSee App

To help blind and visually impaired people identify objects they come across on a daily basis, TapTapSee is a free app. The app needs an internet connection in order to work because it compares the photo to a sizable online database to identify what it is. At the moment, it is limited to working with a selection of Apple products, such as the iPad, iPod, and iPhone.

Smart Glasses

Companies that make assistive technology use AR, AI, and the Internet of Things to make smart eyewear. You can auto-zoom, boost contrast, and magnify with this product. It makes use of adaptive vision software to let those who have lost central vision to lead more independent lives while still enjoying the convenience of an analogy pair.

Envision is an additional enterprise offering intelligent assistive technology to individuals with visual impairments or blindness. In the words of the manufacturer, “Envision Glasses are AI for your eye.” To put it simply, their smart glasses cannot be better. This assertion is supported by an amazing range of features, such as text-to-speech, video calling, face recognition, real-time scene description, and more. On the other hand, the developers of Orcam have set out to make all Virtual reality headsets Furthermore, people with low vision are using virtual reality to enhance

their vision. Instead of immersing users in strange experiences, Virtual Reality (VR) in this case simulates a virtualized version of the real world that has been altered to allow those with vision impairments to perceive it. One kind of VR-enabled assistive technology for the blind and visually impaired is offered by Iris Vision. In order to facilitate more autonomous navigation of the world, the business has developed a device that integrates the capabilities of a smartphone with a virtual reality headset. Therefore, a smartphone's camera captures what a low-vision user sees and remaps the image to increase visibility. The wearer experiences reality as enhanced and magnified as a result. The device has Smart home solutions With a voice-activated smart home system, people who are blind or visually impaired can control their climate, lights, locks, doors, televisions, vacuums, lawnmowers, and more—all from the comfort of their own homes. The system can also notify the owners of any events happening in their homes. More than that, smart home assistants may help with scheduling, grocery shopping, music playing, phone calls, and messaging.

Alexa or Google Home

Information can be spoken back to you by hands-free, voice-activated electronic personal assistants like Amazon Alexa and Google Home. Many blind or visually impaired people use these speakers to read the news, check the weather, listen to the radio and hear the time.

Important things to keep in mind while implementing technological aids for the visually handicapped In their pursuit of user approval, providers of assistive technology solutions should keep the following in mind:

1. Assistive technology development for the visually impaired and the blind requires new levels of stakeholder involvement. The following factors should be given particular consideration by assistive technology solution developers in order to win over end users:
2. There has to be unprecedented levels of stakeholder engagement in order to develop assistive technology for the visually impaired and the blind. Developers of assistive technology sometimes fail to address the actual needs of individuals with disabilities because they do not involve end users, their careers, clinicians, and scientists. About one-third of people who use assistive technology stop using their devices as a result of this flaw. Include people with visual impairments in the design process to ensure that your device meets their actual needs. Additionally, keep in mind that even individuals with the same disability may experience very different impairments. Therefore, assistive technology may not be able to meet each person's needs if it was created to meet the needs of a population that was artificially homogenised. Because of the strong correlation between the usage of assistive technology in a specific setting and its efficacy, it is essential to maintain open lines of communication with physicians. Accordingly, while designing the software or gadget, take into account all possible settings and scenarios.
3. When designing devices and software, it is important to consider potential dangers for those with visual difficulties. Avoid potential hazards by taking all required measures while designing assistive technology for the visually impaired. Do a thorough risk assessment to make sure the assistive technology is safe for the purpose for which it is intended. Including safety-related features in your product, like GPS localization, fall detection, or emergency calls, can also help reduce risks. Consideration should also be given to compatibility with medical care. Ensure that a user's medical treatment is not impeded by technology.
4. The visually impaired need accessible and reasonably priced assistive technology. The specifics of assistive technology will always involve expensive development, limited production, and high costs. But as technology advances, it becomes simpler to create inexpensive, user-friendly assistive technology.

Conclusion

Assistive technology for the visually impaired is receiving more attention as a result of accessibility initiatives launched by tech companies and governments. Technology businesses are creating cutting-edge solutions for those who are visually impaired by utilizing the latest advancements in artificial intelligence, virtual and augmented reality, and the Internet of Things. But there should be a wider selection of practical, affordably priced solutions for people with limited vision on the market for assistive technology for the blind and visually impaired.

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