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Research Article

ASSISTIVE TECHNOLOGIES IN GADGETS AND IN INFORMATION TECHNOLOGY ACTS AS A THIRD EYE'S VISION TO VISUALLY CHALLENGED PEOPLE

Arivazhagan D and Sundaram S

Department of Information Technology, AMET University, India

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ABSTRACT

People with disabilities meet barriers of all types. However, assistive technology is helping to lower many of these barriers. By using assistive technology for tasks such as reading and writing documents, communicating with others, and searching for information on the Internet, people with disabilities are capable of handling a wider range of activities independently. Navigation in new environments is highly challenging for the severely visually challenged people. Assistive technologies are helping to overcome this problem. Alarge number of people are aware of assistive technologies, even though many of them are not aware of it. Assistive technology requires internet resources to assist visually challenged people. This paper describes the best tools and practices in information technology to support visual challenged people in their activities such as mobility systems, computer games, accessibility of e-learning, web-based information system, and wearable finger-braille interface for navigation. The purpose of this paper is to define and elucidate the various assistive technologies for visually challenged people.

INTRODUCTION

Braille was the only option for visually challenged people to access the required information. Even though Braille products are still widely in use, the information and communication technology (ICT) paved way for visually-challenged in new means of solution through assistive technology. New hopes are streaming with the help of assistive technology. Nowadays, visually challenged people can access the internet resources with assistive devices. As there are limitations in the availability of Braille books, visually challenged people are now depending on internet resources more to access the required information. The IT world empowers them to complete tasks independently which they would normally not be able to accomplish without the help of others. ICT helps to encourage students to become active participants in social, cultural, and economic developments. ICT can be multi-media for instructional delivery. It can be delivered in textual, audio, visual, and audiovisual forms. The use of internet and e-resources are increasing day-by-day. The Web environment is creating a new gateway for visually-challenged people to access information quickly and easily without any barriers and support from others. Introduction of ICT has impacted the traditional education system of visually-challenged people. Hence, an attempt is made to study whether the visually-challenged students are aware of these advanced technologies and whether these services provided by assistive devices are reaching them properly [1]. It is already established that access to information is one of the most important human rights: it allows the individual to develop himself/herself, and participate actively within a democratic society, fully exercising his/her rights and duties (Todaro, 2001) [2]. Today knowledge and information are the main keys of obtaining the productivity, competition, wealth and comfort. Technology is bound to rule our present and our future. Information technology is referred to the knowledge process and its applying methods, processing, transferring and making information in progress IT includes gathering, organizing, storing, publishing and using the information in the form of sound, picture graphic, text, number, by using the computer and telecommunication tolls [3]. People with visual challenges, partially or totally blind, are often challenged by places that are not designed for their special condition. For example, places like bus and train terminals, public offices, hospitals, educational buildings, and shopping malls. Several objects that are present in most built environments become real obstacles for blind people, even putting at risk their physical integrity. Simple objects such as chairs, tables and stairs, hinder their movements and can often

Corresponding author:* **Arivazhagan D
Department of Information Technology, AMET University, India

cause serious injuries. This paper presents a prototype of a navigation system that helps the visually challenged people to move from one place to another. The main objective of the paper is to provide some useful assistive technologies that enables a user to make appropriate and timely decisions [8].

Tools to Assist Visually Challenged People

The goal of any tool designed for visually challenged people is to be able to increase their activities, achieve their goals and to gain independence as a normal one. They should be able to increase their abilities to access and utilize everything. Advances in technology have made this increasingly more accessible with tools and aides that take advantage of the latest innovations to help enable visually challenged people [13].

Sceneeye 500

The Scene Eye 500 is a camera that easily connects to a laptop or tablet. By magnifying the image seen by up to 50X, a visually challenged people can use the device to easily see the blackboard or any classroom presentation. Contrast is also adjustable to make the image even easier to read. Visually impaired students can record the images for later viewing, giving them a permanent study aid in what is being taught in class. This assistive device only works for partially affected people [13].

Braille Compass

Using a Braille imposed tracing wheel, this compass from Howe Press enables visually challenged one to complete math tasks with no assistance. The point end works the same as on regular compasses, but the student is able to read the tracing wheel with their finger and make the proper adjustments [13].

Video Magnifier

The Olympia video magnifier enables visually impaired persons to follow along in their textbooks and read and complete worksheets. The device features a range of magnification settings as well as a tilt screen for optimal viewing. Battery operated and portable, the Olympia can be used in the classroom or at home and has no limitations in the type of text it is able to view [13].

Ovation

The Ovation is able to read the pages of a text book and convert the words into an audio format. Using a flatbed scanner, the Ovation is capable of reading and translating newspapers, books and magazines and immediately read it back to the user. This device could virtually eliminate the need for a visually challenged person to purchase audio textbooks or Braille versions [13].

Ray Phone

There are a number of apps that can be added to a smart phone that the visually impaired person may find useful, but the Ray cellular phone has already incorporated a number of them into one device. Visually impaired persons will find its note taking capabilities and schedule makers especially helpful in their academic careers, while being able to have all of the other advantages that smart phones offer modified to be accessible by the vision impaired [13].

Braillenote Apex Note Taker

This portable word processor allows a visually challenged person to type notes in Braille and then later convert them to audio. Created by Human Ware, the Braille Note offers an array of features including three USB ports and synchronization with home computer. Note taking without an audio recording device is difficult for visually impaired persons, but this device makes it easier [13].

Winbraille

WinBraille is a software program that can take text from a scanned document and convert it to Braille. The document can then be printed out using an embosser and given to the visually challenged student as a study aide or test exam. This eliminates the need to isolate visually impaired students to administer exams orally [13].

Embosser

The View Plus Max Embosser allows the user to print anything from their home computer that has been translated into Braille. Having a versatile unit like this at home will make it easy for the parents of a visually challenged student convert their schoolwork into readable material for their visually challenged student 13].

Visual Cortex

Visual Cortex on Silicon addresses three "domains" or end uses, each of which will augment human vision in particular ways. Third Eye-AR (Augmented Reality) and Third Eye-DA (Driver Assistance) will aid in the recognition of objects and people in a variety of settings, including busy streets and urban battlegrounds. Most of the team's effort in its first year has gone into the third domain, Third Eye-VI, where the aim is to develop a system coupled to a wearable device that will help visually impaired people do their grocery shopping.

Smartphone Crosswalk App

Street crossings can be especially dangerous for people with low vision. James Coughlan, Ph.D., and his colleagues at the Smith-Kettlewell Eye Research Institute have developed a smartphone app that gives auditory prompts to help users identify the safest crossing location and stay within the crosswalk. The app harnesses three technologies and triangulates them. A global positioning system (GPS) is used to pinpoint the intersection where a user is standing. Computer vision is then used to scan the area for crosswalks and walk lights. That information is integrated with a geographic information system (GIS) database containing a crowd sourced, detailed inventory about an intersection's quirks, such as the presence of road construction or uneven pavement. The three technologies compensate for each other's weaknesses. For example, while computer vision may lack the depth perception needed to detect a median in the center of the road, such local knowledge would be included in the GIS template. And while GPS can adequately localize the user to an intersection, it cannot identify on which corner a user is standing. Computer vision determines the corner, as well as where the user is in relation to the crosswalk, the status of the walk lights and traffic lights, and the presence of vehicles.

Artificial Intelligence is Helping the Visually Impaired

New technologies are rapidly changing how many of us live our lives. Advances in connectivity are allowing us to access and transmit information faster than ever before. From financial services to healthcare to education, the application of new technologies is simplifying long-existing processes and changing how consumers interact with businesses and service providers. Although new technologies are undoubtedly changing our commercial interactions, the application and proliferation of new technologies like Artificial Intelligence (AI) are having a much broader and positive impact on society. However, much of the focus on Artificial Intelligence (AI) has been on how its commercialization will impact the global labor force. Without question, the development and design of systems, machines, and processes that will effectively carry out tasks previously reserved to humans, ranging from decision making to the manufacture of products, will have far reaching implications on our societies and deserves much discussion. Yet, what is equally as impactful and worthy of discussion is the role AI can play in improving the quality of life of everyday individuals. As many would agree, self-driving cars or automated vehicles are one of the most exciting AI innovations of the 21st century. Powered by advanced AI technology that senses, processes, reacts and adapts to external factors in much the same way a human driver would, self-driving cars are expected to revolutionize human transportation. In terms of safety alone, AI not only predicts and anticipates responses, but can also prevent and mitigate the consequences of bad weather or collisions. Consequently, the future proliferation of automated vehicles is expected to reduce accidents, cut greenhouse emissions, and even increase human productivity. Now imagine adapting the very same highly advanced AI technology that powers automated vehicles to applications that will improve the lives of the visually impaired. By applying technology that accurately senses its external environment and makes accurate, split second decisions to aid visually impaired individuals you could have a transformational impact on people's lives.

CONCLUSION AND CHALLENGES

This paper discussed about the assistive technologies for visually challenged people in order to enhance their computer skills and prepare them to make use of recent technology in their daily life. At the same time they have to advance their information technology skills beyond the basic computer skills. This paper also explained about the best tools and practices in information technology to support visually challenged people in their activities such as mobility systems, computer games, accessibility of e-learning, web-based information system, and wearable finger-braille interface for navigation. The main challenge on assistive technology is to enhance accuracy, reduce computational cost, and to improve the various techniques toward tracking applications.

New visualization algorithms are needed to handle density, occlusion, and general situational awareness issues in assistive technology. This algorithm must be done in real time, without the manual intervention of artists or programmers. Technical issues are not the only barrier to the acceptance of assistive technology. Users must find the technology socially acceptable as well.

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