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Survey on Assisting Methodologies For The Visually Impaired People

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Abstract

This survey talks about the assistive technologies for visually impaired people.These technologies providea greater independence which enable blind user to perform their own task .This technology can be defined as any object that will help to improve the capability of people with visual disabilities. For that reason assistive technologies play a vital role in destroying barriers for people who suffer from vision loss.In this paper a survey has been done about the devices and tools implemented especially for the blind users .All these devices and tools have been helpfulfor visually impaired people and also to provide confidence and encourage for them to look at the outside environment bravely. This paper also presents a technology behind those tools and how it has been implemented.

Keywords: visually impaired, assistive tools, blind people.

Introduction

Blindness makes people feel difficult to suffer when comparing to people who suffer from normal health problems. They face a large difficulty in order to fulfill their needs. Though they are blind their sense of hearing is very sharp and strong. This is an added advantage for them. It is necessary for each and every individual to have good education, to be self-employed and to have friendly relationship with the outside environment. The problem of accessing the public busses is one of the mysterious tasks faced by the blind users because in all public busses only the bus number is displayed. Inconvenience is caused to the blind user because they have to wait for someone for help. and the worst case is during non-office hours and at less frequently used bus stop they have to wait patiently for someone to help them. So the best solution is that they can accompany someone with them for help but this creates

dependence on the other individual. The task of crossing the road is a tough challenge faced by the blind users. The problem occurs probably when they get hit by a car, fire truck horn blasts, sirens blare and also some sort of obstacle might disturb them while crossing. One of the best solution followed in foreign countries is that the user gets aware of the tone sounds and vibrations with the help of these sounds they can easily cross the road. There are many blind students emerging all over the world but the challenges faced bythe blind students are to identify the correct classroom or department, problem in listening to class lectures. are some challenges faced by the blind students .The employment opportunity play a very important role in all individuals life Without employment it is impossible for people to acquire their means and resources and thereby lead a successful life .In order to overcome all these problems this survey will tell what are the assistive devices and technology that are applied to the blind users. By using all these devices and tools will give them the confidence to sustain independently in this sort of environment like other human beings. Section II describes the assistive tools and devices that are implemented for the blind users. In Section III describes the methods that are applied for all these devices and tools. and in Section IV describes the various applications that are implemented for the blind users.

Assistive Tools and Devices

In earlier days the guide dogs have been the close friend of the visually impaired people The user will use them to go to places in the surrounding environment .But the drawback in guide dog is that they don't have to access to all the environment and also training the guide dog is little bit difficult. So Sergio I.Lopes ,Jose M.N.Vieria had implemented out three electronic mobility devices namely Mobi free cane an improved long cane , Mobi Free sunglasses ,and Mobi free echo [1][2][25]. The long cane helps to detect obstacles such as holes on the road side while walking .the sunglasses are used to detect head level obstacles such as pillars, parking stand etc. The Mobi Free echo are used to detect obstacles such as wallsand bikes. But all these electronic applications will work only in outdoor localization..Navigating in an unknown environment is very difficult for blind users a large amount of devices were implemented among which one was the RFID .The RFID based system proposed by Punitdharani[3][4][26] works well in outdoor environment .[5]Chun-hung Yang and Sheue – Ling Hwang had used GPS based navigating system which helps in broadcasting the information .[37]For reaching the destination properly at the right time the position of the user has to be estimated properly . [33][34]Koji Soeda and Shingo Aoki improvised this technique by using DGPSFrom the digital map data base the position of the user is estimated . From this technique a suitable route from initial point to destination is calculated depending on the users position and digital map data base .Jin-hee Lee and kyeongyulkim had used the zigbee module as one of the navigating system .the purpose of this module is that it determines the range and the position of the user both are calculated [6][29].In order to travel in an unknown environment they decided to pre build a map and store the information details in the form of a database .All the information details are fed into the system before the user

starts his navigation task. The information such as floor plans, room numbers are all recorded. This sort of system had been implemented by Apostolopoulos and Fallah [7][8]. Navigation for the blind user can also be done through synthesized speech and through audio output [9][10]. A large variety of robotic based system are designed for people with visual disabilities . The mobile robot are fed with a pre build map, navigation path, and also with a vision system so that the blind can travel without fear in an unknown environment [11][28]. Many blind students are emerging all over the world .Several tools and devices are implemented for blind students .the one such device is the use of smart phone. the purpose of using smart phone is that it has the capability of sharing the information over a network such as the internet [12][29][39].

Figure 1: Guide dog

Figure 2: White cane

Figure 3: Sensor Types

Figure 4: GPS

Figure 5: RFID

Figure 6: Smartphone

Figure 6: obstacle Detection

Figure 7: Step Detection

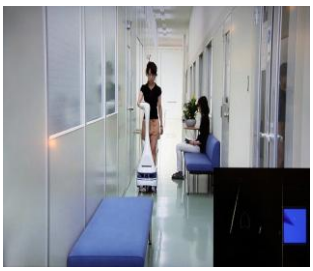
Methods Implemented For All These Assistive Devices and Tools

The task of moving from one place to another is one of the tough challenges which involves obstacle detection , accessing room numbers and door numbers, reach the destination path correctly are some of the challenges faced by the blind users in their daily lives .The GPS based device are useful to identify the location of the user [13][14][38].The GPS does not work in indoor localization because the GPS signals are deployed inside the building .So in the outdoor environment you can keep GPS as an information source and use RFID technology for the detection of location errors.[15]Richard F.Joseph and AnandA.Godbole had implemented a method using RFID technology .[27][30]The process works with the help of RFID tag and RFID reader .The PDA baseddevice provides output information in the form of audio whereas the user can provide input in the form of speech. A wide variety of sensors are used for detecting obstacles which includes the ultrasonic sensor, infrared sensor, sonar sensor etc. Instead of using a variety of sensors [16]A.Aladren and G.Lopez.Nicolas had chosen one device named RGB-D camera . This RGB-D camera takes the information of both range information and visual information .The range based information includes a detail account of information .All the information that are collected are found to be interfaced in to the system. And this helps to identify the objects in the scene. It helps to calculate the distance between the object and the user[17][18][19].Since the blind user suffer from visual disabilities they don't have the opportunity to look at the outside environment .[20]So Sofia Cavaco and J.ThomasHenriques had implemented a software tool which captures an image and converts the color information into sound .The converted color information includes pixels color range, the location of shapes etc. [31]This sort of application will help the user in their daily routine .It helps them in buying the clothes of their own , getting things of their own, cross the road independently .the above technology is further improvised by [21Roberto Neto and Nuno Fonseca .They applied two technology namely the optical character recognition and speech synthesis .[22]optical character recognition involves recognizing text from images such as traffic signal signs. Speech synthesis involves a text which is in digital format is converted to voice and played in the form of audio.[23]The technique of choosing the clothes by the blind users where further improved by Xiaodong Yang and Shuai Yuan has developed a camera-based prototype system that recognizes clothing patterns .Such recognition of accessing

clothing pattern varities and accessing the color types helps to improve their life quality .butAutomatic camera-based clothing pattern recognition becomes a difficult task due to many clothing pattern and color designs[24].Here, we introduce a camera-based system to help visuallyimpaired people to recognize clothing patterns and colors. Mostly all camera based system works with the help of a sensors which includes a camera for capturing clothing images, and for the input to the blind user a headphone or microphone is used for audio output and analysis of clothing pattern recognition, and color identification we can use a mini-computer or a smartphone .The system was tested practically by the blind users and they found it to be useful However, most blind users expressed that they wanted such sort of system to support more independence in their daily life.The blind user must gain sufficient knowledge even from social networking sites say the internet.So[32].Simon Liu and Wei Ma they decided to help blind people in improving web access .This technology will be helpful even for low sighted individuals .The process works in such a way that it helps to increase the text font size alters the page display so that the text is bright even in dark background . The blind user can give commands through speech rather than using a mouse.The blind users can thereby receive the information with the help of text to speech system .the text to speech systems is been discussed above.[35][36][40]Because the internet application is very useful which enables to establish communication between people and things Maria Carmen Domingo was the first to make an overview of the internet of things for people with disabilities.She introduced a IOT architecture (Internet of things) She divided into Three categories in which all these assistive devices where introduced The first was to identify the objects with the help of sensors,actuators,RFID,andsmartphones.once identified the object it is necessary to transmit the information and thereby satisfy the users needs.

Applications

S.No	Name	Images	Application
1.	Braille Alphabet		The braille application which is represented by a sequence of raised dots.especially used for blind students.
2.	Identification of correct footwear by the blind user		The footwear application which helps blind user to identify their own footwear

3.	Blind users watching television		Television application .Blind users watch television with the help of sound effects
4.	Guide dog robot		guide dog robot application guides the blind user on the pedestrian path and also avoiding from moving obstacles .
5.	Bionic Eye Glass		The bionic eye glass application useful while walking on the roads mainly used in both indoor and outdoor application.

Conclusion

We have seen the various assistive devices and technologies that are been introduced for the blind user in which the most widely used is the GPS the GPS technology is used to estimate the position of the user. but still there are drawbacks in GPS in the circumference of a tunnel or building it is very difficult to receive the GPS signal so still advancements can be made in this field of technology .Speech synthesis technology had played a vital role because in all available devices this technique is been applied so different types of voice modules and tools can be introduced in future and also that technology can be improved in the case of security purpose for the blind user especially in the case of indoor application .because the blind users safety at home is very important

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