Smart Devices for Visually Impaired

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Abstract:- **The number of people visually impaired or blind people was counted to be nearly three hundred million. A recent plan that seems to achieve a global reduction of avoidable visual impairments of thirty percent by inventing smart devices. Many children suffer from blindness due to cataracts, accidents or may be blind from birth. Although they can be treated with operations. Many global hospitals and societies are providing them with safe treatments. But we are trying to motivate them and increase the usage of smart devices available in the market.**

I. INTRODUCTION

Physical disabilities can cause depression or loss of confidence but a person must never give up. The World Health Organization have acquired data that estimates 285 % are visually impaired in which 85% of them live in poverty range. According to the rights blind people should be given priority and need more attention from government to improve the country . The blind people or visually impaired in few countries aren't considered useful and leave them to suffer which has to change. So the convention accepts them and pledges on a right that says blind or visually impaired to live or prosper as an equal to a regular human being.

II. PROBLEM STATEMENT

A blind or a visually impaired has right to enjoy regular life but to certain disabilities they can't so travelling, communication , and other thing become difficult for them .People with blindness face serious trouble .For a blind person or visually impaired a simple task like accommodation in a room or maybe communicating with one another may be difficult . So taking tall these to considerations we understand they have several constrains and barriers.

III. BACKGROUND

Blindness or visually Impaired is a disability where people don't see anything. Few people are called blind although they see couple of things in general .This is because they see things blurred or in different colors. In the modern world several people are blind. This is caused due to lack in malnutrition, disease like cataracts and trachoma or accidents. Sometimes they are born blind. Few people are color blind that means they can see but misinterpret the colors .People with blindness or visually impaired used old technologies like Braille's system or a dog to help them. But in the modern world new technologies have emerged to save the blind people or the visually impaired.

IV. SMART DEVICES

Smart devices are interactive electronic gadgets that understand simple commands sent by users and help in daily activities. These are few assistive smart devices for blind or visually impaired people that assist them in daily activities.

A. The Smart Finger Reader

The Smart Finger Reader is a finger reading device that helps the blind to read printed text just by scanning the words. This device has hardware and software which includes video processing and gives outputs accordingly. The Finger Reader hardware uses 1) dual-material case, 2) tactile feedback and 3) video camera. Vibration motors are present in the ring to give outputs on the directions of the user.

Fig 1:- The Smart Finger Reader

The Finger reader contains software which includes a text reading system, hardware control driver, an adding section that uses Tesseract OCR (Optical Character Recognition) and Flite i.e. a Text-to-Speech (TTS) conversion. First the user wears the ring which is connected to the Text Control Device. This device controls the flow of data from the ring. The recognized characters and words are converted using the algorithms to audios with the internet application installed in this device. The finger reader has a small camera that is used to detect the characters. The camera analysis stores the information retrieved from the camera line-by-line. Once the say tab is used the device starts reading the stored words. Although some practice is required by the user so that they don't confuse the lines.

B. The Glove PI

The glove PI is a smart wearable device that supports blind people in communication using the Malossi technique. Two blind people can communicate by typing on each other's hand, in turns: they touch different areas of the palm, each corresponding to a letter.

Fig 2:- The Glove PI

The Glove Pi contains three parts which are (1) Gardener glove; (2) MPR121 capacitive touch sensor module with an expansion board, (3) Raspberry Pi .The Glove Pi device uses the Malossi technique to uses the alphabets the sensors are connected too. The user selects the letters or characters in terms of words that he wants to convey to his partner. These letters require a MPR121 sensor that is used to sense the touch of a user hence it recognizes what letters you have touched. After the letters have been sensed it is send to the raspberry pi device. This device includes python programming to determine the words which is connected to an android application. This android application then converts the words to audio .Similarly the partner requires this device to send any text back to the user.

C. The Attachable Electronic Device

The cane is used by the visually impaired to travel. It very successful in its outcomes that even the blind can use it. This device can be used as medium of recognizing obstacles in front of the cane by giving a signal in the ear piece which is connected to the device.

Fig 3:- The attachable Electronic Device

This device is mainly made up of a box and an earpiece. This box contains several devices which are an ultra-sonic sensor, a microcontrollers chip, a switch to turn the device on and off and a buzzer to give signals. This device includes several electronic components like the microcontrollers, batteries, sensors, switch and a buzzer along with an SD card . The user attaches this device to a cane on the top at a certain angel and plugs the earpiece in. Once he starts moving the sensors present in the boxes try to sense elevated obstacle or a dump. This senor works with the microchip present inside the box one it detects any obstacle it sends a signal back to the earpiece with a certain audio.

V. COMPARITIVE STUDY

After doing a brief comparative study on these modern devices that are implemented for visually impaired we have come up with few ideas. Also we have found how these technologies will impact the daily lives of visually impaired. These devices not only help the visually impaired but also the complete blind as well as the senior citizens. Taking few terms into conditions like they can purchase these devices and can use them without any issues here are few advantages and challenges.

A. Advantages

- These Devices are affordable to mostly everyone.
- The performance of these devices is high because Internet and modern chips are used.
- These Devices are easy to install so that the users don't face any trouble using them.
- It can be used by different types of impaired people like completely blind, visually impaired after a certain age or people with blindness due to aging.

B. Challenges

- Customization of these devices may lead to increase in expenses
- If the user has no knowledge about the basics of the devices like the Malossi alphabet technique or the balance of hand in using the finger reader it may be difficult for them to use such devices.
- If the users have several disabilities like missing arm or leg these devices cannot be used.

VI. CONCLUSION

In this paper we present and focus on comparative study on smart devices. After a comparative study we have found these device can be used by several disabled people like visually impaired after a certain age, blindness due to aging or fully blind. The devices which we have done comparative study on are the smart finger device which is used to read a book, the Glove PI used to communicate between blind people and AED i.e. an Attachable Electronic Device which is connected to a cane helping them to avoid obstacles. By doing this we are trying to provide the blind people or the visually impaired with modern technology. All Impaired people have the right to prosper equally hence we have come up with a conclusion to make use of these modern devices to help their needs.

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