**Chapter 2**

**LITERATURE SURVEY**

**Case Study1: Survey on Smart Glasses for Visually Impaired People**

By Muhammad Shahbaz Khan, Sunil K A, Pramod Sencha N

**Abstract**

Blind people face lot of challenges in their daily lives. To overcome the difficulty of the visually impaired group this paper presents a Smart Glasses which provides guidance to blind people efficiently and safely. The main objective of the present work is to develop a low cost, reliable, portable, user friendly solution for smooth navigation. It includes ultrasonic sensors to detect any obstacle and notify the user with a beep sound. It also includes a camera which provides various functionalities such as OCR (optical character recognition), voice out the top 10 news, current time, new emails, current temperature, current location etc. The experimental results show that the Smart Vision System can effectively improve the user’s travelling experience. Thus it serves as a consumer device for helping the visually impaired people.

Keywords: Raspberry PI, OCR (Optical Character recognition), Obstacle detection, Current date and time, new emails, current location and temperature.

1. **Introduction**

According to WHO (World Health Organization), the estimated number of people visually impaired in the world is 285 million, out of which 39 million are blind and 246 million are having low vision. The visually impaired people face a lot of difficulty in perceiving and interacting with the surroundings but there are some navigation systems or tools available for visually impaired individuals. Traditionally, most of them rely on cane (walking stick) swaying in front while walking to avoid obstacle. However, they cannot perceive any information written on boards or any important indication.

The proposed prototype includes ultrasonic sensors, camera which is used for multiple functionalities. The ultrasonic sensors are placed on hat/glass which detects objects and notify the user with a beep sound through an earphone when the user is very close to the object. The camera is used for OCR (optical character recognition) which extracts text from images taken by the camera on the press of button on remote by the user. The processing unit used is Raspberry pi which processes the above functionalities. The other functionalities implemented on raspberry pi are news headlines, current date and time, current temperature, current location etc. The details of the above functionalities are discussed in the proposed system.

1. **Literature Survey**

The paper[1] presents an assistive system for visually impaired people. The system helps the visually impaired people while travelling. It is designed in the shape of eyeglasses for providing guidance efficiently and safely. It uses Ultrasonic sensors which are placed on glasses which are used to detect objects and alert the User. The model improves the traveling experience of users but still the user cannot perceive any written information.

The paper[2] identifies the personal, environmental, and transportation factors that have an effect on visually impaired people. It is designed to help the visually impaired people in indoor and outdoor mobility and navigation. The prototype can detect traffic situations such as street crossings, traffic lamps, cars, cyclists, other people and low and high obstacles. The user is alerted with a beep sound via an earphone.

The paper[3] consists of rangefinders that would take input from the ultrasonic sensors and output feedback to pulse vibration motors which are placed on the blind man's head. When the person gets closer to the object, the intensity and frequency of the vibration are increased. The main limitation is the use of vibration motor. The vibrations as an output feedback are far way irritating for any blind person.

In paper [4] it can be observed that it consists of a video camera on the frame itself as well as a computer processing unit precise enough to get fit in the pocket and the software that provides images of objects close by to transparent displays on the eyepieces. The major limitation of this device is that it is not at all suitable for completely blind people. It is recommended only for people with low vision or night blindness.

1. **Barriers**

The visually impaired people face a lot of difficulties in their daily tasks. A visually impaired person needs some help to move from one place to another either in the form of a tool such as cane(walking stick) or a person to guide them. The walking stick doesn’t detect potholes or small objects which is inefficient for the user. A human guidance is not available or cannot be given every time.

Some of the existing systems offer limited functionality such as detecting the objects and alerting the user through speaker but cannot assist the blind person to the fullest. Few models are not feasible because of weight or cost.

1. **Conclusion**

The paper introduces the need for a good model for the visually impaired. The performance of the proposed system has found to be effective. The ultrasonic sensors can detect the obstacle in the range 2cm to 400cm and alert the user with a beep sound via an earphone. With the press of a button, the user can perform various functionalities. The user can perceive any written information with a press of a button, voice out the current date and time, current temperature, current location etc. The proposed model is easy to wear and use and can be used as a portable model for visually impaired people.

**Case Study - 2: Implementation of Smart Glasses for Visually Impaired people.**

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**Abstract**

In today’s growing world where technology is advancing into every aspect of our lives, it has changed the way we go about our life. With all this technology in hand, improvements can be made in various ways to help the society. Blind people face lot of challenges in their daily lives. To overcome the difficulty of the visually impaired group this paper presents a Smart Glasses which provides guidance to blind people efficiently and safely. The main objective of the present work is to develop a low cost, reliable, portable, user friendly solution for smooth navigation. It includes ultrasonic sensors to detect any obstacle and notify the user with a beep sound. It also includes a camera which provides various functionalities such as OCR (optical character recognition), voice out the top 10 news, current time, new emails, current temperature, current location etc. The experimental results show that the Smart Vision System can effectively improve the user’s travelling experience. Thus it serves as a consumer device for helping the visually impaired people.

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1. **Implementation**

The implementation of Smart Glasses for visually impaired People is done with the help of components such as Raspberry pi, ultrasonic sensors, webcam, earphone. All the components are placed in secure manner which is easy for the person to use it. The person can anytime wear or remove the model.

The raspberry pi is a low cost, credit card size computer which is used for running the programs(processing). The Ultrasonic sensors measure distance by using ultrasonic waves. The sensor head emits an ultrasonic wave and receives the wave reflected back from the target. Ultrasonic sensor measure the distance to the target by measuring the time between the emission and reception. It has a range to detect the objects in the range of 2cm to 400cm. The sensors are placed on the model which are used to detect any obstacle and alert the user with a beep sound.

The webcam is used to capture an image and is processed by Raspberry pi to extract text from the image using the OCR (optical character recognition) technology. It can also identify the dominant color present in the image.

The features such as voice out unread emails, current temperature, current location, current date and time, current weather details are programmed on the raspberry pi. All the above features can be executed with the press of a specific button on the handheld remote. The output of all the features is in speech format using gTTS library.

1. **Modules**
2. **Voice out results**

gTTS (google text to speech library): It is used to convert the text to speech format. It is vital for voice output for user.

1. **DateTime module**

It has methods to return information about the date and time object. Basically, it is used to fetch the current date and time.

1. **OpenWeatherMap API**

OpenWeatherMap API is used to get the current temperature and the weather description for the day and the result is stored in a text file.

1. **Imap module**

Internet Message Access Protocol. It is an Internet standard protocol used by email clients to retrieve email messages from a mail server over a TCP/IP connection.

1. **News API**

It is used to fetch the top headlines from news server and store the results in a text file. The text file is given as an input to gTTS module to voice out the top 10 headlines.

1. **Tesseract**

Python-tesseract is an optical character recognition (OCR) tool for python. That is, it will recognize and “read” the text embedded in images.

1. **Geocoder**

This module is used to find the current location of the user. Geocoding uses spatially explicit reference dataset (e.g., digital road network) to identify the location that best matches the input address, essentially by comparing and interpolating the address to the range of addresses for each segment of the reference dataset.

1. **Conclusion**

With the available improvements in technology it is imperative to provide a solution which will work towards the betterment of the society and make a change in our community. The paper introduces the need for a good model for the visually impaired. The performance of the proposed system has found to be effective. The ultrasonic sensors can detect the obstacle in the range 2cm to 400cm and alert the user with a beep sound via an earphone. With the press of a button, the user can perform various functionalities. The user can perceive any written information with a press of a button, voice out the current date and time, current temperature, current location etc. The proposed model is easy to wear and use and can be used as a portable model for visually impaired people.