_____

THIRD EYE SYSTEM FOR VISUALY IMPAIRED PEOPLE

Anushri Bhuyar [1], Kiran Chaudhari[1] Bhagyashri Bele[1] Gaurav Zade[1]

[1]*Electrical Engineering Department, D.M.I.E.T.R, Maharashtra, India*

Abstract: This paper represents the idea of developing a system for the blind people which will assist them in their daily activities. There are many challenges faces by the blind people and in most cases they also require the assistance of other people in almost all daily activities. They face major challenges outside while walking like obstacles on road, vehicles, other people walking on road etc. To counter this, we propose a "third eye system" in assistance to blind people. This system will help them in their daily activities. This system is voice embedded which will assist blind people in their day to day work. This system is the integration of various available technologies in a single device with multipurpose use by the blind people. The paper discusses about the design of such a system and the challenges involved in designing the device.

Keywords: Text to speech, Blind people, Obstacle detection, Voice command

I. INTRODUCTION

Blindness is the condition of poor visual perception. There are 285 million visually impaired people in the world, of which 246 million people had low vision and 39 million people are blind. Most of the time blind people had to wait for the assistance of other people in their day to day activity generally while walking or crossing the road. The number of visually impaired is so large that it has a huge impact on the economy of the country. In fact in this busy world, common man doesn't have time to even look at these differently able ones. According to World Health Organisation, there are at least 2.2 billion people have a vision impairment or blindness, and out of which least 1 billion have a vision impairment.

This 1 billion people includes those with moderate or severe distance vision impairment or blindness due to unaddressed refractive error (123.7 million), cataract (65.2 million), glaucoma (6.9 million), corneal opacities (4.2 million), diabetic retinopathy (3 million), and trachoma (2 million), as well as near vision impairment caused by unaddressed presbyopia (826 million)[2].

The prevalence of blindness in India has come down by around 47 per cent since 2007, according to the National Blindness and Visually Impaired Survey (2019) released on Thursday, indicating that the country is close to achieving the WHO's goal of reducing it to 0.3 per cent of the total population by 2020. However, the data reflects that reduction rate has surpassed the target of 25 set by the WHO. The WHO Global Action Plan for Universal Eye Health (2014-19) aims to reduce the prevalence of avoidable visual impairment by 25 per cent by 2019 from the baseline levels of 2010.

"The prevalence of blindness in India has come down by around 47 per cent since the last survey conducted in 2006-2007 and the findings of the current survey are for blindness as defined to be vision of less than 3/60 in the better eye," Vardhan said adding the country is close to achieving the WHO's goal of reducing it to 0.3 per cent by 2020.

Travelling or merely walking down a crowded street can be challenging. A physical movement is one of the biggest challenges to the blind people. We want explore the possibilities by using the hearing sense to understand the visual object. In this, we have converted visuals into audio by using artificial intelligence. The visuals are converted into

_____

audio by using various devices. This will help them to analyse the current environment situation and also increase their self confidence and it will also work as safety device.

I. RELATED WORK

In absolute numbers, people suffering from blindness have reduced from 12 million in 2006-07 to 4.8 million in 2019. However, cataract still remains to be the most common cause of blindness (66.2 per cent) followed by corneal blindness (7.4 per cent). Besides this, the proportion of blindness due to complications of cataract surgery (7.2 per cent) has also increased [1].

Dr. I S Akila, Akshaya B, Deepthi S, sivadharshini P, has proposed the system which involves the text reading within the image with the concepts of Tesseract OCR [Optical Character Recognition] engine and Google Speech API [Application Program Interface] which is the textual input to speech engine. The text is converted to speech in English and Tamil language.

Akhilesh A. Panchal, shrugal Varde, M. S. Panse, design a system which involves extraction of the text from the image which is converted into speech. It identifies the text from scene text and artificial text.

Rajendrasing Rajput, Rushikesh Borse, developed a system that reads the text written on the object.

II. SYSTEM HARDWARE

The third eye hardware is a proposed system of, Raspberry Pi 3B Module mounted with secure digital card (SD card), Speaker, Raspberry Pi Camera, power supply. The figure 3.1 represents the system hardware design for the system.
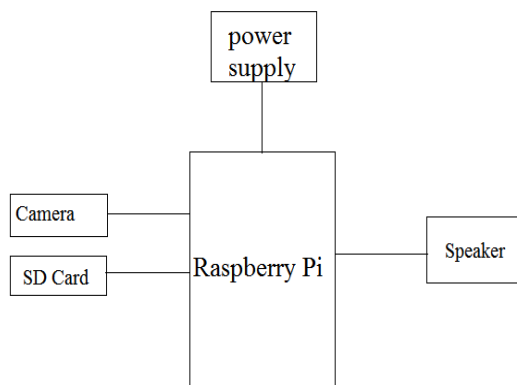

Fig.1.1. System Hardware

a. Raspberry Pi 3

The Raspberry Pi 3 has been chosen as a microcontroller due to its compact design and portable convenience. It also has a python programming language which is comparatively easier to understand and also has similarity to the English language. The fig. 1.2 shows the raspberry pi 3+ module B.

_____

_____

The Raspberry Pi 3 Model B+ is the latest product in the Raspberry Pi 3 range, boasting an updated 64-bit quad core processor running at 1.4GHz with built-in metal heat sink, dual-band 2.4GHz and 5GHz wireless LAN, faster (300 mbps) Ethernet, and PoE capability via a separate PoE HAT. The Raspberry Pi 3 Model B+ maintains the same mechanical footprint as both the Raspberry Pi 2 Model B and the Raspberry Pi 3 Model B. Adafruit made/brand cases will still fit but some other cases may not, especially ones that depend on component location or have a built in a heat sink.
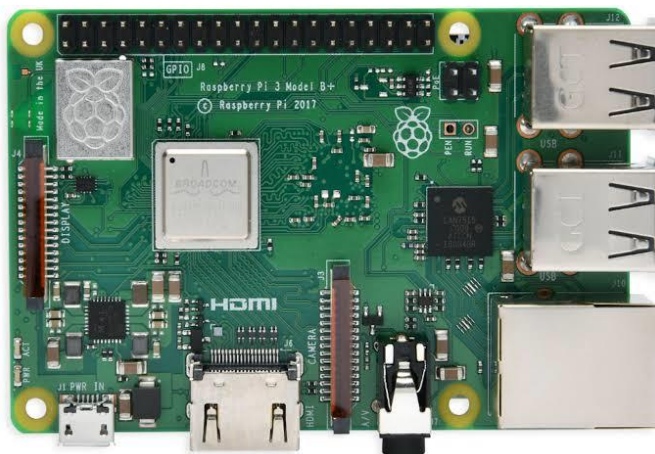

Fig.1.2. Raspberry Pi 3+ Module B

b. Raspberry Pi with Camera

The camera is used to capture images of different objects and the SD card is used for the storage of the images for further processing. The webcam package is installed to interface the camera with Pi. The captured images are processed using Open Source Computer Vision (OpenCV) which is a library of programming functions mainly aimed at real-time computer vision [3].

Fig.1.3. Raspberry Pi with camera

III. WORKING OF THIRD EYE

The fig. 1.3 shows the block diagram of the system, which shows the working process of the system. This system is so designed that it will help the blind people in their day to day activity. This system first capture the image with the help of camera which is then stored in the SD card. Then the pre process is done on the image identifying the object

_____

and very next the image extraction is done and converted into text. Then the text is converted into speech, and this all process is done through Raspberry Pi 3 module B+ and the python programming language.

a. Image Acquisition

In image acquisition process, the usually a hardware based source for stored in the SD card. The image is Raspberry Pi camera. It is the fi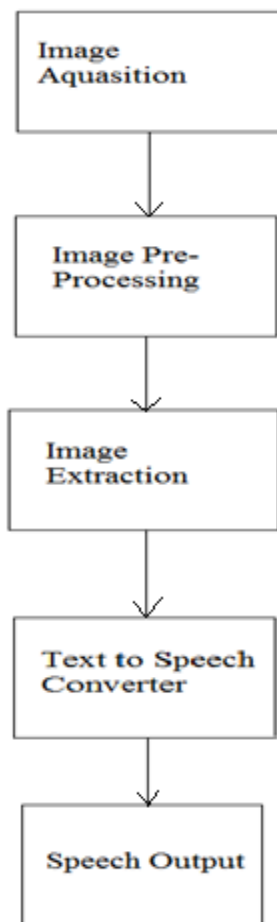rst in fig. 1.3 due to which the further image is retrieved from the source, processing. The captured image is acquired with the help of camera, step in the work flow sequence shown processes are completed.

b. Image Pre - Processing

In image preprocessing is done during is preprocessed for the proper captured is not aligned, the image is degree for the alignment. In this the and the clear image is stored. the capturing of the image. The image alignment of the image. If the image processed and is rotated in certain clarity of the image is also detected

_____

Fig.1.4. General Block Diagram of System

_____

c. Image Extraction

In machine learning, pattern recognition and in image processing, feature extraction starts from an initial set of measured data. The character in the image is recognized in this process and is converted into text.

d. Text to Speech Converter

The data extracted from image is converted in the speech through Open Source Computer Vision (Open CV) and python programming which is easier to understand and similar to English language.

IV. RESULT

The propose system based on object detection. The system consists of Raspberry Pi 3 Module with camera and external SD card for storage and a speaker for voice output. This is connected to the display device "laptop" and external power source. The set-up of the proposed system is shown in fig. 1.5. The detected object is stored in the external SD card which is processed for image extraction and displayed on the display device "laptop" and then it is converted into output voice command spelling out the detected object through speaker. The final output of object detection is shown in fig. 1.6.
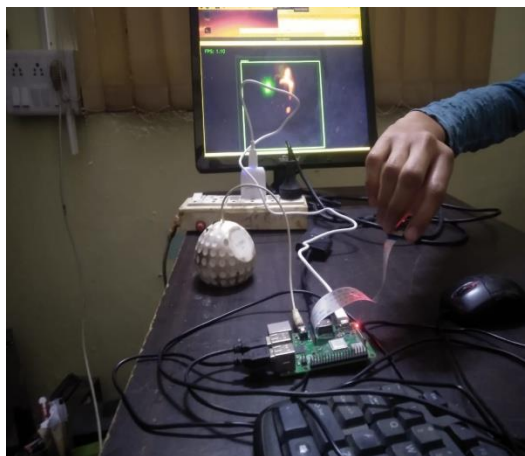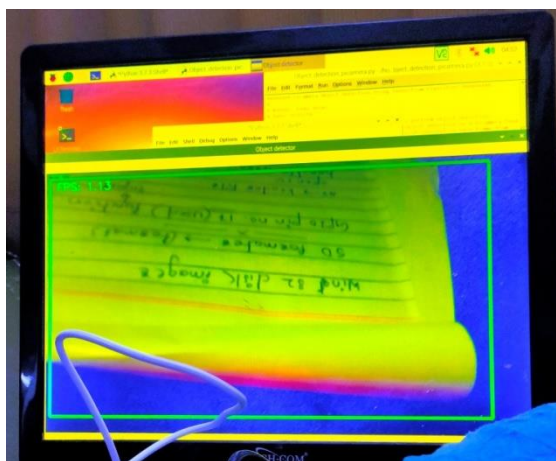

Fig.1.5. The Prototype set-up   Fig.1.6. Object detection as book

V. CONCLUSIONS

This is the proposed system of object/obstacles detection for blind people. In this system the object or the obstacles are been detected and is converted into voice command in English. The system is user friendly and compact which can be easily handled by the blind people. This will help the blind people while walking on street and in doing day to day activities.

VI. ACKNOWLEDGEMENTS

_____

_____
_____

REFERENCES

1. https://www.dailypioneer.com/2019/india/blindness-in india-drops-by-47---report.html
2. https://www.who.int/news-room/fact sheets/detail/blindness-and-visual-impairment
3. Joe Louis Paul I, Sasirekha S, Mohanavalli S, Jayashree C, Moohana Priya P, Monika K, "Smart Eye for Visually Impaired-An aid to help the blind people", Second International Conference on Computational Intelligence in Data Science (ICCIDS-2019)
4. Dr. I.S. Akila, Akshaya B, Deepthi S, Sivadharshini P, "A Text Reader for the Visually Impaired using Raspberry Pi", Proceedings of the Second International Conference on Computing Methodologies and Communication (ICCMC 2018) IEEE Conference Record # 42656; IEEE Xplore ISBN:978-1-5386-3452-3