

DEVELOPMENT OF VIRTUAL EYE FOR BLIND PEOPLE

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ABSTRACT

Vision is a beautiful gift of being able to see. Vision enables individuals to see and comprehend the encompassing scene. Till date daze individuals battle a considerable measure to carry on with their hopeless life. In the displayed work, a basic, shabby, well disposed client, virtual eye is composed and actualized to enhance the versatility of both visually impaired and outwardly disabled individuals in a particular region.

This project is helps blind people to map their world using the sense of hearing. It's a visual based project consisting of few main components such as camera, raspberry pi and earphones mounted together and additional working technologies of the internet interlinked. The input of the project will be an image/video (multiple frames), the image captured and analyzed with the help of the camera interfaced to the raspberry pi/IOT technology. Hence the object is detected and audio information is conveyed to the blind person through earphones.

This system deals with an approach to make better life for blind people as it well equipped with the latest technology and it is meant to aid the visually impaired to live a life without constraints.

Keywords: virtual eye, visual based project, Image, audio, raspberry pi.

I. INTRODUCTION

Visual deficiency is a condition of lacking visual recognition because of physiological or neurological components Virtual impairment may cause people difficulties with normal day activities. the incomplete visual impairment speaks to the absence of development in an optic nerve or visual focus of the eye. According to recent estimation 253 million people live with vision impairment. 36 billion are blind & 217 million have moderate to servere vision impairment. The loss sight causes enormous human suffering for the affected individuals and there families .Vision allows human being to view the surrounding world.

1.1 Top 5 causes of blindness

Cataract. Cataracts the No.1 cause of blindness is.

A waterfall is framed when the generally clear focal point of the eye winds up overcast. This obstructs light from entering the eye and makes vision end up obscured after some time. Patients may likewise observe coronas around lights or feel that hues look dull. Around 65 for each penny of those visually impaired is the two eyes here endure frame waterfalls. Drawn out introduction to bright (UV) beams exhibit in daylight, long haul utilization of medications like steroids and a few sicknesses like diabetes raise the danger of creating waterfalls. Under revised refractive mistakes. (Under corrected short-sightedness, long-sightedness, astigmatism and other refractive errors under rectified refractive blunders were in charge of causing visual deficiency in just about 20 percent People with serious folly can create complexities that can dazzle them forever, in spite of the fact that this happens infrequently. Limitation or astigmatism which makes individuals experience issues seeing items that are far away, is a developing issue .Myopia happens when the eyeball becomes too long and can't center light beams around the retina, the layer in the back of the eye on which pictures are shaped. The condition advances the most quickly amid adolescence .individuals who lost their vision in the two eyes

- **Glaucoma:** Glaucoma makes liquid in the eye develop, which fastens up the weight inside. The high weight harms the optic nerve, which send signals from the eye to the cerebrum to empower the individual to see. The harm is irreversible and can prompt visual impairment in serious cases. The malady comes in a few structures. The dominant part of patients build up a frame called essential open point glaucoma. It advances gradually and effortlessly and annihilates fringe vision before focal vision, so patients frequently don't see that their vision is breaking down. Another frame called intense point conclusion glaucoma, which tend to hit more established individuals.
- **Macular degeneration:** The hazard likewise rises when there is a family history of glaucoma, outrageous childishness of perpetual maladies like diabetes and hypertension
- **Diabetic retinopathy:** Diabetic retinopathy causes abnormal blood vessels to grow over the retina and optic nerve of a diabetic patient, which then leak and damage the retina and nerve.

It causes blurring of vision and “floaters” – black spots so called as they seem to float. It can cause the retina to detach, damage the retina's centre or develop into glaucoma.

However in this presented work/project, is an user friendly application VIRTUAL EYE is designed and implemented. Virtual eye –this implementation is used to improve the mobility of both blind and visually impaired people(guiding indoor and outdoor movement) This wireless device helps a blind person navigate from one point to another using voice guidance

11. RELATIVE WORK

In 2014, Rupali kale et al. [1], proposed an efficient and a low-cost system which provides information about the environment scenario of static and dynamic objects around them. This system was based on Global Positioning System (GPS) and obstacle detection and object avoidance technologies. Advantage of this system lies in the

fact that it has low production cost, low design time, less space, low power consumption; this system is suitable for both indoor and outdoor environment. This system was a combination of various working units that provides a real time position monitoring of the user and provides a dual feedback which makes the navigation more accurate and safe.

In 2015, Pooja Sharma et al [2] built a cheap fast & easy to use system which is an innovative solution to usually impaired people. The system is a wearable equipment that has head hat, mine hand stick & foot shoes that provides a help to usually impaired person to navigate on his own & prevent him from obstacles and prevent accident . ultrasonic sensors is used for scanning predetermined area around them the signals that are received communicate the states back to earphone using SD card technology the plus point about the work is that is suitable for both indoor & outdoor systems , design& production cost is low.

In 2016, Shradha Andhare et al. [3], designed a small, lightweight white cane that provides the information about the direction along with the information that helps to avoid obstacles based on ultrasonic sensor. This system has inbuilt a buzzer, accelerometer and Pit sensor for accurate results. GSM-GPS module is used to accurately spot the location of the blind person and for efficient wireless communication. This approach is conventional method of guiding the blind against the odds. Few drawbacks related to this system is that GPS signals is not received in the indoor regions and there is delay in response and receiving data from satellite side.

In 2016, Harshali kumbhar et al [4] , proposed a model which gives information about dynamic object and the environment receiver to the blind people . The system consists of ultrasonic sensor to sense the obstacles & these sensors are fit in the shoes of the blind , one in case & other in cap , the other component is the camera which is used to find difference between the wall end the door . The main motto of the proposed is to make the usually challenged lead an independent life . This system is well adopted because setting in the destination is easy and less space & power consumption. The drawback of the system is that the sensor data is not collected properly and understanding complex direction is difficult.

III.PROPOSED WORK

3.1 Methodology

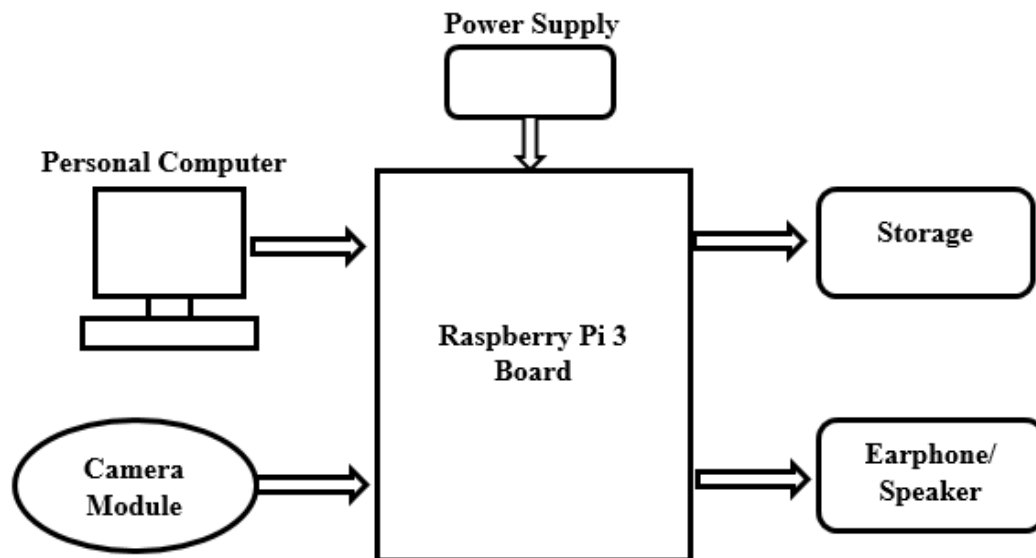


Figure 1: Block diagram of virtual eye for blind people

The input to the project will be the video/image. The image will be captured and analyzed with the help of camera interfaced to the Raspberry Pi Board. It will detect the objects in the image and will give the audio output. The input video is converted into multiple frames in order to ease the process. The key frames are selected and converted into grayscale images and pre-processing is applied in order to detect all the boundaries in the image independently of the particular gray levels involved. To detect the objects/text in an image, Objects/text needs to be placed in brighter and darker regions of the image. Hence an advanced and efficient algorithm is used in order to detect the object/text. Feature extraction process will be implied in order to classify/identify the object/text in an image efficiently.



Figure 2: raspberry pi kit configuration



Figure 3 camera configuration

It is single board PC or scaled down PC comprises of BCM2837 64 bit Quad center processor. It works on 700MHz 1.2GHz. It has 1 GB RAM with 4USB ports as CSI (camera serial interface) and DSI (show serial interface).It is an Omni vision sensor camera associated with Raspberry pi utilizing RMC connector. It has determination of 2592*1944 pixel with 30 outlines for each second. Camera catches the picture of protest and changes the middle position of question on X - Y plane by moving robot left and right position

IV. TABLE

Table 1

Sytem on a chip(SOC)	Broadcom BCM2835
CPU	700MHz ARM11 ARM1176JZF-S core.
GPU	Broadcom VideoCore IV, OpenGL ES 2.0, OpenVG 1080p30 H.264 high-profile encode/decode
Memory (SDRAM)	512Mib
USB 2.0 ports	2 (via integrated USB hub)
Video outputs	Composite RCA, HDMI (cannot be used simultaneously)
Video input	CSI
Audio outputs	TRS connector / 3.5mm jack, HDMI
Onboard storage	SD / MMC / SDIO card slot
Onboard network	10/100 wired Ethernet RJ45
Low-level peripherals	26 GPIO pins, SPI, I ² C, I ² S, UART

V. RESULTS AND DISCUSSIONS

The results of proposed system are practically implemented. there are various ways that we can show the expected results. Results of the designed system are attached below.



Fig 4: Indicates the hotspot connected to the controller.

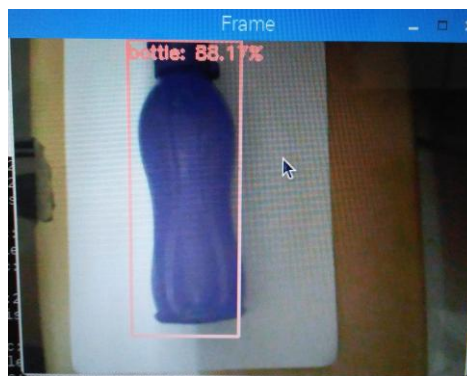


Fig 5 : scans the object through camera and appropriate audio is listened through earphone.

V1. CONCLUSION

This proposed demonstrate empowers the outwardly hindered individual to work freely like some other human. This gadget for daze individuals will enhance their quality of their life. The framework is minimized in nature guaranteeing probabilities that visually impaired individuals don't appear to be unique while they utilize it. This design articulates the client to act calmly and separately with no confinements. The equipment gadgets utilized as a part of this venture are deliberately chosen in such a way, to the point that it doesn't bring on any hurtful radiations. The kit along with the power bank can be placed in the user's pocket as it is captured and process the image in front him. We use raspberry pi kit with ARM v7 processor along with compatible HD camera for the image processing. It is cost efficient, if it is made in large scale, in future we can expect it to be implemented in android app, it has a huge scope of improvement.

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