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An Unobtrusive Device For Visually Challenged Persons – Using Python Language

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ABSTRACT

This paper is presented to help visually disabled people in their navigation. Finding things with multi- mixed contents with “an unobtrusive assistive system for blind people”. A camera-based assistive text reading framework to help blind persons read text labels and product packaging from hand-held objects in their daily lives. To isolate the object from cluttered backgrounds or other surrounding objects in the camera view and the image is processed and the output is given in the form of voice output. The whole setup will be fixed in a cap.
Keywords : Blind navigation, Python CV, Raspberry-pi, Ultrasound sensor.

I. INTRODUCTION

Blindness is inability to see anything, even light if you are partially blind then you have limited vision. For example you may have blur vision or the inability to distinguish the shapes of objects. Complete blindness means that you cannot see at all and are in total darkness. Legal blindness refers to vision that is highly compromised. If a person can see from 200 feet away, but legal person can see only from 20feet away.

Globally, it is estimated that approximately 1.3 billion person live with some form of vision impairment. With regards to distinct vision, 188.5 million people have mild vision impairment, 270 million people have moderate to severe vision impairment and 36 million people are blind. With regards to near vision, 826 million people live with a near vision impairment. Globally the leading cause of vision impairment is uncorrected refractive error and cataracts. Approximately 80% of all vision impairment globally is considered avoidable. The majority of people vision impairment is over the age of 50 years.

II. RELATED WORKS

Extensive researches have been made towards visuallyimpaired persons for their navigation. Here, it has been discussed about the different assistive device that is being used by the blind persons for navigation.The following discussed methods are some of them.

RFID used in blind navigation[1] An RFID-based system for navigation in a building for blind people is visually impairment. The system relies on the location information on the tag, a user psilas destination, and a routing severe psilas current location to the destination. The navigation devices communicate with the routing severe using GPRS network. The tags stores location, information and gives it to any reader that is within a proximity range which can be up to 10 to 15meters for UHF RFID system. It is found that there are delay problem in the device which are the communication delay due to the file transfer delay due to the file transfer delay from a MMC module.

A. Ultrasound Navigation Systems for Blind[2]

It is based on a microcontroller with synthetic speech out. This aid is portable and gives information to the user about urban walking routes to point out what decision to make. On the other hand, in order to reduce navigation difficulties of the blind, an obstacle deduction using ultrasounds and vibrators is added to this device. In this system it detects the nearest obstacle via stereoscopic sonar system and sense back vibro-tactile feedback to inform the visually impaired persona about its location.

B. Mobile blind navigation system [3]

The technologies that are used in this system are: the blind mobile device, RFID and readers, GPS, text to speech, voice recognition and wi-fi.the systems detects the bind location using GPS ,if the internet connection is available and uses RFID tags fixed outdoors and indoors on the building in the path, Wi-Fi routes are used indoors to detect the location. This system uses voice recognition and text to communicate with the bind to lead him to his destination and to give him a direction. The result shows performance in obstacles avoidance and in blind guidance. This navigation system was first introduced in King Saud University campus area for their student's employee and guests to navigate within the campus.

C. Smart cane with range notification for blind[4]

It is designed to develop a smart cane with distance measurement system .The system comprises of an ultrasonic sensor as input and earphone as an output. Ultrasonic sensor is used to measure the distance from the obstacle. Data is then send national instrument myRIO-1900 controller for processing which later produce beep sound as an output. The process was graphically performing using lab view with FPGA as the intended target. Performance of the system has been ascertained to several verification test. In general the, device will alert blind people of the obstacle through the audio output.

III. PROPOSED SYSTEM

In the section it is discussed about the method by which our proposed system is explained its working and block diagram.

A. Programming in Raspberry-pi

The raspberry-pi 3B+ is used for programming the whole system. For the programming we have used python software. The python Open Cv software is easily accessible, and is user friendly. The raspberry-pi used here as the processor speed ranges from 700MHZ to 1.2GHZ, on-board memory ranges from 256 MB to 1GB RAM. Secured digital cards (SD card) are used to store the Operating System (OS) and programming memory either SDHD or Micro SDHD sizes. The board has one to four USB ports. For video output, HDMI, and composite videos are supported, with a standard 3.5mm phono jack for audio output. Low-level output by a number of GPIO pins which supports common protocols like I2C. The B+- model has an 8P8C Ethernet port and the pi-3 and pies zero W have onboard Wi-Fi 802.11n and Bluetooth.

B. Voice processing

The input given in the form of voice module. The voice output is converted into text form by using speech recognition method (Fig 1). The converted speech text is store in the data file which is then processed and saved for the later use. Here for the data conversion, processing and storage is done using raspberry-pi, where the program is loaded.

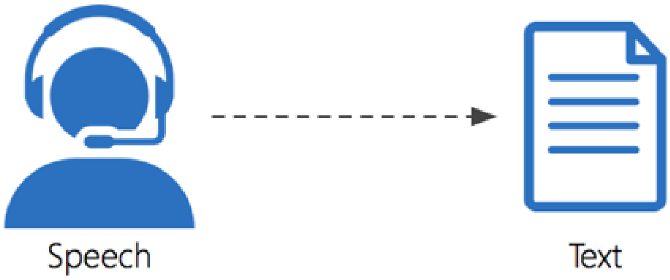

Fig 1 Text to speech conversion

C. Program processing

Here the program is coded according to the requirement of the paper which is been presented. Here the command code "imports RPi.GPIO as GPIO" (general processing input output) indicates the general processing to be imported to the raspberry pi. The code such as "import osimport thread import time" these commands are given for importing the operating system time and the program processing the raspberry pi. The programming code indicates that the process that been done in the operating system for the voice output. There the import and osthread runs parallel. For the whole program we have a separate add, delete and start and stop command and that is programmed separately. Here the add program and start stop program runs parallel while the delete program is stopped.

D. Stepwise explanation

STEP 1: Voice input- the input to the raspberry pi given as a voice input through the add command.
STEP 2: Voice input is converted into as text files and stored in data file.
STEP 3: Image is captured by giving input through the start/stop command.
STEP 4: Processing of the captured image. STEP 5: The processed image is compared with the text file.
STEP 6: If the text and images are matched, the output is given to the headphones with approximate distance.

E. Schematic representation

In the schematic representation (Fig 2) raspberry pi plays a major role which is connected to IR sensor to detect the obstacle, camera module to capture the images and mic to give the voice in put which severs as a input to raspberry pi. The speaker which is connected to the raspberry pi that serves as an output.

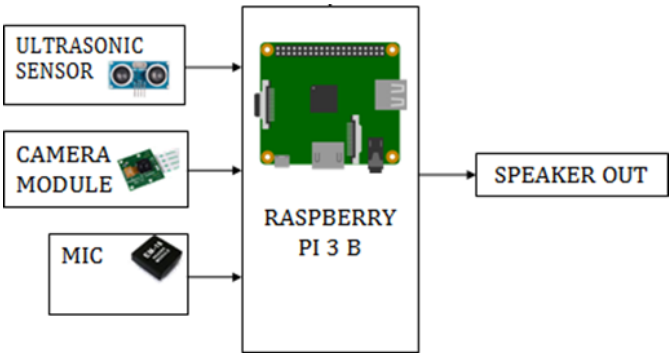

Fig 2 Block diagram

IV. RESULT

The database in the section III is evaluated to perform the proposed method. A primary experimental setup is to guide the blind people for the navigation. From this input method the program and the data that is being given to the raspberry-pi is processed (Fig 3) and the output is given in the form of voice (Fig 4). Here the primary method is to capture the image (Fig 5). The image is processed and converted to the text format (Fig 6).

The image which is converted as text after being processed again converted to the voice input (Fig 7) using a pulse code modulation. These voice modules will help the blind people in navigation.

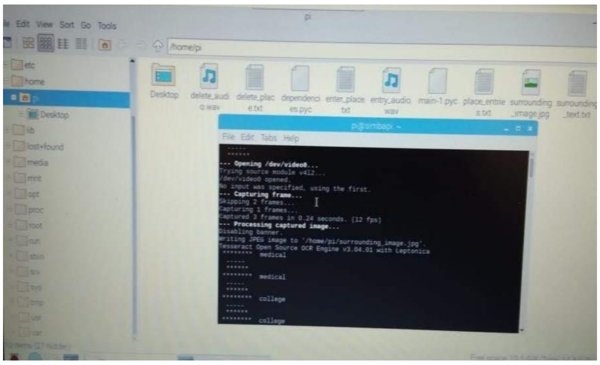

Fig 3 voice recognition process

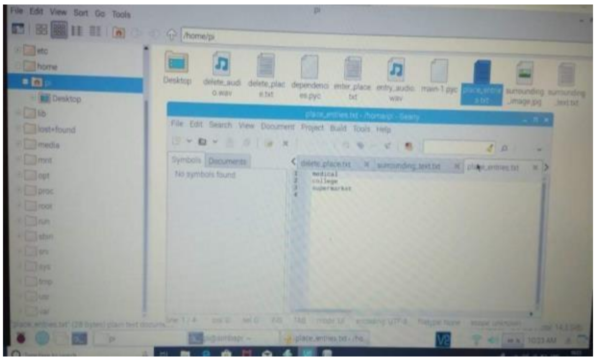

Fig 4 voice converted into text and stored

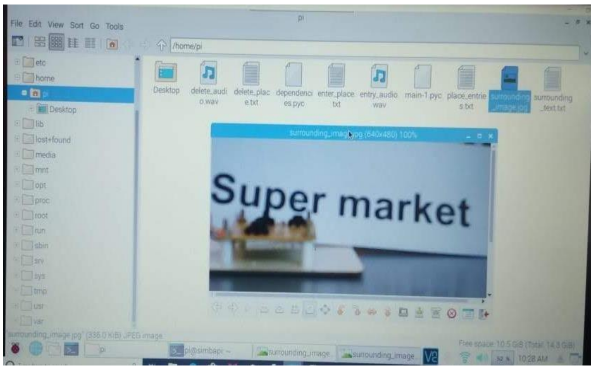

Fig 5 Image captured

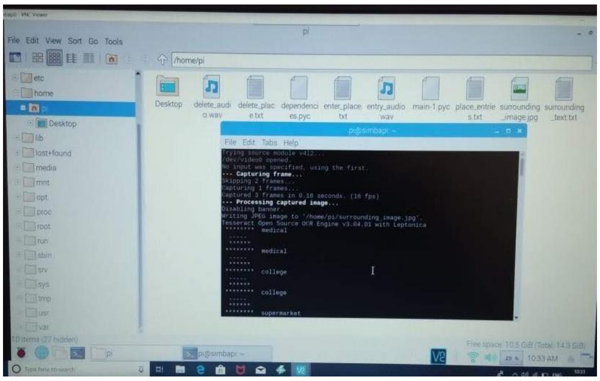

Fig 6 Image processing

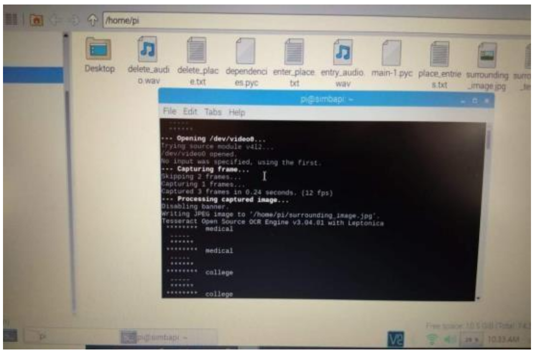

Fig 7 Processing for voice output

V. CONCLUSION

In this paper, an obstructive device for visually challenged person, it allows the blind person to independently navigate without the guidance of others. It helps the blind to fulfill their needs using this device. The whole device as a product is fixed in the form of a cap so that it will be more comfortable and convenient for the users to wear. The extension of this project can be done using an IOT device with more information added to it. The information such as tracking their location, sending text message to their relative can also be added to this.

VI. REFERENCES

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