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Product Label Reading of Hand-held Products for Visually Impaired using Raspberry- Pi

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Abstract - *The project aims to design a system for visually impaired to recognize the hand held objects or products. In this project, we design and develop a system to find product with voice announcements. The portable system captures the image of the product placed in front of the camera. These details will be verified using Raspberry Pi processor for authentication. The Raspberry Pi processor system alerts the visually impaired person through voice messages. The image of the product details is fed as input to the Raspberry Pi processor. The Processor takes responsibility to check the product name details and covert text to speech and announces it to the visually impaired. To perform this task, Raspberry Pi processor is programmed using embedded Python.*

Key Words: Raspberry pi 4B, Power Supply, Speakers, Raspberry Pi Camera, Open CV, Python Programming.

1. INTRODUCTION

According to World Health Organization (WHO) globally at least 2.2 billion people have a visually impaired or blindness, of whom at least 1 billion have a vision impairment that could have been prevented or has yet to be known [1]. The majority of people with visually Impaired are the age of 50 years.

Billions of people include those with moderate or severe distance vision impairment blindness due to severe distance visually impaired or blindness due to unknown refractive error [1].

Reading is necessary in today's society. Text is seen everywhere in the form of product label, restaurant menus, Books, Bottles, Receipts etc. Visually impaired persons face the challenges when they interact in public places because so much information is existing in daily life. This project helps to assist the Visually impaired to easily identify the during difficulty conditions [2][3].

1.1 Literature Survey

Portable Camera-Based Assistive Text and Product Label Reading from hand-held objects for blind people comes up with an efficient and effective motion-based method to define a region of interest in the video by asking the user to shake the object for isolation of objects from the scattered background. This method extracts moving object regions by a mixture of Gaussians-based background subtraction methods.

So, in this reason we implemented, In the extracted ROI, text localization and recognition are conducted to acquire text information. To automatically localize the text regions from the object ROI, we propose a product label localization cloud computing algorithm by learning gradient features of stroke orientations and distributions of edge pixels in an Adaboost model. Text labels in the localized label regions are then binarized and identified by optical character recognition software. The recognized text codes are output to Visually impaired users in speech.

Product Label Reading of Hand-Held products for Visually Impaired People- propose to camera-based product label reading framework and to process the captured object label and obtain its details to help Visually impaired persons to read text labels and product packed from hand-held Products in their daily lives.

2. BLOCK DIAGRAM

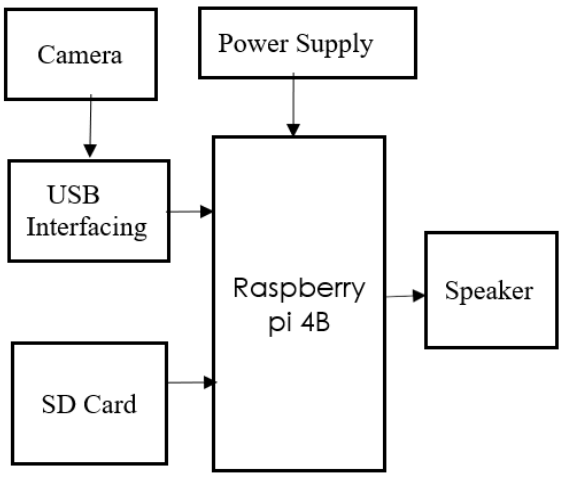

Figure1: Block Diagram

3. DESCRIPTION OF BLOCK DIAGRAM

3.1 RASPBERRY PI 4B:

Raspberry pi Model B is a first of the fourth generation in Raspberry pi computers. This model has a more powerful Broadcom BCM2711B0 quad-core ARM processor and the 4K-capable Broadcom. It consists of Video Core video processor, and also move to faster USB 3.0 p and USB Type-C for power.

Figure 2: Raspberry pi 4B

3.2 RASPBERRY PI CAMERA:

Raspberry pi camera Board v2 is a high quality 8 mega pixel Sony IMX219image sensor custom designed add-on board for Raspberry Pi featuring a fixed focus lens. Its capable of 3280x2464 pixel static images.

Figure 3: Raspberry pi Camera

3.3 SPEAKER

Speaker is connecting to the aux jack on the raspberry pi 4Band can be used to play music, voice and alerts it. Raspberry pi speaker has a good and more sound. Speaker having its own power supply that it can be charged with the help of USB port.

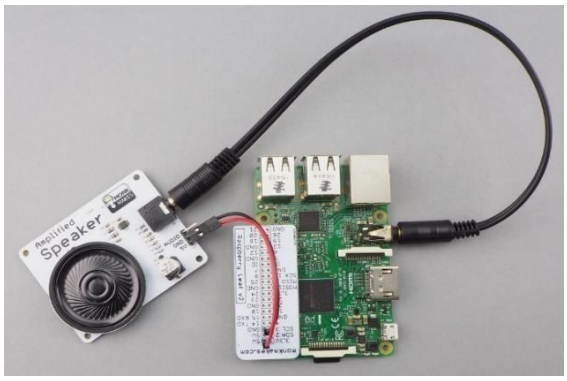

Figure 4: Speaker Connecting with Raspberry Pi

3.4 USB CABLE

USB is a plug and act as interface, which allows the computer to connected all the devices and it covers a broad range. It can be in any from as such keyboard and mouse to music players and flash drivers.

Figure 5: USB Cable

3.5 SD Card

Raspberry basically uses microSD card as a hard drive to store any information. There is a separate, even faster category called UHS-1.

Figure 6: SD Card Connecting with Raspberry pi

4. WORKING PRINCIPLE

Set all the required components into the device. This set up has to be done in a particular order to check that the components are safe or not.

First, insert the micro-SD card on the Raspberry Pi 4B. Take the USB port of mouse cable, and connect it to the USB port on Raspberry Pi 4B. Connect the keyboard cable to the Raspberry pi. Make sure that plug your screen into a socket and turn it ON. Connect the computer monitor to Raspberry pi device using an adapter.

Figure7: Connecting all Components

To connect Raspberry Pi 4B to the internet connect an Ethernet cable linked to a Wi-Fi router or a broadband connection. The audio devices like headphones and speakers by connecting them via a headphone jack. Booting the Raspberry Pi 4B [4].

When the camera is placed in front of the image the system captures the document image which is connected to Raspberry4 which undergoes in advanced ARM processer through USB.

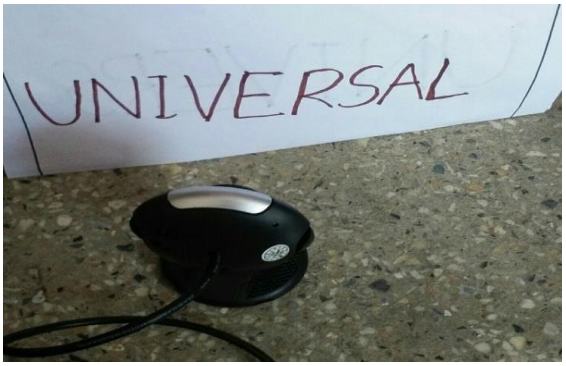

Figure 8: Capturing Image

After selecting the processer button, the captured document goes to through the open cv software using machine learning database. By using open cv software which consists of 500 library functions we convert text to speech and that captured document get converted into audio and finally identifies which is to be pronounced through voice [7].

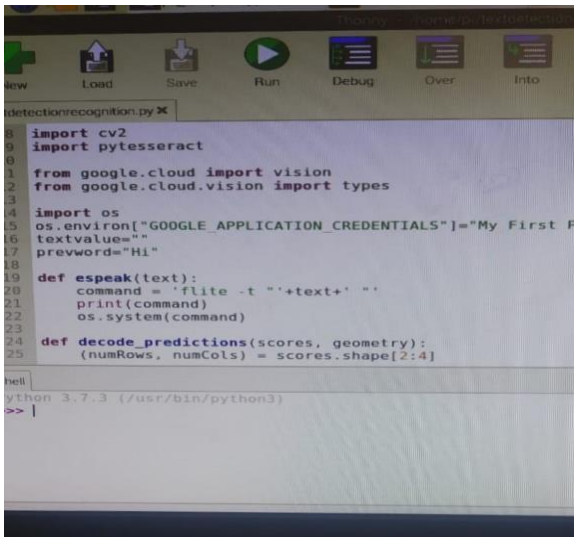

Figure 9: Algorithm for capturing the image

The camera acts as a main vision in detecting the image of the placed documents [5], the image is processed internally and finally recognized

Now the converted text to audio input can be listened by using the earphones or through speakers via Bluetooth based on them convince.

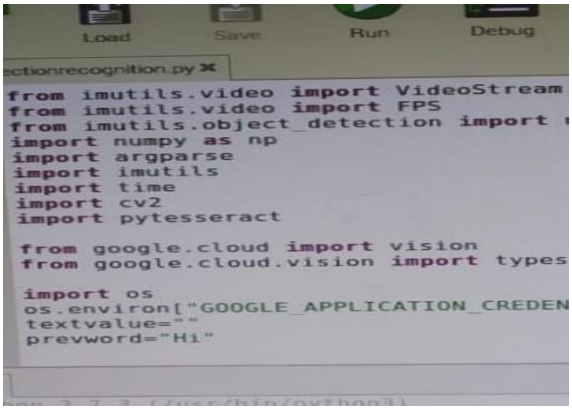

Figure10: Algorithm for converting text to speech

5. RESULT

These are some of the samples where when the object is placed in front of the camera it captures the image and get start printing It gives in terms of speech and which show in below Fig:10 and Fig:11.

Figure 11: Sample output-1

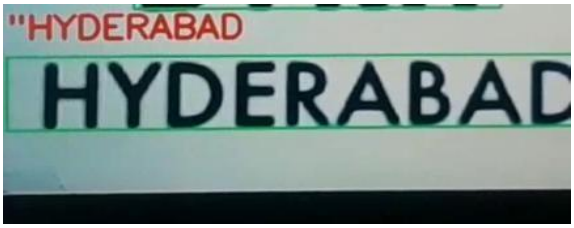

Figure12: Sample output-2

6. CONCLUSION

This project is aimed at helping the Visually Impaired people to read the printed text on an object or product and can be also helpful for assisting older persons who suffer from vision loss. Text recognition is done and text code is transformed into speech.

7. FUTURE SCOPE

Our future work can be extended to the text fixing algorithm with extra features and we can find the human interface issues associated with the text reading for the Visually Impaired user.

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