Raspberry Pi Based Blind Reader

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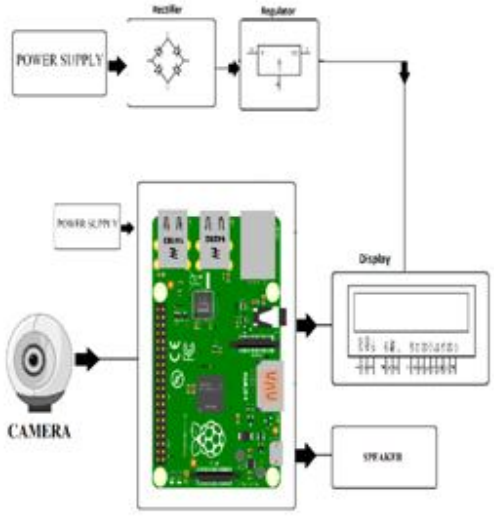
Abstract- *According to the World Health organization (WHO), 285 million people are estimated to be visually impaired worldwide among which 90% live in developing countries and forty five million blind individuals world-wide Though there are many existing solutions to the problem of assisting individuals who are blind to read, however none of them provide a reading experience that in any way parallels that of the sighted population. In particular, there is a need for a portable text reader that is affordable and readily available to the blind community. Inclusion of the specially enabled in the IT revolution is both a social obligation as well as a computational challenge in the rapidly advancing digital world today. This work proposes a smart reader for visually challenged people using raspberry pi. This paper addresses the integration of a complete Text Read-out system designed for the visually challenged. The system consists of a webcam interfaced with raspberry pi which accepts a page of printed text. The OCR (Optical Character Recognition) package installed in raspberry pi scans it into a digital document which is then subjected to skew correction, segmentation, before feature extraction to perform classification. Once classified, the text is readout by a text to speech conversion unit (TTS engine) installed in raspberry pi. The output is fed to an audio amplifier before it is read out. The simulation for the proposed project can be done in MATLAB.*

Keywords- Speaker, Camera, PC, Raspberry pi, MATLAB.

I. INTRODUCTION

Gives an algorithm for detecting and reading text in natural images for the use of blind and visually impaired subjects walking through city scenes. The overall algorithm has a success rate of over 90% on the test set and the unread text is typically small and distant from the viewer. Have proposed a novel scheme for the extraction of textual areas of an image using globally matched wavelet filters. A clustering based technique has been devised for estimating globally matched wavelet filters using a collection of ground truth images .Proposes a support vector machine (SVM) is used to analyze the textual properties of texts. The combination of CAMSHIFT and SVM's produces both robust and efficient text detection .Tells about the navigational technologies available to blind individuals to support independent travel, our focus is on blind navigation on large scale .Presents an approach to automatic detection and recognition of signs from natural scenes and its application to sign translation task that further propose a local intensity normalization method to effectively handle lighting variations followed by a gabor transform to obtain local features .Presents a comparative survey among portable/wearable obstacle detection/avoidance systems to inform about the progress in assistive technology for visually impaired people.



II. RELATED WORK

As conditioned in [1], there are several ongoing researches on camera based document analysis which include text detection, extraction, recognition, enhancement and its uses. Few images to text and text reading system models for assistive text reading for visually impaired and blind people is also present in literature is given below. P.Nagabhushan

[2] the easy admittance to portable cameras as in Mobile phones, has made it probable to video capture even text documents and take out reading the text in leisure time. With this backdrop, here we have devise a microcontroller based mechanized video graphing of text. It is also proposed to voice text the video graphed text in real time. Subsequently for the reason of archival, video text is stored as a text file circumventing the large memory obligation because of text video. Roy Shilkro

[3] describes that visually impaired people description numerous complexities with accessing printed text using existing technology, as well as problems with arrangement, focus, accurateness, mobility and efficiency. We present a finger worn device that helps the visually impaired with in effect and competently reading paper-printed text. We introduce a novel, local-sequential method for scanning text which enables reading particular lines, blocks of text or skimming the text for significant sections while providing real-time auditory and tactile feedback. Ajantha Devi et al [4] suggest that the Optical Character recognitions is utilized to Digitize and reproduce texts that have been formed with non-computerized system. Digitizing also helps decrease the storage space. To Edit and Reprint of Text document that were printed on paper are time consuming and labourex haustive. Optical Character Recognition is also helpful for visually impaired people who cannot read text document need to access the content of the Text documents. A camera based assistive device method that can be employing by people to read Tamil Text document. Using image

In this paper [5], they have performed the automated classification of RBCs as falling into one of the anaemia type. The proposed system identifies RBCs using intensity ratio transformation followed by centroid contour distance for segmentation of RBC. Two geometric features are used to distinguish between normal and anaemic RBCs: Aspect Ratio and Fourier Descriptors.

III. METHODS AND MATERIALS.

A. SOFTWARE SPECIFICATIONS:

Operating system : Raspbian (Debian)
Language : Python OR C#.net
Platform : OpenCV (Linux-library)
Library : OCR engine, TTS engine

1. OCR Python-Tesseract is an optical character recognition (OCR) contrivance for python. It will be familiarized and understand the text embedded in icons. It is a binding for google's OCR. It is too functional and a stand-alone incantation script to Tesseract, as it can read all facsimile types reinforced by the Python Imaging collections and others, whereas Tesseract-occur by default, it ropes tiff and bmp. To boot, if practiced as a script, Python-Tesseract will print the recognized text instead of writing it to a file. Figure 14 Tesseract Features: Page layout analysis. More languages are supported. Improve forecast accuracy. Add UI.

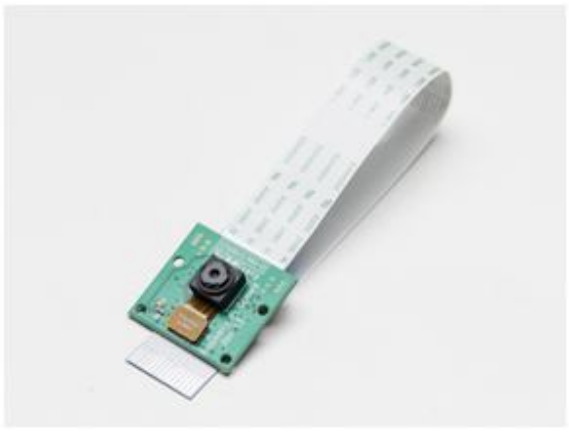
2. Opencv: OpenCV (Open Source Computer Vision) is a compilation of encoding functions primarily aimed at factual-time computer vision, originally shaped by Intel research and subsequently supported by Willow Garage and now maintained by Itseez. It is the collection of cross-platform and free for use under the open source. OpenCV includes foremost changes to the C++ interface, aiming at ease, more case-safe designs, and better implementations for existing ones in terms of execution. It is used in diverse purposes for Facial recognition

B.HARDWARE SPECIFICATION

1 POWER SUPPLY.

There have been reports that wireless adapters take a great wad of ability, but the Raspberry Pi with an adapter which runs on a Samsung charge, which can be associated to the laptop also..

2 RASPBERRY PI CAMERA



Budget Pack for Raspberry Pi 1 Model B (Doesn't include The Raspberry Pi Camera Module is a custom designed add-on for Raspberry Pi. It attaches to Raspberry Pi by way of one of the two small sockets on the board upper surface. This interface uses the dedicated CSI interface, which

was designed especially for interfacing to cameras. The CSI bus is capable of extremely high data rates, and it exclusively carries pixel data. Raspberry Pi NOT INCLUDED

The board itself is tiny, at around 25mm x 20mm x 9mm. It also weighs just over 3g, making it perfect for mobile or other applications where size and weight are important. It connects to Raspberry Pi by way of a short ribbon cable. The camera is connected to the BCM2835 processor on the Pi via the CSI bus, a higher bandwidth link which carries pixel data from the camera back to the processor. This bus travels along the ribbon cable that attaches the camera board to the Pi.

The sensor itself has a native resolution of 5 megapixel, and has a fixed focus lens onboard. In terms of still images, the camera is capable of 2592 x 1944 pixel static images, and also supports 1080p30, 720p60640x480p60/90 video.

The camera is supported in the latest version of Raspbian, Raspberry Pi's preferred operating system.

3 RASPBERRY PI .

The Raspberry Pi is a bargain basement priced, creditcard sized computer which can be easily plugged into a computer monitor or TV. We utilize a standard keyboard and black eye. It is a minute device that enables people of all ages to research computing, and to learn how to program in languages like Scratch and Python. It is capable of doing everything we would expect a desktop information processing system to perform, surfing from the net and playing high-definition videos, to making databases, word-processing, and live games. Raspberry pi has the capability to intercommunicate with the exterior world, and has been used in a spacious array in digital projects, from music equipment and sensors to weather stations and chirping birdhouses with infrared cameras. In this project we are using the Raspberry Pi 1B board and those specs are as follows International Journal of Scientific Research in Science, Engineering and Technology (ijsrset.com) 170 A.1) Memory: 512 MB RAM A.2) Connections: 2 USB ports Ethernet port of a socket 3.5mm and jack for audio out. It includes HDMI, component and composite video outputs. A.3) Processor: SoC is a Broadcom BCM2835.It can run at 700Mhz, with a Video core 4 GPU.

4 LAPTOP/COMPUTER

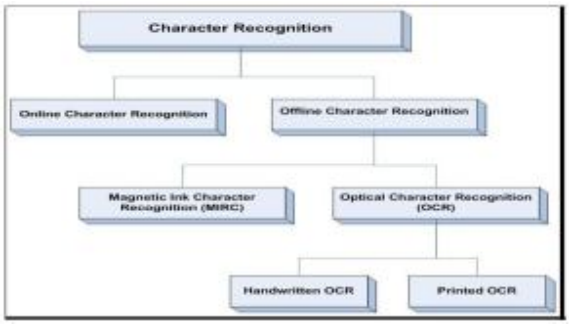
The processed image is saved in the computer or laptop and the connection to the whole is taken from it.

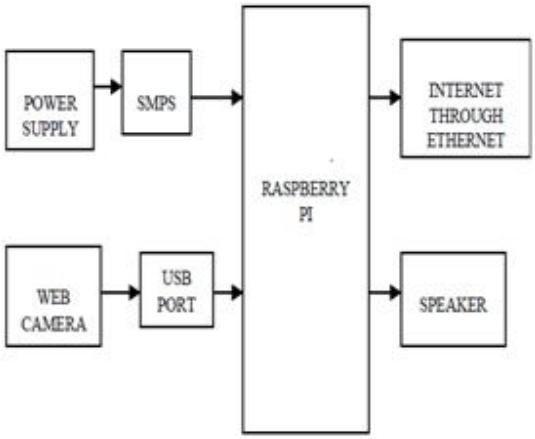
5 SPEAKER

The first process is for the blind people, in this process, the visually impaired people have to buy some products or any wordings in the image, in order to help them, we have interfaced the Logitech camera to capture the image by openCV2. The picture which is captured is being first converted to text by Tesseract OCR. In this OCR, they apply the adaptive thresholding techniques to change the image to binary images. And so they were transferred them to character outlines and these characters outlines were converted into speech. And the group of words forms the text and it has been read out by the speaker.

IV. WORKING PRINCIPLE

When capture button is clicked this system captures the product image placed in front of the web camera which is connected to ARM microcontroller through USB .After selecting the process button the captured label image undergoes Optical Character Recognition(OCR) Technology. OCR technology allows the conversion of scanned images of printed text or symbols into text or information that can be understood or edited using a computer program. In our system for OCR technology we are using TESSERACT library. Using Flite library the data will be converted to audio. Camera acts as main vision in detecting the label image of the product or board then image is processed internally and separates label from image by using open CV library and finally identifies the product and identified product name is pronounced through voice. Now it identifies received label image is converted to text by using tesseract library. Once the identified label name is converted to text and converted text is displayed on display unit connected to controller. Now converted text should be converted to voice to hear label name as voice through ear phones connected to audio jack port using flite library.





V. CONCLUSION

In this research, we have described a prototype system to read printed text and hand held objects for assisting the blind people. To extract text regions from complex backgrounds, we have proposed a novel text localization algorithm based on models of stroke orientation and edge distributions. The corresponding feature maps estimate the global structural feature of text at every pixel. Block patterns project the proposed feature maps of an image patch into a feature vector. Adjacent character grouping is performed to calculate candidates of text patches prepared for text classification. An Adaboost learning model is employed to localize text in camera-based images. Off-the-shelf OCR is used to perform word recognition on the localized text regions and transform into audio output for blind users. In this research, the camera acts as input for the paper. As the Raspberry Pi board is powered the camera starts streaming. The streaming data will be displayed on the screen using GUI application. When the object for label reading is placed in front of the camera then the capture button is clicked to provide image to the board. Using Tesseract library the image will be converted into data and the data detected from the image will be shown on the status bar. The obtained data will be pronounced through the ear phones using Flite library.

VI. FUTURE WORK

To further this project can be followed out with any other advanced devices by using simple coding language to get it less complicated. The complication can be reduced by a tiny gadget which could be more useful those people in this electronic world.

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