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Raspberry Pi Based Reader for Blind

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ABSTRACT: Bring relief to the agonizing tasks that the visually impaired has to go through this difficulty. To provide technical solution and to assist the visually impaired people to access various text resources and enhance their knowledge. Aims to study the image recognition technology with speech synthesis .To develop a cost effective, user friendly image to speech conversion system. This paper presents usually impaired (Blind) people can't watch anything for them ,this project is useful. This paper presents the automatic document reader for visually impaired people, developed on Raspberry Pi. It uses the Optical character recognition technology for the identification of the printed characters using image sensing devices and computer programming. This paper proposes a smart reader for visuallychallengedpeopleusingraspberrypi.ThispaperaddressestheintegrationofacompleteTextRead-outsystemdesigned for the visually challenged. The designed system consists of a webcam interfaced with raspberry pi which accepts a page of printed text. This system uses OCR technology to convert images into text and reads out the text by using Text-to-Speech conversion. This system supports audio output via Speakers as well as headphone. The OCR(Optical Character Recognition) package installed in raspberry pi which scans it into a digital document which is then subjected to skew correction, segmentation, before feature extraction to perform classification. Once classified, the textis readout by a text to speech conversion unit (TTS engine) installed in raspberry pi.It converts images of typed, handwritten, or printed text into machine encoded text. In this research these images are converted into the audio output(Speech) through the use of OCR and Text-to-speech synthesis. The conversion of printed document into text files is done using Raspberry Pi which again uses Tesseract library and Python programming. The text files are processed by OpenCV library & python programming language and audio output is achieved.

KEYWORDS: Optical Character recognition, Low power, GTTS Engine, Raspberry Pi 3B, Speech Output, OCRbasedbook reader, OpenCV, Python Programming.

I. INTRODUCTION

Visually impaired people report numerous difficulties with accessing printed text using existing technology. This project presents a smart device that assists the visually impaired which effectively and efficiently reads the paper-printed text. The system proposed in this project uses the methodology of a camera based assistive device that can be used by people to read Text document.. In this project, we have proposed a text read out a system for the visually challenged. The proposed fully integrated system has a camera as an input device to feed the printed text document for digitization and the scanned document is processed by a software module the OCR (optical character engine). Most of the access technology tools built for people with blindness and limited vision are built on the two basic building blocksof OCR software and Text-to-Speech (TTS) engines. Optical character recognition (OCR) is the translation of captured images of printed text into machine-encoded text. OCR is a process which associates a symbolic meaning with objects(letters, symbols an number) with the image of a character. It is defined as the process of converting scanned images of machine printed into a computer process able format. Optical Character recognition is also useful for visually impaired people who cannot read Text document, but need to access the content of the Text documents. Optical Character recognition is used to digitize and reproduce texts that have been produced with the non-computerized system. Digitizing texts also helps reduce storage space. Editing and Reprinting of a Text document that was printed on paper are time-consuming and lab our intensive. It is widely used to convert books and documents into electronic files for use in storage and document analysis. OCR makes it possible to apply techniques such as machine translation, text-to-speech and text mining to the capture / scanned page. The final recognized text document is fed to the output devices depending on the choice of the user. The output device can be a headset connected to the raspberry pi or a speaker which can spell out the text document loud. The designed system is to convert the text in the textual image into the speech efficiently.

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II. LITERATURE SURVEY

A K-Reader Mobile number of portable reading assistants are designed specifically for the visually impaired."K-Reader Mobile" is a mobile application which allows the user to read mail, receipts, fliers, and many otherdocuments.Butthesesystemsfailtogiveaneconomicsolutiontotheproblemandareavailableonspecificplatforms.[1]

This project proposes smart shopping assistant label reading system with voice output for blind using raspberry pi. This system aims at the document to be read must be nearly flat, placed on a clear, dark surface and contains mostly black text printed on white background and it does not read from complex backgrounds.[2]

This project proposes a Navigation System for blind people to navigate safely and quickly. In this systemobstacledetectionandrecognitionisdonethroughultrasonicsensorsandUSB camera.This system detectstheobstacles up to 300cm via ultrasonic sensors and sends Feedback in the form of beep sound via earphone to inform theperson aboutthe obstacle. [3]

This system proposes a Wearable Obstacle Avoidance Electronic Travel Aids for Blind that presents a comparative survey among portable/wearable obstacle detection/avoidance systems in an effort to inform the research community and users about the capabilities of these systems and about the progress in assistive technology for visually impaired people. [4]

ThisprojectproposesAutomaticdetectionandrecognitionofsignsfromnaturalscenes.It presents an approach to automatic detection and recognition of signs from natural scenes and its application to a sign translation task. Author has applied the approach in developing a Chinese sign translation system, which can automatically detect and recognize Chinese signs as input from a camera, and translate the recognized text into English but its only work in Chinese language. [5]

This project proposes a system for converting English text into speech. The feasibility of Converting English text into speech using an inexpensive computer and a small amount of stored data that has been investigated. But it'sno tsuitable for all memory range ofComputers. [6]

This project proposes Improved Adaptive Gaussian Mixture Model for Background Subtraction. Backgroundsubtraction is a common computer vision task. it analyses the usual pixel-level approach. Author has developed anefficient adaptive algorithm using Gaussian mixture probability density. Recursive equations are used to constantlyupdatethe parametersand butalso tosimultaneously selectthe appropriatenumber ofcomponentsfor eachpixel. [7]

This project proposes Assistive Translator for Deaf &Dumb People Communications between deaf-mute and anormal person have always been a challenging task. The proposed system aims to facilitate people by means of aglove-baseddeaf-mute communication interpreter system. [8]

This project proposes Finger Reader which is audio reading gadget for Index Finger. System presents a finger-worn device that assists the visually impaired with effectively and efficiently reading the paper printed text. But theblind peoplecan't aimthe letters accurately. [9]

This project proposes a Vision Based Assistive System for Label Detection with Voice Output. A camera-basedassistive text reading framework to help blind persons read text labels and
Productpackaging froma hand-held object intheir daily resides are proposed.[10]

III. IMPLEMENTATION

1. Collecting information related to the project, circuit diagram and components.
2. Checking for availability of components and buying according to need.
3. Mounting the circuit according to circuit diagram on breadboard.
4. Installing the Raspberry pi OS i.e. Raspbian on the SD Card
5. Prepare and install Tess act Libraries for Optical Character Recognition

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6. Install the Internet of Things repositories for Web based weather information collection
7. Installation of Speech recognition and text to voice converter
8. Collecting information related to the project, circuit diagram and components.
9. Checking for availability of components and buying according to need.
10. Mounting the circuit according to circuit diagram on breadboard.
11. Installing the Raspberry pi OS i.e. Raspbian on the SD Card
12. Prepare and install Tess act Libraries for Optical Character Recognition
13. Install the Internet of Things repositories for Web based weather information collection
14. Installation of Speech recognition and text to voice converter.
15. Collecting information related to the project, circuit diagram and components.
16. Checking for availability of components and buying according to need.
17. Mounting the circuit according to circuit diagram on breadboard.
18. Installing the Raspberry pi OS i.e. Raspbian on the SD Card
19. Prepare and install Tess act Libraries for Optical Character Recognition
20. Install the Internet of Things repositories for Web based weather information collection
21. Installation of Speech recognition and text to voice converter.

[III.1]Architecture:

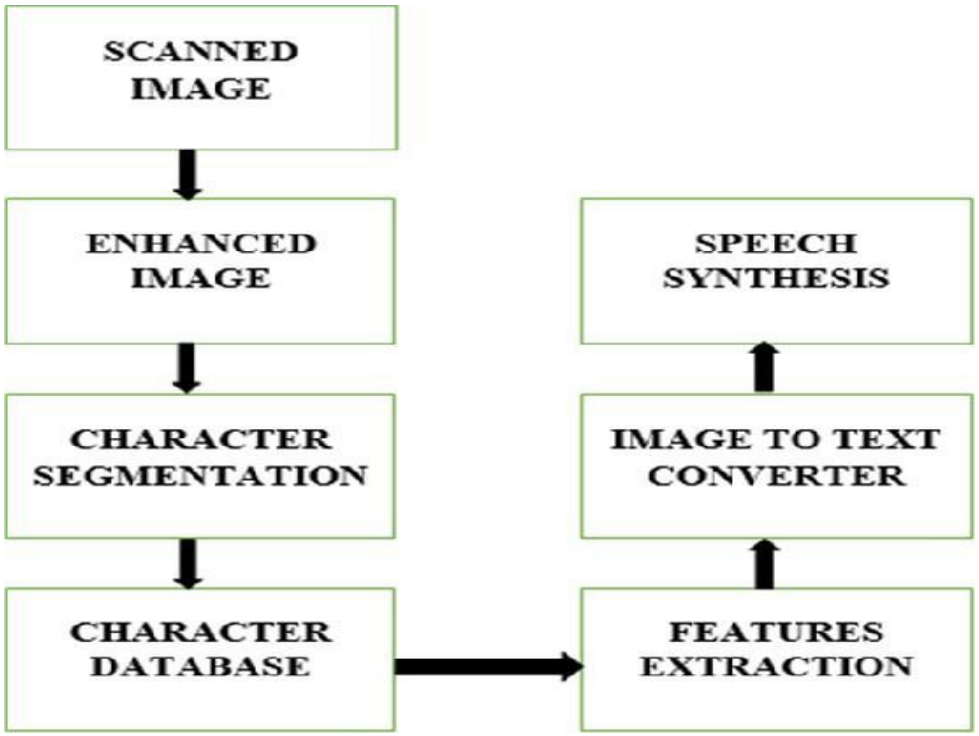

Fig1. Architecture of Raspberry Pi Based Reader

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Figure shows first image scanned through camera and next this image is enhanced. In this project OCR technology is used .This technology using character segmentation process is done. Then character database passing features extraction then image to text conversion is done by OCR. Then audio output achieved by speech synthesis.

IV. METHODOLOGY

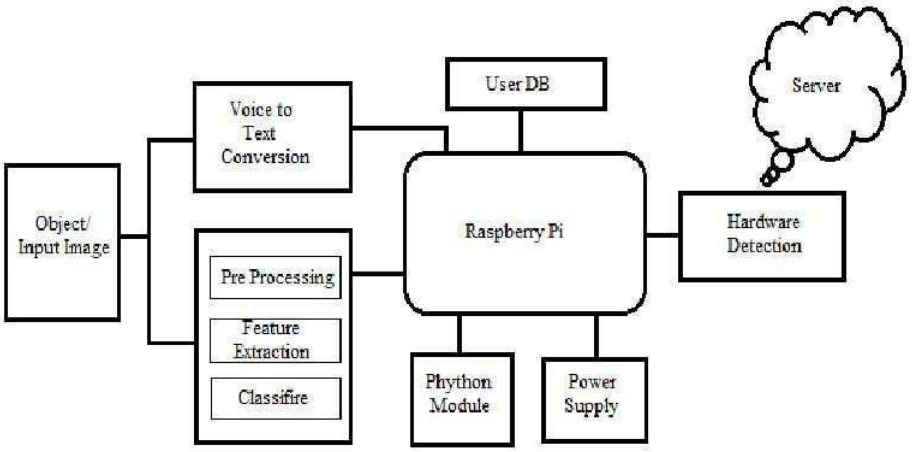

Fig2. Methodology

V. BLOCK DIAGRAM

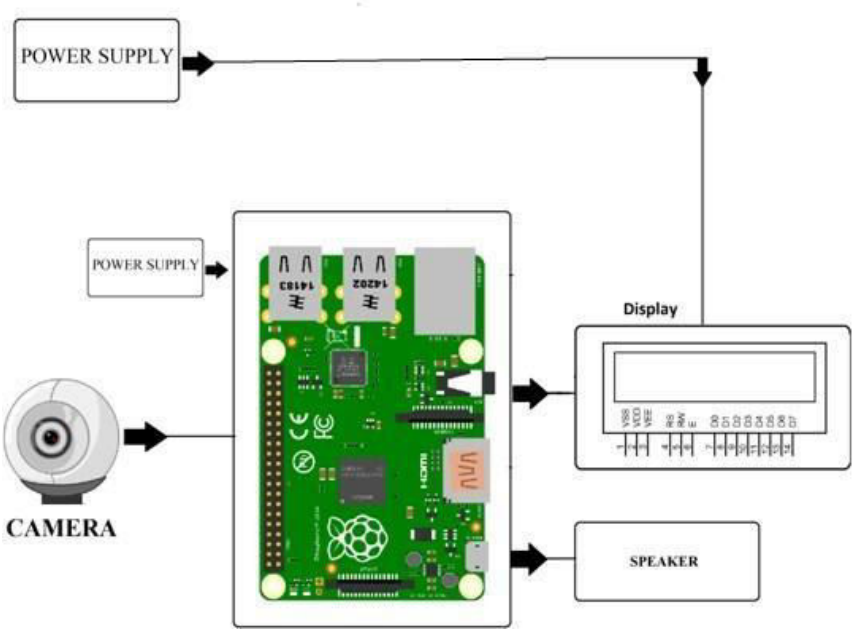

Fig3. Block Diagram

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I. Working

The designed system uses the methodology of a camera based assistive device that can be used by people to read Text document. The framework is based on implementing image capturing technique in an embedded system based on Raspberry Pi board. In this system, we have proposed a text read out system for the visually challenged.

Optical character recognition (OCR) is the translation of captured images of printed text into machine-encoded text. OCR is a process which associates a symbolic meaning with objects (letters, symbols an number) with the image of a character. It is defined as the process of converting scanned images of machine printed into a computer process able format. Optical Character recognition is also useful for visually impaired people who cannot read Text document, but need to access the content of the Text documents. Optical Character recognition is used to digitize and reproduce texts that have been produced with non- computerized system. The final recognized text document is fed to the output devices. The output device can be a speaker connected to the raspberry pi board which can spell out the text document aloud. The audio output is taken from the audio jack of the raspberry pi. Speaker can also be replaced by a headphone for convenience.

HARDWARE REQUIREMENT

Raspberry Pi 3
Speaker
Camera
LCD Display
Resistors
Capacitors
Transistors
Cables and Connectors
Diodes
PCB and Breadboards
LED

SOFTWARE REQUIRMENT

Used libraries

- Operating system: Raspbian (Debian)Language: Python2.7
- Platform: Tesseract, OpenCV (Linux-library)
- Library: OCR engine, TTS engine

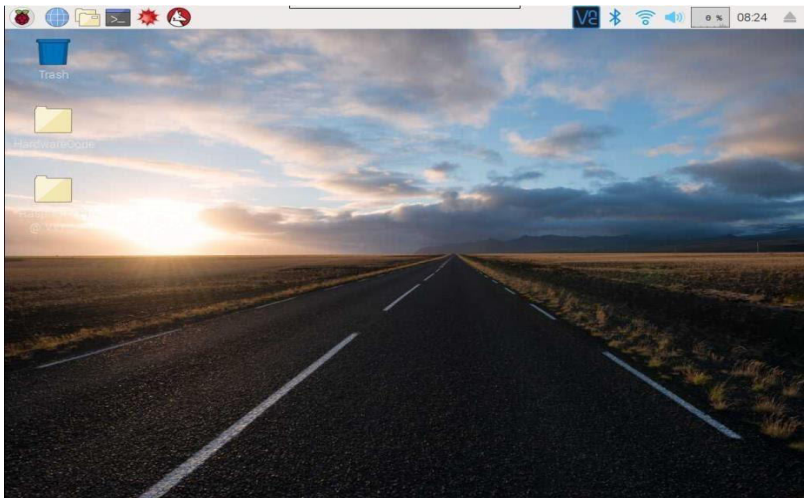

Fig4. Raspberry Pi OS

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V. FLOW OF PROCESS

a. Image Processing

The first step in which the device is moved over the printed page and the camera captures the images of the text. The quality of the image captured will be high so as to have fast and clear recognition due to the high-resolution camera.

b. Pre-Processing

The pre-processing stage consists of three steps: Skew Correction, Linearization and Noise Removal. The captured image is checked for skewing. There are possibilities of the image getting skewed with either left or right orientation. Here the image is first brightened and binarized. The function for skew detection checks for an angle of orientation between ±15 degrees and if detected then a simple image rotation is carried out till the lines match with the true horizontal axis, which produces a skew corrected image. The noise introduced during capturing or due to the poor quality of the page has to be cleared before further rprocessing.

c. Segmentation

After pre-processing, the noise free image is passed to the segmentation phase. It is an operation that seeks to decompose an image of sequence o characters into sub-image of individual symbol (characters). The binarized image is checked for inter line spaces. If inter line spaces are detected then the image is segmented into sets of paragraphs across the interline gap. The lines in the paragraphs are scanned for horizontal space intersection with respect to the background. Histogram of the image is used to detect the width of the horizontal lines. Then the lines are scanned vertically for vertical space intersection. Here histograms are used to detect the width of the words. Then the words are decomposed into characters using character width computation.

Feature Extraction

Feature extraction is the individual image glyph is considered and extracted for features. First a character glyph is defined by the following attributes:

1. Height of the character;
2. Width of the character;
3. Numbers of horizontal lines present—short and long;
4. Numbers of vertical lines present—short and long; Numbers of circles present;
5. Numbers of horizontally oriented arcs;
6. Numbers of vertically oriented arcs;
7. Centroid of the image;
8. Position of the various features;
9. Pixels in the various regions.

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VI. RESULT

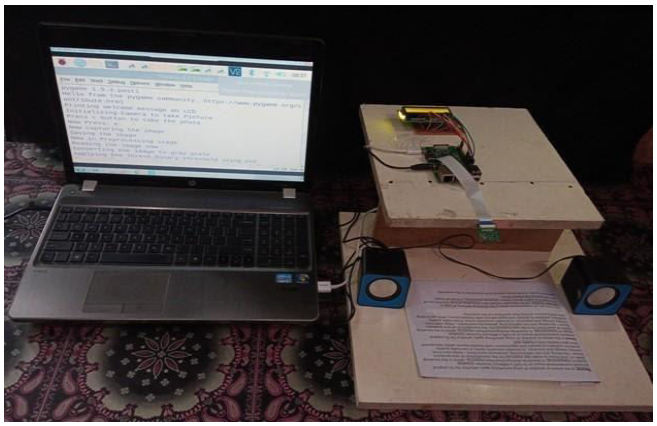

Fig5. Result

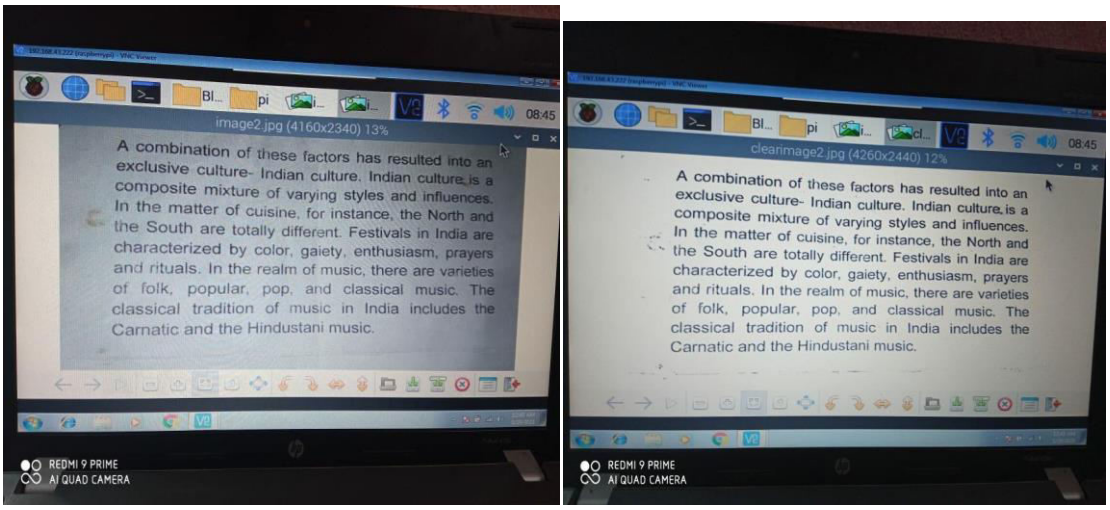

Fig6. Captured Image And Cleared Image

VII. ADVANTAGES

- It is used for blinds helps a blind person to read a paper without the help of any human reader.
- It allows a blind person to use the computer.
- It allows a blind person to creat a document using a word processor like MS Word.
- A blind can now read any article on the internet.

VIII. APPLICATIONS

- It is used in blind Schools and Collages.
- Raspberry pi based reader is an automatic document reader for visually impaired people using OCR technology.
- The proposed project uses a camera based assistive device which can be used by individuals to read printed text.

IX. CONLUSION

The raspberry Pi based reader used for blinds helps a blind person to read a paper without the help of any human reader and. It is cost effective system requires very little maintenance and is easy to handle and use with minimum errors. We have successfully implemented conversion of text image into audio format. We also developed technique for

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object detection in an image and cropping of textual part of image using Open CV libraries. Our algorithm successfully processes the image and reads it out clearly with set volume. And also detect the object and crop the text part of image. This is an efficient as well as helpful device for the visually impaired, illiterate, or have a learning disability people. We have applied our algorithm on many images and found that it successfully does its conversion. We have implemented an image to speech conversion technique using raspberry pi. The simulation results have been successfully verified and the hardware output has been tested using different samples. Our algorithm successfully processes the image and reads it out clearly. This is an economical as well as efficient device for the visually impaired people. We have applied our algorithm on many images and found that it successfully does its conversion. The device is compact and helpful to the society. In future we can use more robust and the efficient algorithms to read the images and separate the text from the images.

REFERENCES

1. Ray Kurzweil K Reader Mobile User Guide, knfb Reading Technology Inc. (2008). [Online]. Available: http://www.knfbReading.com
2. Ms.Athira Panicker Smart Shopping assistant label reading system with voice output for blind using raspberry pi, Ms.Anupama Pandey, Ms.Vrunal Patil YTIET, University of Mumbai ISSN: 2278 – 1323 International Journal of Advanced Research in Computer Engineering & Technology (IJARCET) Vol. 5, Issue 10, Oct 2016 2553 www.ijarcet.org.
3. Marut Tripathi, Manish Kumar,Vivek Kumar,Warsha Kandlikar A Navigation System for blind people International journal for research in applied science and engineering technology (IJRASET) – Vol. 2 issue 4, Jul-Aug 2014.
4. Dimitrios Dakopoulos and Nikolaos G. Bourbakis Wearable Obstacle Avoidance Electronic Travel Aids for Blind IEEE Transactions on systems, man and cybernetics, Part C (Applications and Reviews). Vol. 40, issue 1, Jan 2010.
5. Xilin Chen, , Jie Yang, Jing Zhang, and Alex Waibel Automatic Detection and Recognition of Signs From Natural Scenesieee transactions on image processing, Vol. 13, NO. 1, Jan 2004.
6. William A. Ainsworth A system for converting English text into speech IEEE Transactions on Audio and Electroacoustics, Vol. 21, Issue 3, Jun 1973 [7] Zoran Zivkovic. Improved Adaptive Gaussian Mixture Model for Background Subtraction Pattern Recognition, 2004. ICPR 2004. Proceedings of the 17th International Conferece on 20 Sep 2004.

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