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A Review Paper on I to V Conversion for Blind People using Raspberry pi

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Abstract: ***Authors have proposed the new device of automatic document reader for visually blind people, which is developed on the Raspberry Pi Platform. The primary objective of this paper is to provide the smart reader using raspberry pi for visually challenged people. It is an innovative, efficient and real-time cost-beneficial technique that enables the user to hear the contents of text images instead of reading through them. An approach combines the concept of Optical Character Recognition (OCR) and Text to Speech Synthesizer (TTS) in Raspberry pi. Text-to-Speech is a technique that scans and reads English alphabets and numbers that are in the image using the OCR technique and changing it to voices. This device is introducing the integration of a complete Text Read-out system. This device consists of two modules, the image processing module, and a voice processing module. The device is developed for the conversion of the printed document into a text file by using Raspberry Pi which uses Python programming. Experimental results have shown the efficiency of the model.***
Keywords: OCR, image processing, voice processing, raspberry pi, webcam, Python.

I. INTRODUCTION

Blind people are an indivisible part of our human society. All over the world lots of people are suffering from blindness and the number is increasing day by day. Although there is a technique called Braille, which is the most common and primary method of text reading for blind people to access information and education independently, however many visually impaired, that is those who are blind or partially sighted, find learning to read Braille difficult. We are looking at the difficulties that face visually impaired learners. Therefore, we are focusing on and trying to overcome related problems. The proposed work will introduce the integration of a complete text read-out system for the visually impaired peoples. This uses the methodology of a camera-based assistive device that can be used by people to read Text document. In this project, we are going to develop a technique to extract text from type documents, convert them into machine-encoded text, create the text files and then process them using Digital Image Analysis to convert the text into the audio output. The framework is on implementing an image capturing technique in an embedded system based on the Raspberry Pi board. They propose a fully integrating system consist of 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 recognition). To extract text from the image we need to do image processing. We are doing Python programming for Raspberry Pi. A text-to-speech converter converts text into speech. The machine has to follow some procedure which is divided into basic two steps: the first step is, character recognition in which we are using OCR that is the optical character recognition method. We are implementing for English alphabets. The next step is TTS that is a Text to speech conversion in this we have to convert recognized text from OCR into simply in the speech file the text data is converted to an audio output and is played through the earphones or speaker.

II. LITRETURE SURVEY

A. In this project or paper they explained the OCR conversion using online and offline method. This project is an automatic document reader for visually impaired people, developed on the Raspberry Pi processor board. It controls the peripherals like camera, a speaker which act as an interface between the system and the user. Optical character recognition (OCR) technology is used for the identification of the printed characters using image sensing devices and computer programming. The OCR process is done using online and offline methods.

B. In this paper they give the information about the Text to speech engine for OCR Conversion. 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.

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C. In this paper they explained the image conversion using python. 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. 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.

D. In this paper they implement the distance measuring technique. An OCR (Optical Character Recognition) system which may be a branch of computer vision and successively a sub-class of AI. Optical character recognition is that the translation of optically scanned bitmaps of printed or hand transcription into audio output by using of Raspberry Pi. OCR's are developed for many world languages are already under efficient use. This method extracts moving object region by a mixture-of-Gaussian based-background subtraction method. A text localization and recognition are conducted to accumulate text information. To automatically localize the text regions from the image, a text localization and Tesseract algorithm by learning gradient features of stroke orientations and distributions of edge pixels in an Ada boost model.

III. BLOCK DIAGRAM

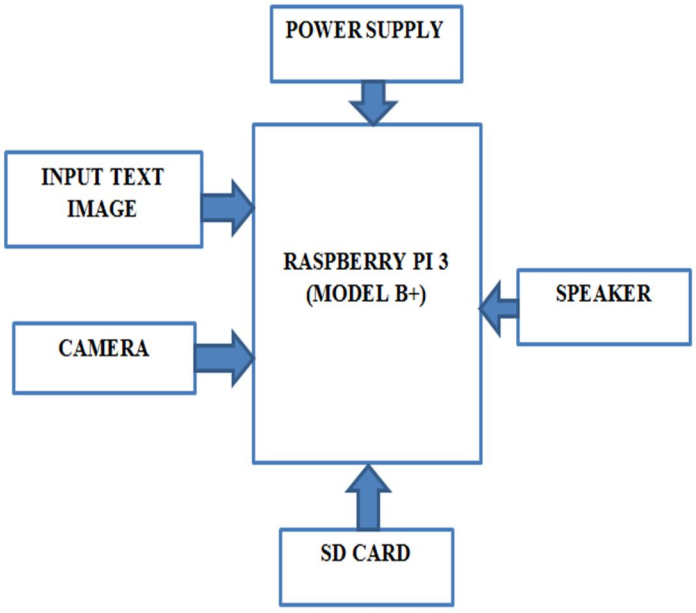

Fig 1: I to V Conversion for Blind People using Raspberry Pi

IV. WORKING

The authors have used Raspberry Pi to control the module. The first part was booting the Raspberry Pi board by installing the Operating system Raspberry OS and installing the essential libraries and packages. Next is the image acquisition system, in which we have interfaced with a webcam, to capture the image of the text document. When the capture button is clicked this system captures the product image placed in front of the web camera which is connected to Raspberry pi through USB. This data is then given to the OCR Algorithm which converts the image data to text data which includes Background subtraction and Template Identification, where the characters are detected and we obtain the individual alphabets. Background subtraction, also known as foreground detection, is a technique in the fields of image processing and computer vision wherein an image's foreground is extracted for further processing (text recognition, etc.). For OCR we wrote a program using the Python language for better output. The Algorithm scans the image, checks each alphabet or letter and gives a corresponding text output after verifying it with its database. Storage Device saves the text data that we get after applying the algorithm in a text file. According to the application required the next step is text to speech conversion wherein the text data is converted to an audio output and is played through the earphones or speaker connected to the audio jack. The Raspberry Pi is powered by a 5V 2A Adapter.

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V. METHEDOLOGY

The initial step in which the images of the text can be captured by the inbuilt camera. Depending on the camera used, the quality of the image is captured. The quality of the image captured will be high to have fast and clear recognition due to the high-resolution camera. We are using the Web camera with a resolution of 640x408.After the acquisition of the image, various operations are needed to be performed to extract text from the image. Firstly pre-processing steps are performed in which filtering of the image, removal of noise is done. After filtering, we convert the image into gray scale image and threading operations are performed. Thresholding is the simplest method of image segmentation from a gray scale image. Optical Character Recognition shortened as OCR is the software device used to read the typed or handwritten content into machine-encoded text. OCR is a text recognition technology that allows the written text or printed copies of the text into editable soft copies or text documents. It is an algorithm used to recognize the text patterns and to separate the text from the background of the image. It converts the pre-processed image which is in .png form to a .txt file. We are using the Tesseract OCR. A Tesseract is a free software, optical character recognition engine for various operating systems. The output of OCR is the text. Here, the text is converted to speech using a speech synthesizer. A text to speech (TTS) synthesizer is a computer-based system that can read text aloud automatically, regardless of whether the text is introduced by a computer input stream or a scanned input submitted to an Optical character recognition (OCR) system. Here, speaking software is used to convert the text to speech. In this project, the English TTS method is used for reading the contents and the speech is artificial and robotics.

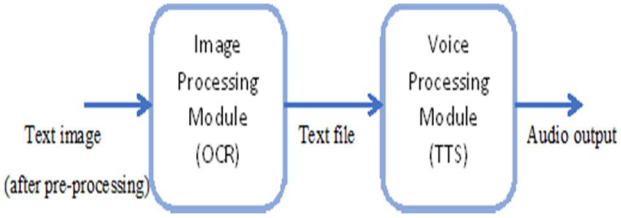

Fig 2: Text to Audio Conversion

VI. CONCLUSION

The Authors have presented the IOT based smart readers for visually impaired people using Raspberry pi and implemented a low-cost and efficient camera-based assistive smart text reader for those who are facing difficulties in reading textbooks and printed or handwritten documents. As in the existing system, a blind reader has some of the disadvantages, to overcome that authors have proposed a handheld computer system for visually impaired readers. By using this smart reader, most of the blind and visually impaired people can enjoy various books just as much as ordinary people, without being concerned with the Braille system The device helps the visually impaired person in the following ways: Text extraction from the scanned image using Optical Character Recognition (OCR) and convert the text to voice as an output using speak Text- to-Speech (TTS) tool which is played through the speaker. The model is tested and all the parameters are verified.

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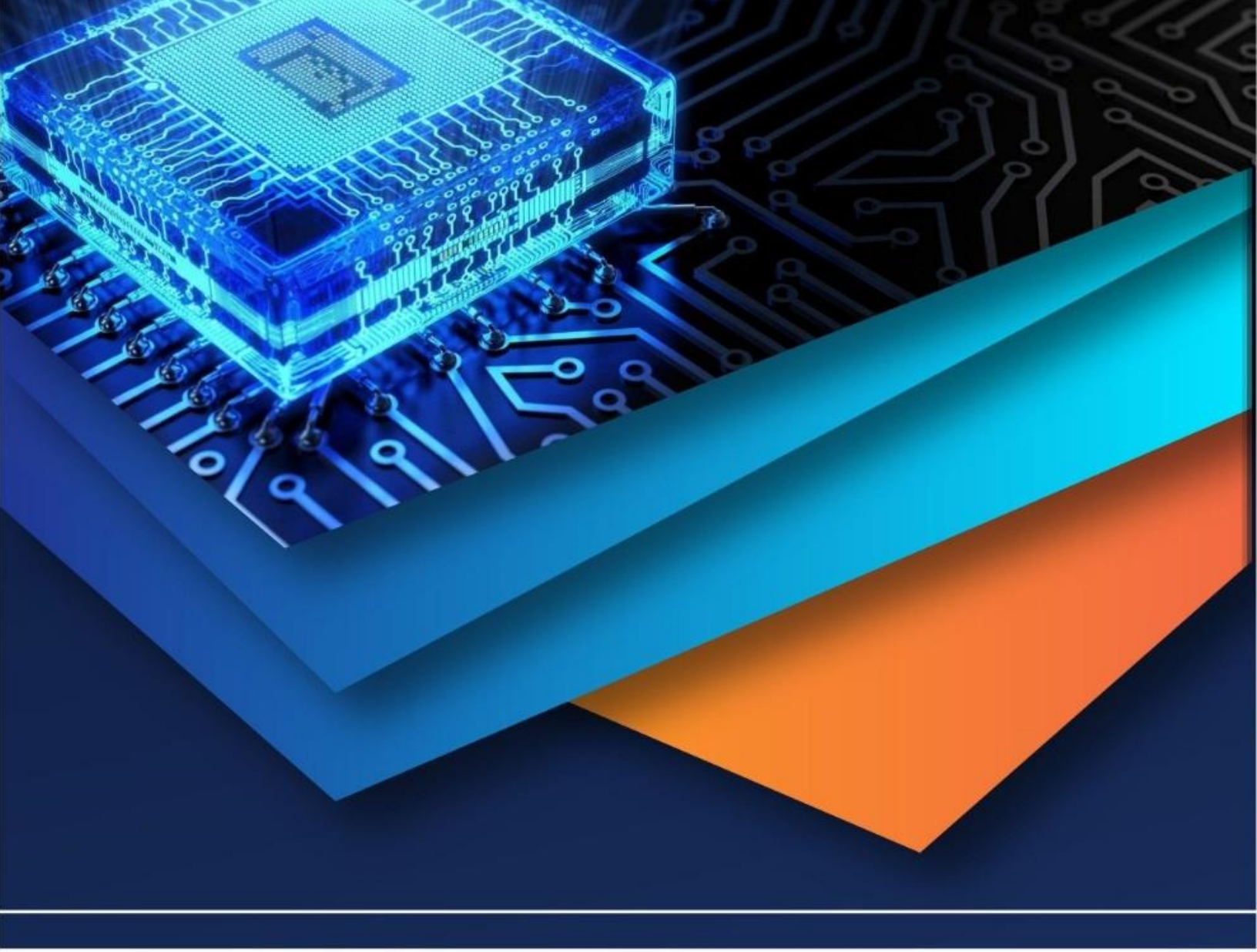

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