OCR READER FOR VISUALLY IMPAIRED PEOPLE USING RASPBERRY PI

[1]Manu Gokulanathan, [2] Tharang Prabhakar, [3] Misbah B K, [4] Visruth Babu Onden, [5] Aswathi C R

[1] [2] [3] [4] UG Scholars,[5]Assistant Professor,

Department of Electrical & Electronics Engineering, College of Engineering, Thalassery

Kannur, Kerala, India

[2]tharangp31@gmail.com, [5]cr.aswathi@gmail.com.

To access & cite this article
Website: www.ijirmet.com

ABSTRACT

Blind people are always cursed in the sense of vision. In this world characters are found everywhere. This paper focuses on the Raspberry Pi Reader for blind people that assists them in recognizing the characters. The system can be used for converting images of either handwritten or printed text into machine coded text. For this purpose Optical Character Recognition (OCR) technology is used. The images are captured using a Pi camera module mounted on a stand. The Open CV Library is used for converting scanned images into machine text. The Tesseract Platform (library) is used to assist the OCR Technology. The encoded text is then converted into an audio output (speech) through Text-Speech Synthesis method. Python programming is used by Raspberry Pi for conversion of printed image to text file and then to audio output. Here we introduce a simple and portable reader that efficiently and effectively converts text into audio output in a proper way.

KEYWORDS: Raspberry Pi, Optical Character Recognition, Open Computer Vision Library, Raspbian,

I.   INTRODUCTION :

Vision is one of the most important senses of human beings. So blind people cannot read text or printed text of any format. According to the studies, it is estimated that there are about 1.3 billion people with some form of vision impairment. New technologies make it possible to assist blind people in reading text. This problem can easily be handled by using Raspberry Pi reader. The proposed project converts image into machine coded text using a camera module. The camera module captures the image of the printed/written text. Later the machine coded text is converted into audible output through text to speech synthesis. Optical Character Recognition (OCR) technology is used for the conversion of captured images of the text into machine coded text. Tesseract Library is used for assisting OCR Technology. The scanned images are converted into machine coded text with the help of Open CV Library. The operating system used for Raspberry Pi can either be NOOBS or RASPBIAN. This method can be used for recognizing text of different fonts and sizes that   assist the blind.
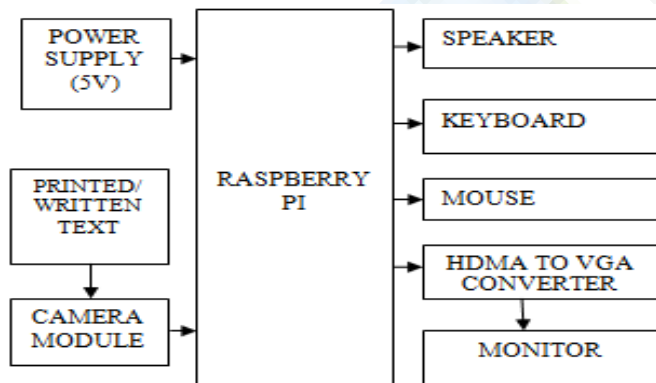
II.   PROPOSED SYSTEM :

Fig.1: Block Diagram for Raspberry Pi reader

HARDWARE PART

The main hardware parts of the proposed project are:-

•   Raspberry Pi board
•   Camera module
•   Speaker
•   Power Supply
•   Keyboard
•   Monitor

The Raspberry Pi 3B is a mini computer board and this model is the third generation of Raspberry Pi. The Raspberry Pi 3B model consists of 4 USB ports, a micro SD port for storing the operating system and other data, a CSI camera port for connecting the Raspberry Pi camera, an Ethernet port for internet connection, a HDMI port, DSI display port for connecting the Raspberry Pi touch screen display, Micro USB power source etc.

The Raspberry Pi board is powered through a 5V power supply. The camera module which is mounted on a stand captures the images of the printed/written text and sends to the board. The scanned image is later converted into machine text.

The audio output is obtained from the speaker which is connected to the audio jack of Pi board and the audio output is amplified later using an audio amplifier. The keyboard and mouse are peripheral devices connected to the Raspberry Pi board. The monitor is used for display purpose and is used for interfacing with the Raspberry Pi board. In conventional systems, a button is pressed inorder to capture the image and this may lag the whole system. The proposed system corresponds to a voice command using the voice recognition system to capture the image and process it.

SOFTWARE PART

Like any system, Raspberry Pi needs an operating system to operate on. Raspbian is the official operating system of Raspberry Pi. Raspbian is a Debian based computer operating system. The versions of Raspbian include Raspbian Stretch and Raspbian Jessie. In this system Raspbian Stretch is used. Noobs is another commonly used operating system for Raspberry Pi.

The scanned images are converted into text format with the help of Open CV Library. The Open CV Library is an open library consisting of a large number of library functions for various applications. It is usually written in languages like C, C++, Python, Java etc.

Tesseract is the platform that supports the OCR technology in recognizing characters of various

fonts and sizes. The languaging program used for converting images into text and into audio is done by python programming.

INTERFACING OF HARDWARE AND SOFTWARE

First the operating system file is downloaded. In this project, Raspbian –Stretch is used. Raspbian is a Debian based operating system used for Raspberry Pi. Then the memory card is formatted in "FAT32" format. Using balena etcher Raspbian-Stretch is flashed to the SD card. The flashed SD card is inserted into the Raspberry Pi module. Now by using a power source (especially 5V), the Raspberry Pi is powered. Later the Raspberry Pi board and monitor are interfaced using a HDMI cable.

IV. WORKING PRINCIPLE :

The Raspberry Pi board is the main part of the Raspberry Pi reader. The board controls the devices like the camera, speaker etc. The camera which will be mounted on a stand takes the images of the printed/written text. Then the captured image is converted into machine coded text with the help of OCR technology. OCR technology is a text recognition method used for conversion of scanned images to machine text. Open CV library is the library used for conversion of images into text format. The operating system used for Raspberry Pi can be NOOBS or RASPBIAN. Thereafter the machine coded text undergoes Text –Speech Synthesis. The Text-Speech Synthesis converts machine encoded text into audible output through the speaker.
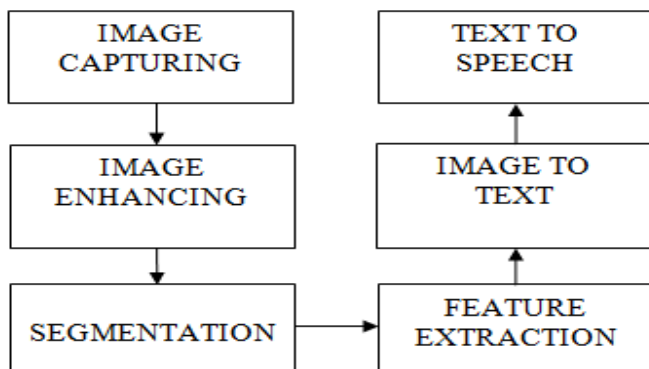
V. FLOW OF PROCESS :

Fig.2: Block Diagram of Process Flow

The first and foremost process is to capture the image of the printed/written text. For this we use a Pi camera module which will be mounted on a stand. There are 5 MP and 8 MP camera module, for better resolution we use 8 MP module.

In pre-processing or image enhancing process there are mainly three steps: Skew-correction, Linearization and Noise removal. In skew-correction step we check for any fault in angle of orientation (between ±15 degrees). If any change in orientation is found, then the image is simply rotated (i.e; the image will be linearized) till the skew is corrected. Then the noise must be removed. The noise is due to the poor quality of the page or due to any problem while capturing the image.

The noise free image is then segmented. Here the image of the text is decomposed into sub-images of individual characters (symbols). In feature extraction process these sub-images are taken into consideration and the features are extracted. The features include Height & width of characters, Number of horizontal & vertical lines present (long and short) and Number of special symbols & shapes. These images are then converted into machine coded text. Different characters and symbols have different ASCII value. These ASCII values processed by Raspberry Pi board are matched with its corresponding templates. These are saved as normal text. Now these text transcriptions are converted to audible signals that can be accessed by the visually impaired people through a speaker or a headset.

VI. CONCLUSION :

OCR based reader using Raspberry Pi is implemented and tested. This paper focuses on a portable Pi reader that can help to solve the problems of visually impaired people by assisting them to recognize characters. This proposed system captures the printed/written characters and convert them to audible output in an efficient way that can be clearly read by the blind people.

VII. FUTURE SCOPE :

Artificial intelligence devices are developing day by day.OCR technology is the main system

used in this project which includes voice command function. This project fails in case of reading a book which can be solved with further mechanism that turns the page automatically.

A portable smart form capable of reading in a simple way can also be developed. Advanced programming in python code allows this project to read multiple font and languages with ease.

VIII. RESULT :

The proposed system will assist the blind people in recognizing the printed or written characters.The system willconvert the text into a paper audio output which can be clearly heard by the individual.

IX. REFERENCES

1. Velumurugan D et al, Hardware Implementation of Smart Reader for Visually Impaired using Raspberry Pi, IJAREEIE, Vol.5, Issue 3, March 2016.

2. Nagaraja L. et al, Vision Based Text Recognition using Raspberry Pi, International Journal of Computer Applications, NCPSIA 2015.

3. George Naggy et al, A Prototype Document Image Analysis System for Technical Journals, University of Nebraska - Lincoln Digital Commons, at University of Nebraska – Lincoln.

4. N. Venkata Rao et al, Optical Character Technique Recognition Algorithms, Journal of Theoretical and Applied Information Technology, Vol.83, No. 2, 20th January 2016.

5. Dr. S. Rabiyathul Basariya, and Dr. Ramyar Rzgar Ahmed, 2019. "The Influence of 'Adventure Tourism Activities' in promoting tourism business in mountain stations", African Journal of Hospitality, Tourism and Leisure, Volume 8 (2).

6. Dr. S. Rabiyathul Basariya, and Dr. Ramyar Rzgar Ahmed, Nov 2018. "A Study On consumer satisfaction and preference of colour TV brands in Chennai city", International Research Journal of Management and Commerce, Volume4, Issue 10.

7. Dr. S. Rabiyathul Basariya, and Dr. Ramyar Rzgar Ahmed, "A Study on Attrition: Turnover intentions of employees", Jan 2019. International Journal of Civil Engineering and Technology (IJCIET), Volume 10, Issue 9.

8. Dr. S. Rabiyathul Basariya, and Dr. Nabaz Nawzad Abdullah, Dec 2018. "A STUDY ON CUSTOMER'S SATISFACTION TOWARDS E-BANKING", International Research Journal of Management and Commerce, Volume 5, Issue 12,

9. S Rabiyathul Basariya , 2R.BharathVajan, "ANALYSIS OF THE LEGAL ISSUES OF ELECTRONIC CONTRACTS" International Journal of Pure and Applied Mathematics, Volume 116 No. 17 2017, 147-150