International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering (IJAREEIE)

| e-ISSN: 2278 – 8875, p-ISSN: 2320 – 3765| www.ijareeie.com | Impact Factor: 6.392|

||Volume 9, Issue 4, April 2020||

Text Reading Device for Blind & Illiterate People

Dr.Pramod Sharma [1], Shreya Singhal [2], Siddhartha Tiwari [2], Rohit Kumar [2]

Associate Professor, P.G. Department of Electronics & Communication Engineering, Raja Balwant Singh Engineering, Technical Campus, Bichpuri, Agra, Uttar Pradesh, India. [1]

B.Tech. Final Year Student, Department of Electronics & Communication Engineering, Raja Balwant Singh Engineering, Technical Campus, Bichpuri, Agra, Uttar Pradesh, India [2]

ABSTRACT: This paper presents a smart device that assists the visually impaired and illiterate people to effectively and efficiently read paper printed text. The developed device highlights the capabilities of visually impaired as well as illiterate peoples as it focuses to improve their reading skills without the help of third person. The proposed project uses the methodology of a camera based assistive device that can be used by people to read text documents. The developed device can work as 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.

KEYWORDS: OCR, Raspberry pi, Tesseract, Python, Text to speech, Camera module

I. INTRODUCTION

The main aim of our project work is to provide a reliable, cost effective, low power solution for the visually impaired and illiterate people, which would help them to read and study almost like any other normal people. According to a survey the numbers of visually impaired people in the world is around 285 million, of whom 39 million are blind. The total illiteracy rate of males is 10% while the total illiteracy rate of females is 17.3%. They even can't read and write. Also due to eye diseases, uncontrolled diabetes, accidents and other reasons the number of visually impaired persons increased every year. Visually impaired people report numerous difficulties with accessing printed text using existing technology, including problems with alignment, focus, accuracy, mobility and efficiency. In this paper we present a smart device that assists the visually impaired as well as illiterate person to effectively and efficiently read paper-printed text.

The proposed device is basically a text-to-speech conversion device consists of two main modules, the image processing module and voice processing modules. Image processing module captures image using camera, converting the image into text. Voice processing module changes the text into sound and processes it with specific physical characteristics so that the sound can be understood.

II. METHODOLOGY

The proposed system is consists of two modules basically such as image processing module and voice-processing module. The input is in the form of printed document or any text. The image is captured by using Pi camera which is

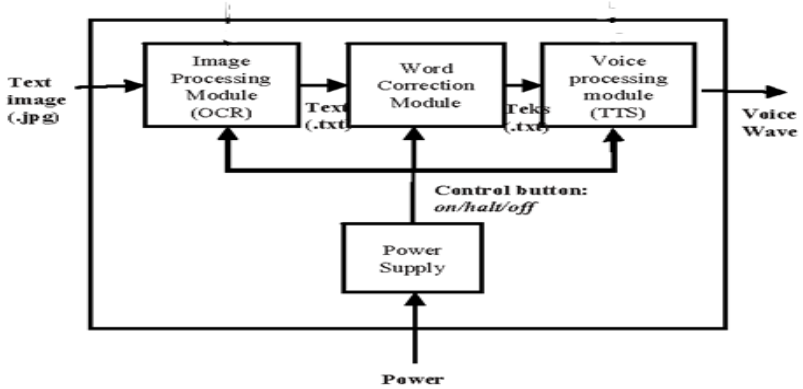

Fig.1. Basic block diagram of the system

| e-ISSN: 2278 – 8875, p-ISSN: 2320 – 3765| www.ijareeie.com | Impact Factor: 6.392|

||Volume 9, Issue 4, April 2020||

Connected to Raspberry Pi. The Raspberry Pi is coded by using Python programming. This input is fed into the image processing module. The image processing module extracts the text from the image through OCR technique. For OCR technique we are using Tesseract software. The image text is converted into characters by ASCII codes. Then this text is converted into speech by voice processing module. The output is taken through audio jack of Raspberry Pi using headphones. The two modules can be described as Image processing module & Voice processing module

Image Processing Module :

Image processing module converts image to text conversion using Optical Character Recognition (OCR) technique. Optical Character Recognition, also known as Optical Character Reader, OCR, is the mechanical or electronic conversion of images of typed, handwritten or printed text into machine-encoded text, from a photo of a document.

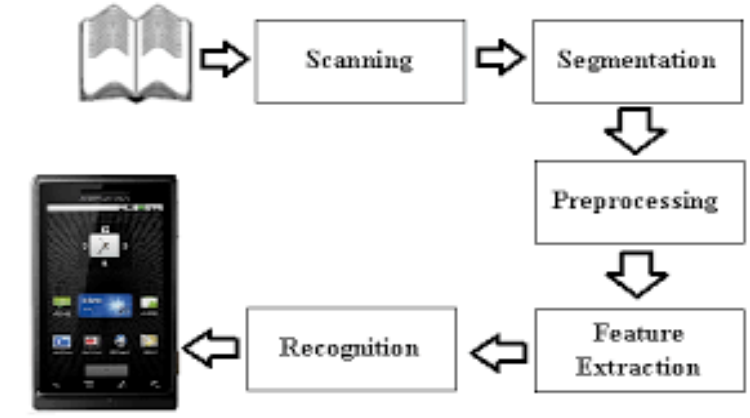

Fig.2. Block diagram of OCR

- In this block diagram of OCR, the first step is scanning, the document that is going to be converted into text is scanned first.
- After scanning the segmentation process occurs, in this process the main image is segmented into subimages of individual symbols.
- After segmentation preprocessing occurs, the main objective of this process is "to make as easy as possible" for OCR system to distinguish a character from the background.
- The feature extraction stage is used to extract the most relevant information from the text image which helps us to recognize the characters in the text.
- After all the processes the character is recognized and then finally it is converted into ASCII code and we get the text out of image.

Voice Processing Module :

Voice processing module converts text into speech. The output of OCR is the text, which is stored in a file (speech.txt). Here, software is used to convert the text to speech. The Raspberry Pi has an on-board audio jack, the on-board audio helps to listen the output. A USB audio card can greatly improve the sound quality and volume. As the recognition process is completed, the character codes in the text file are processed using Raspberry Pi.

III. SOFTWARES USED

For the development of our project work we have used Tesseract software and Python programming. Tesseract is an optical character recognition engine for various operating systems. It is free software, released under the Apache License, version 2.0, and development has been sponsored by Google since 2006. Tesseract software is used to convert the text into speech by converting into ASCII codes while Raspberry Pi is coded through python programming. Python is an interpreted high-level programming language for general-purpose programming. It supports multiple programming paradigms, including object oriented, imperative, functional and procedural, and has a large and comprehensive standard library. Python interpreters are available for many operating systems. CPython , the reference implementation of Python, is open source software.

| e-ISSN: 2278 – 8875, p-ISSN: 2320 – 3765| www.ijareeie.com | Impact Factor: 6.392|

||Volume 9, Issue 4, April 2020||

IV. WORKING OF THE SYSTEM

With the help of this device text is converted into speech. Its working integrates OCR and TTS concepts. It includes the image text extraction and transforms the text into speech; this allows the blind and illiterate people to read the text easily. The output of OCR is the text, which is stored in a file (speech.txt). Here, software is used to convert the text to speech. After the image in converted into text, then this text is converted into speech.

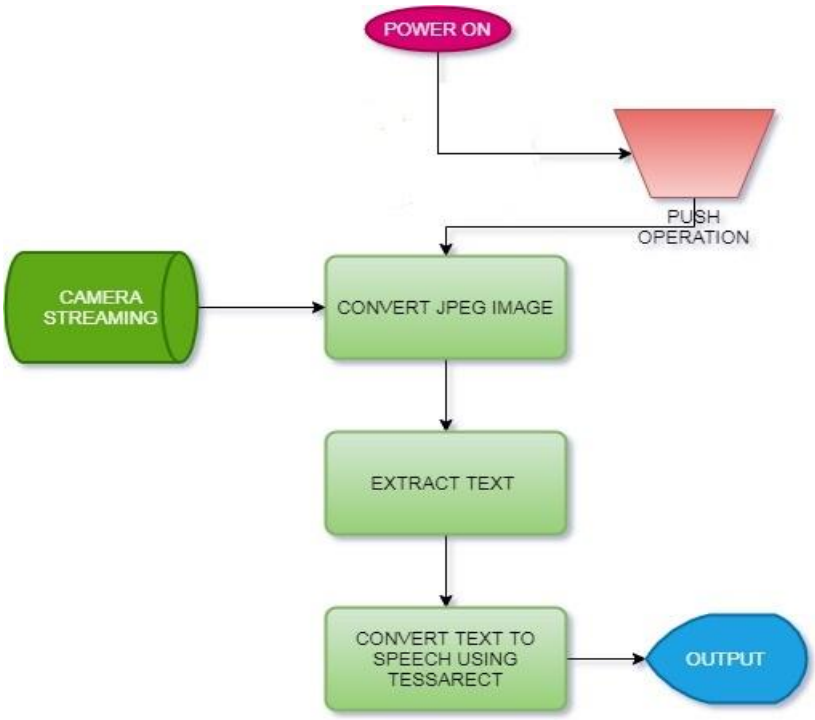

Fig.3. Flow diagram of text to speech

The image processing part works on OCR technique while the voice processing part works on TTS (text to speech) technique. The word correction module selects the appropriate text to read and removes all the unwanted text. The power supply halts button controls both the modules.

V. HARDWARE USED

Major hardware used are Raspberry pi and Camera module, whose specifications are

Raspberry pi :

Raspberry Pi is a low cost, credit card sized computer that plugs into computer monitor or TV and uses standard keyboard and mouse. There are two models of it, Raspberry Pi 2 and Raspberry Pi 3. Here we are using Raspberry Pi 3 Model B. The Raspberry pi 3 Model B is the latest version of the Raspberry pi computer. The quad - core of Raspberry pi is both faster and more capable than its predecessor, the Raspberry pi 2. The Raspberry pi 3 also supports wireless internet out of the box, with built-in Wi-Fi and Bluetooth. Raspberry pi 2 and Raspberry pi 3 are bit similar with few advance features on Raspberry pi 3. Compared to the Raspberry Pi 2 it has :

- A 1.2GHz 64-bit quad-core ARMv8 CPU
- 802.11n Wireless LAN
- Bluetooth 4.1
- Bluetooth Low Energy (BLE)
- 4 USB ports
- 40 GPIO pins
- Full HDMI port

| e-ISSN: 2278 – 8875, p-ISSN: 2320 – 3765| www.ijareeie.com | Impact Factor: 6.392|

||Volume 9, Issue 4, April 2020||

- Ethernet port
- Combined 3.5mm audio jack and composite video
- Camera interface (CSI)
- Display Interface (DSI)
- Micro SD card slot
- Video Core IV 3D graphics core

Fig.4. Raspberry pi 3

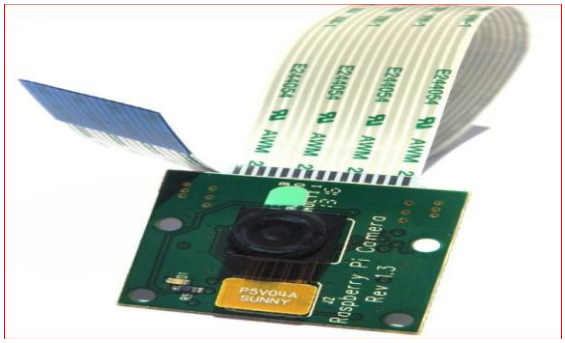

Fig.5. Camera module

Camera module :

- In this project we are using raspberry pi camera rev 1.3. The Raspberry Pi Camera Modules are small PCB's that connects to the CSI-2 camera port on the Raspberry Pi using a short ribbon cable. They provide connectivity for a camera capable of capturing still images or video recordings.
- It's able to deliver a crystal clear 5MP resolution image.
- Fully Compatible with Both the Model A and Model B Raspberry Pi
- 5MP Omnivision 5647 Camera Module
- Still Picture Resolution: 2592 x 1944
- Size: 20 x 25 x 9mm
- Weight 3g

VI. RESULT AND DISCUSSION

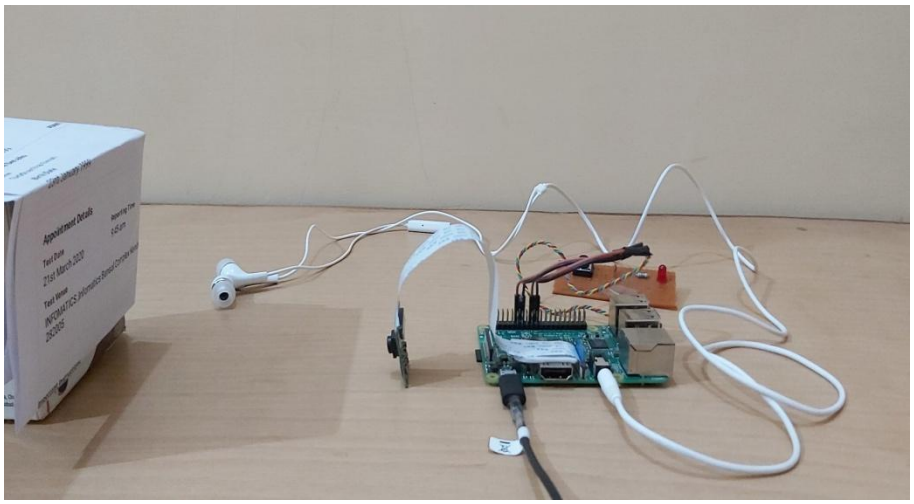

Fig.6. Actual photograph of the device

| e-ISSN: 2278 – 8875, p-ISSN: 2320 – 3765| www.ijareeie.com | Impact Factor: 6.392|

||Volume 9, Issue 4, April 2020||

Following observations had been made during the operation of the proposed system :

- The device is tested for the successful reading of text having the font size in between 10 – 16 with bold font style.
- This device can read English alphabets only.
- The document which has to be read should be placed 6-10 cm away from the camera.
- The device reads 10-14 words at a time because the focal length of camera is less.
- The device should be operated in proper light.
- The overall delay of the device to convert the image text to speech is found to be 15-18 seconds.

VII. CONCLUSION

We have proposed a simple and efficient device for conversion of text-to-speech. Device highlights the capabilities of visually impaired as well as illiterate people. This focuses to improve their reading skills without the help of third person.

VIII. FUTURE SCOPE

- The readability of the device can be increase by increasing the focal length of the camera being used.
- This device can be further modified for other languages also with other font styles and sizes.

REFERENCES

1. Sandeep Musale, Vikram Ghiye, "Smart Reader For Visually Impaired," IEEE Xplore International Conference on Inventive Systems and Control, June 2018.
2. Shalini Sonth, Jagadish S. Kalliman, "OCR based facilitator for the visually challenged", International Conference on Electrical, Electronics, Communication, Computer and Optimization Techniques, Dec. 2017.
3. Detecting Boris, Epstein Eyal, Ofek Yonatan Wexler "Text in Natural Scenes with Stroke Width Transform" International Research Journal of Computer Science (IRJCS), Issue 05, Volume 4, May 2017.
4. Ani R, Effy Maria, J Jameema Joyce, "Smart Specs: Voice Assisted Text Reading system for Visually Impaired Persons Using TTS Method," IEEE International Conference on Innovations in Green Energy and Healthcare Technologies, Nov 2017.
5. Xiaodong Yang, Shuai Yuan, and YingLi Tian"Recognizing Clothes Patterns for Blind People Confidence Margin based Feature Combination" Proceedings of the 19th ACM International conference on multimedia, November 2011.
6. Asif Shahab, Faisal Shaft, Andreas Dingell " Robust Reading Competition Challenge 2: Reading Text in Scene Images" International Conference on Document Analysis and Recognition, 2011.
7. Yingli Tian, Chula Yi "Assistive Text Reading from Complex Background for Blind Persons", proceedings of the 4th International conference on Camera Based Document Analysis and Recognition, September 2011.
8. Xiaodong Yang, single Tian Chucai Yi Aries Arditi "Context-based Indoor Object Detection as an Aid to Blind Persons Accessing Unfamiliar Environments" Proceedings of the 18th International conference on multimedia, Firenze, Italy, October 2010.
9. Dimitris Dakopoulos and Nikolaos G. Bourbakis, Fellow, "Wearable Obstacle Avoidance Electronic Travel Aids for Blind: A Survey" IEEE 2010.
10. World Health Organization. (2009). 10 facts about blindness and visual impairment [Online]. www.who.int/features/factfiles/blindness/blindness _facts/en/index.html