

Assistive Device for Blind based on IoT

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Abstract: This is the automatic document reader for visually impaired people, developed on Raspberry Pi. It uses the Optical character recognition (OCR) technology for the identification of the printed characters using computer programming. It converts images of 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: Rasbarian, OCR, Rasberry Pi 3, OpenCV

1. Introduction

A comparative survey of the portable assistive devices for visually-impaired people in order to show the progress in assistive technology. Thus, the subscription of this literature survey is to discuss in detail the most significant devices that are presented in the literature to assist this population and highlight the improvements, advantages, disadvantages. With 82% of blind population being 50 years old or above, there are many who have lived majority of their lives with an inability to do tasks like read, write or walk without help. This project describes the implementation of raspberry based assistive aid for visually impaired users. The proposed method develops a progressive work for developing an assistive aid for visually impaired which will help them in reading newspapers and books. It is mainly used in the field of research in Character Recognition, Artificial Intelligence and Computer Vision. In this project, as the recognition process is done using OCR the character code in text files are processed using Raspberry Pi device on which it recognizes character using tesseract algorithm and audio output is listened. To use OCR for pattern identification to perform Document image analysis (DIA) we use information in grid format in virtual digital library's design and construction. This work mainly focuses on the OCR based automatic book reader for the visually impaired using Raspberry PI.

2. Block Diagram

The figure1 shows the block diagram of the proposed book reader. In this system, the printed text is to be placed under the camera view by the blind person to ensure the image of good quality and fewer distortions. Then an applicable blind assistive system, a text localization algorithm might prefer higher recall by sacrificing some precision.

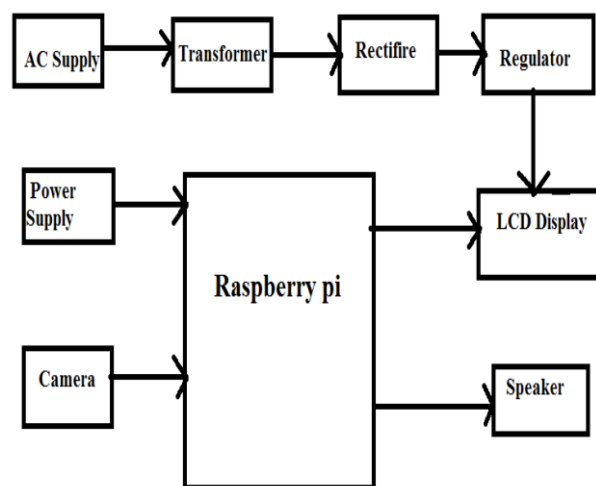


Figure 1: Proposed Book Reader

3. Methodology

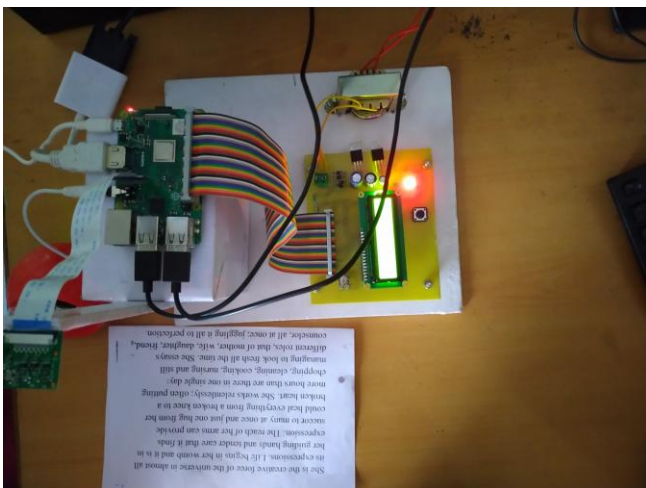
In this paper presents a prototype model Optical Character Recognition (OCR) is the identification of printed characters using photoelectric devices and computer software. It covers images of typed, handwritten or printed text into machine encoded text from scanned document or from subtitle text superimposed on an image. OCR is used in machine process such as cognitive computing, machine translation, text to speech, key data and text mining. Our aim is to inscription and present most of the issues of these systems to cover the way for other researchers to design devices that ensure safety and independent mobility to visually-impaired people.

3.1 Steps in Assistive Device for Blind

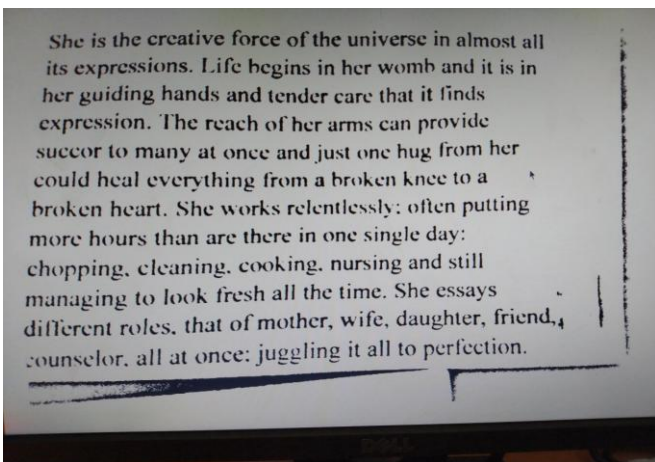
1. First connect the speaker to raspberry pi at composite audio and video jack port of raspberry pi.
2. Give power supply to raspberry pi at micro USB power input.
3. Connect the monitor cable to the HDMI port of raspberry pi.

4. Connect the mouse and keyboard cable to 2USB ports of raspberry pi.
5. Connect the pi_camera to CSI camera port.
6. Connect the LCD board to 40 GPIO pins of raspberry pi otherwise you can connect it by using jumper cable. Two cables required for this and connect it to data and ground pin of LCD and GPIO pin of raspberry pi.
7. Connect the PCB board power cable and the raspberry pi power cable to switch.
8. As the switch is pressed the raspberry pi and the monitor will turn on.
9. Rasbian OS will open then open command prompt and fire command `opencv blind`
10. Then fire `ls` command it will display all the files in directory.
11. Then fire command `sudo python3 final blind command`.
12. Also check the speaker is on and fully charged.
13. As you run the command the speaker will start giving instructions.
14. After that place the paper above the pi camera properly.
15. Then camera will capture the image and then process will start. The overall process is displayed on the LCD.
16. The captured image is converted into audio.

3.2 Snapshots



Snapshot 1: Proposed Book Reader



Snapshot 2: Captured image is converted into Audio

4. Functional Requirements

4.1 Pi Camera:

Pi Camera is a camera which can be used to take pictures and high definition video. Raspberry Pi Board has CSI (Camera Serial Interface) interface to which we can attach Pi Camera module directly. This Pi Camera module cut back attach to the Raspberry Pi's CSI port per 15-pin emblem cable.

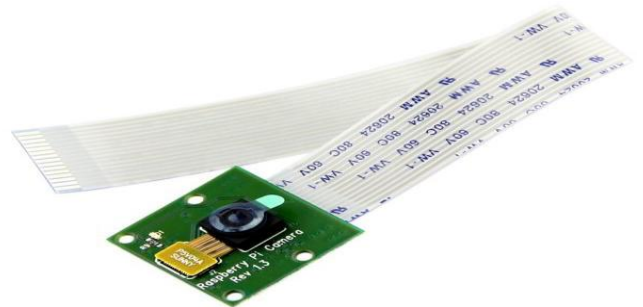


Figure 2: Pi Camera

4.2 Raspberry pi 3 Model

The Raspberry Pi 3 Model is to add a keyboard, mouse, display, power supply, micro SD card with installed Linux Distribution. As the Raspberry Pi 3 supports HD video.



Figure 3: Raspberry pi3 model

4.3 LCD Display

This LCD has two registers i.e Command and Data. Command instructions given to LCD which is stores in command register. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data which is displayed on the LCD. The data is the ASCII value of the character that is displayed on the LCD.

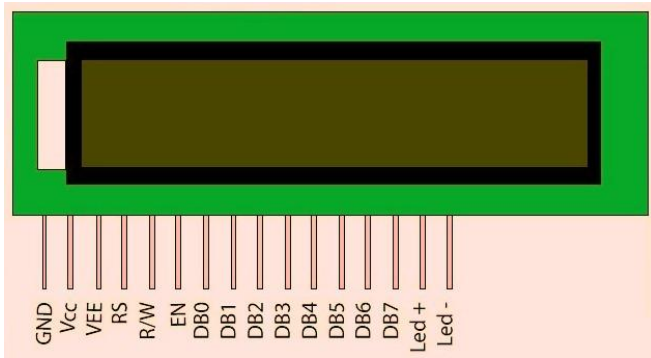


Figure 4: LCD Display

5. Advantages

1. The main advantage of this is to detect the text and gives the voice output for visually impaired.
2. It is helpful for old people who have low eyesight and Blind people.

6. Limitations

1. It just reads the text and does not specify whether it is headline are sub head line.
2. The camera does not auto-focus it takes time to focus on the text.

7. Conclusion

Text to speech device can change the text image input into sound with a performance that is high and reliable tolerance of less than 2%. Our system scan printed text and handheld objects for helping the blind individuals. In this analysis, we've got represented a personification system to scan printed text for helping the blind individuals.

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