

Raspberry Pi Based Text and Image Reader for BlindPeople

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Abstract. Visual impairment can occur due to various conditions, including genetic disorders, injuries, illness, and shock, or other circumstances such as diabetes and MS. The highest number of visually impaired people are found in India. Out of 37 million visually impaired people in the world, 15 million people are from India. Blind readers can only read audiobooks, Braille, or with the help of a private assistant. The scope of this paper is to deliver a technical solution and to support visually impaired people to access numerous resources and improve their knowledge in text. It includes portable camera that captures text and converts it into human speech signals. During the wearable form, it is possible to use the body as a guide and focus on helping the person with VI. Exploring planning concepts with blind users has discovered the need for a small, portable tool that supports free movement, requiring minimal setup and real-time usage. Enables free operation that can be controlled by non-essential settings. Camera text is converted to speech signal using continuous text scanning. With the help of Optical Character Recognition (OCR) software, text-to-speech algorithm is used. Page and audio controls are provided with the Raspberry Pi model. The program is simulated using Python software which provides audio signals as an output, thus it allows visually impaired people to read the text easily.

Keywords— Raspberry Pi, WEB Camera, Optical Character Recognition (OCR), Python.

1 INTRODUCTION

There are many solutions to the problem of helping blind people to read, however, none of them provide effective reading. We focus on improving the ability to read for the blind by providing a solution where information is provided in the form of audio signals. Raspberry Pi-Based Reader is an automatic text and image reader for visually impaired people using OCR technology. The proposed project uses a camera-assisted device that can be used by people to read printed text. The scheme is to use an embedded process that supports the photography process using the Raspberry Pi board. Here, we have set up a text and image reading program for visually impaired people. OCR and Text-to-Speech synthesis are used to convert images into audio output. The suggested device has a camera that acts as a computer input device and this computerized text is processed by OCR. The process is followed by character recognition and the learning curve. The final text displayed is provided by the output devices based on the user's choice. Headphones connected to the Raspberry Pi or speaker acts as an output device. Python programming is used for conversion of printed documents into text file by using Raspberry pi.

Ray Kurzweil proposes K-Reader Mobiles, a learning assistant designed specifically for the visually impaired. "K-Reader Mobile" works on mobile and allows the user to read emails and many other

texts[1]. Marut Tripathi proposes the Navigation System for visually impaired people to travel safely and quickly. In the system, ultrasonic sensors and a USB camera are used to detect and detect obstacles. Once the barriers have been detected by ultrasonic sensors, it sends a beep-soundresponse through the earphone to notify the person of the obstruction.[2]

Dimitrios Dakopoulos proposes a Wearable Barrier to Electronic Travel Aids presenting a comparative study between available or wearable systems to detect barriers or programs to avoid users who are able to progress in teaching aids. Chen promotes automatic acquisition and recognition of signals from natural squares, here introducing a method for automatically detecting andidentifying signals from natural squares and providing signal translation function [6]. Michael McEnancy Finger Reader Audio Index Finger gadget gadget. Although this program does not help blind people to see the letters clearly, the fingerprint system helps the visually impaired to read the printed text. Vasanthi G proposes the Vision Based Assistive System for Label Detection with Voice Output. This camera-assisted app helps blind people to read text labels and portable product packaging[7.]

2 SYSTEM BLOCK DIAGRAM

Visually impaired people use the brail method which is an existing system and is traditionally written on written paper. In this proposed program the main purpose is to assist the visually impaired and people with learning disabilities and dyslexia to assist them in reading the text. But there are problems such as the fact that visually impaired people cannot read to ordinary people, who are experiencing this process. Because OCR is considered a method that converts images of typed or printed text into embedded text. Wearable items such as a camera are lifted to overcome those weights. The camera captures the image where the text is written and the text is first detected using the MSER algorithm. From the OCR algorithm the text is tested to detect errors and use a post processing algorithm. Images of typed or printed text are converted to typed text using the OCR method. Using speech algorithm text the captured text is converted into speech signal. Python is software used in the system. Visually impaired people use earphones to read a converted speech signal. The whole system isimplemented using the blueberry model pi 3.

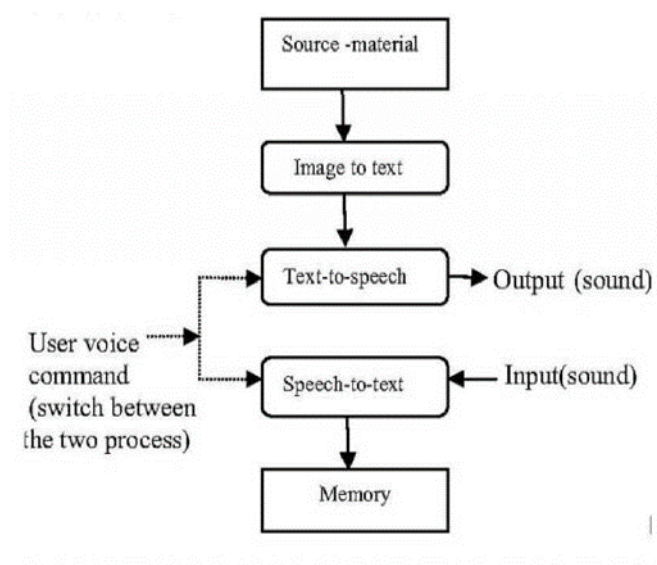


Fig. 1. Proposed system block diagram.

3 WORKING OF RASPBERRY PI BASEDTEXT AND IMAGE READER

- 1) Pre-Processing:- Removal of any sound and other image-related disturbances is performed in a pre- processing unit so that the image is prepared for feature removal.The image smoothing is done.Certain filters are used to reduce noise.
- 2) Optical Character Recognition (OCR):- Web camera in the system captures the input image. Pixel is the minimum character size which can be read by OCR,which is a process that allows us to convert text contained in images into formal texts.
- 3) Post Processing:- Debugging and resolving misunderstandings on OCR outcomes through contact details is a major goal of the post processing unit.Appropriate corrections are concluded by selecting the proper grammar from the compiling dictionary in thisstep.
- 4) Text To Speech:- Text to speech synthesizer is a software that helps to translate text into spoken words,by analyzing and analyzing text using natural language processing (NLP) and digital signal processing (DSP) technology to transform this process text into a highly integrated text representation.Two principle steps are involved :-

The first step is text analysis where the input text is written in phonetics or another language image. Second step helps in the formulation of speech forms.

3 RESULTS AND DISCUSSION

The main purpose of our project is to convert a text signal into a speech signal. This is found in the elements and in the way described above. A prototype can be constructed and thus can convert an image into an audio signal that can cause blind people to learn by listening to speech, which is emitted by the speaker.

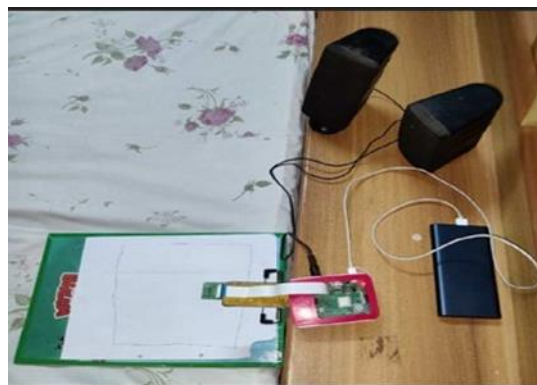


Fig. 2. Top view of Proposed System.

Text extracted from the image as re-entry converted to sound as an output.



Fig. 2. Image of Proposed System.

4 CONCLUSIONS

The text-to-speech device converts the text to image text of sound output. The average processing time required is minimal more than 2 minutes. This device does not require internet access connection can also be used independently by people.

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