Text Reading for Visually Impaired Person using Raspberry Pi

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Abstract:- *Human communication is based on Speech and text. To access text, a person needs to have vision. People having poor vision are able to collect information in the form of voice. The proposed system helps visually impaired person to hear the text. Also it is very difficult for blind people to operate electrical devices this paper offers Google Home's voice recognition with the conception of machine-learning to prove the feasibility analysis using smart home socket for completing the user's need. The proposed idea involves two methods optical character recognition and text to speech conversion. Extraction of the text from the image and converting it into speech is prototype for a person having poor vision to recognize the products in the real world. The Proposed method is carried out by using Raspberry pi and portability is achieved by using a battery backup. Thus the user can carry the device anywhere and able to use at any time.*

Keywords: Optical character recognition, Text to speech conversion, Raspberry Pi, Raspbian OS.

1. Introduction

In humans day to day life speech plays an important role to explain one's thoughts. Reading is one of the most significant difficulties for blind people. Mobile phones, computers, and availability of digital cameras make are feasible to assist the blind person. Combining the existing beneficial products such as optical character recognition system (OCR) and computer vision tools is one of the camera based application for visually blind people. In this proposed system text recognition is done by Open Computer Vision (Open CV), a library of functions used for implementing image processing techniques. Image processing is a technique of using mathematical operations in image, any form of inputs such as image, a series of images, or a video can be used for processing. An image is a set of characteristics or a parameter related to the image, is the output of image processing. Reading devices and technologies involving telegraphy can be created for visually impaired persons with the help of OCR.

Text obtained by converting binary image using Tesseract library in OCR. In this system text to voice output conversion is done with the help of e-Speak algorithm. The e-Speak is a Text- To-Speech (TTS) system which converts text into speech. Speech synthesis is known as Tte artificial production of human speech. The speech synthesizer can be implemented in software or a hardware product. The platform used for this purpose is known as a speech synthesizer. High-quality output in specific usage domains allows the storage of entire words or sentences. A synthesizer can incorporate the model of a vocal tract and other human voice characteristics. The aim of this paper is to build an efficient camera based assistive text reading device. The idea contains text extraction from image clicked by a camera installed on a spectacle. The extracted text is then converted to audio signals and to voice output. It is also helpful to detect a person's face in the frame. With the help of Raspberry pi where the portability is the main aim is carried out, which is achieved by providing a battery backup.

2. Related work

There are a lot of devices which assist the visually challenged for navigation indoor and outdoor. A couple of them are [1] autonomous walking stick helps visually impaired person to hear the text in which text file converted into audio signal using MTLABB16. This system is cost effective and user compatible without use of internet connectivity. System Consume more power to operate. [2] Serves an electronic long cane for blind person. This system was designed using haptic sensors that are used to detect obstacles above the waistline. But this system can detect obstacles only above the waistline.

Late years have seen various text to speech conversion system for visually impaired people. [3] system is developed to help visually impaired person to hear the text. An optical character recognition technology is used. An algorithm development is done with the help of MATLAB16 software. Product label reading and speech conversion system is developed for blind person. Which serves a productive and efficient motion based technique for defining a region of interest (ROI) in the video by shaking the object in the image. Gaussian based background subtraction method is used for extracting region of movement of an object. Optical character recognition technique is used for recognizing text character. Augmented reality based multimodal system is developed which used (OCR) and text to speech technology used.

3. Proposed methodology

The proposed method is to help blind person in reading the text present on the text labels, printed notes and products as a camera based assistive text reader. The proposed system has two different modes. The text modes and automation mode.
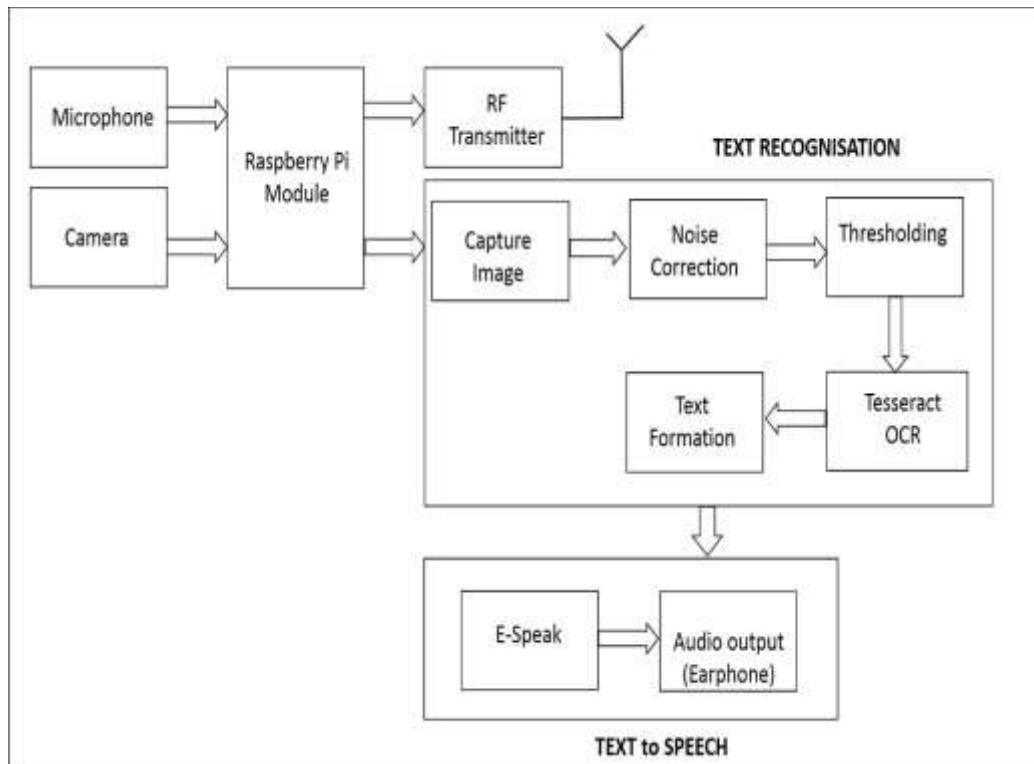

Fig.1: Proposed System Architecture(A)

The idea Involves text recognition and faces detection from image taken by camera on spectacle and recognizes the text using OCR. Conversion of the recognized text file to voice output by e-Speak algorithm.

The system is good for portability, which is achieved by providing a battery backup. The portability allows the user to carry the device anywhere and can use at any time. A prototype was developed which uses a camera on spectacle and Raspberry pi that works in real time.
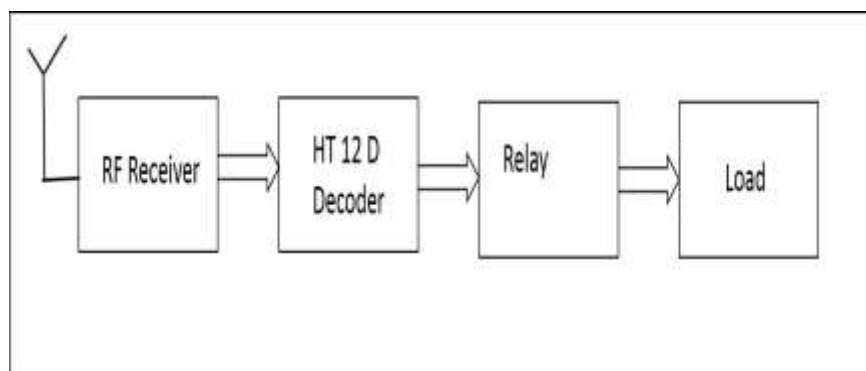

Fig.2: Proposed System Architecture(B)

The binarized image is cropped so that the portions of the image with no characters are removed. The cropped frame is loaded to the tesseract OCR so as to perform text recognition. Output of the Tesseract OCR will be text

file which is the input of the e-Speak. The e-Speak creates an analog signal corresponding to the text file given as the input. An analog signal produced by the e-Speak is then given to a headphone to get the audio output signal. Proposed system OCR and TSS methods along with raspberry pi as operating system.

4. Conclusion

Paper has gone through different text to speech conversion system. Difficulty for visually impaired person is to read product label documents. None of the system physically help to the blind move around. Blind people cannot control smart home without any support system. Some text to speech conversion system is also present. Which help blind people to understand the text. They are not reliable because of their blurring of captured image, bulky hardware, and Weak language translation ratio. Limited text are recognized and converted into speech. In our will extract more words as possible.

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