

IMPLEMENTATION OF SMART READER USING RASPBERRY PI

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Abstract— From several years communication is mostly via text and speech. To access information in text form, a person needs to have vision. So in particular, there is need for a text reader which is portable, affordable and readily available for the blind community. The proposed method is a camera based text reading for helping the blind person in reading the text from the text labels, printed notes and products. In this work, with the help of OCR (Optical Character Recognition) toolbox, the text to speech algorithm is performed. A sample image pixels are converted into binary 0's and 1's, segmentation and labelling, Synthesizer. The text document of sample image is converted into speech which is heard through speaker or headset. The results are done with the help of raspberry pi controller. The audio output is obtained in few milliseconds through the raspberry pi controller.

Keywords—Raspberry pi controller, Optical Character Recognition, Text to Speech Engine.

INTRODUCTION

In our Earth planet there are 7.4 billion humans, out of which 285 million are visually impaired and 39 million people are completely blind, i.e. have no vision at all(WHO 2011). It has been predicted that by the year 2020, these numbers will rises to 75 million blind and 200 million people who are suffering from visual impairment.so there are many advances in this area to help this visually impaired people in reading the document, book, newspaper etc.so the proposed method will help the blind people by capturing the image through camera then converted that image into text after that the text is converted into speech. The Optical character recognition engine converts the text of images into encoded text and saves in a text file. Tesseract is the Optical Character Recognition engine which is used for extract the text from the image and stores in a text file. The text to speech engine converts text to speech. Espeak is a speech synthesizer which is used in raspi for speech output. so the main objective of this method is to convert image into speech within milliseconds.

I. BLOCK DIAGRAM

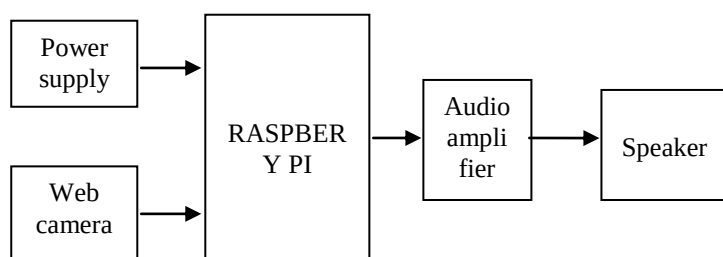


Fig.1.1:Block Diagram

The 5v power supply adapter is given to raspberry pi model. the camera is interfaced with raspberry pi board through USB port. the raspberry pi board have its own operating system which is called as RASPION .then after converting image into speech the audio output is available on audio port of raspberry board. the audio output is first get amplified by using audio amplifier. then through the speaker or headphone we can hear this amplified output. the raspberry pi board also has Internet connection through Ethernet port. we can use this internet connection to update the system and also to update the database. The image text which we want to convert in audio is obtained by capturing the image through webcam. then this captured image is converted into a text by using OCR engine. And this text is converted into speech by using TTS(text to speech) engine.

II. PROPOSED METHOD

In this method we proposes the implementation of Smart Reader with raspberry pi controller. here we uses raspberry pi 3 controller with more advance features. This system consists of a webcam is interfaced with raspberry pi board which accepts a page of printed text. Then with the help of OCR the character recognition is done on image and by using Tesseract the image is converted in text and next this image text is converted into speech by using TTS(Text to speech) engine. the captured image is processed with various operations with the help of Opencv. There are different operations of morphological (erosion, dillusion), RGB to GRAY, filtering is being done on image. after the image is processing the voice processing is done.



Fig 1.2: image conversion

III. HARDWARE DESCRIPTION

Raspberry pi 3:

The Raspberry Pi is a small credit-card sized computer that can be plugs into your TV and a keyboard. It is small capable computer which can be used in many electronics projects, and for many of the things that your PC does, like spreadsheets, word-processing and games. It is low cost, small sized computer which plugs into TV or monitor. It uses standard mouse and keyboard.it uses python language for programming. Raspberry 3model B has many powerful processors which 10x faster .Raspberry 3 has many advance features like it add wireless LAN and Bluetooth.



Fig .1.3 Raspberry pi 3 model B

A. Raspberry pi camera:

The camera module is interfaced to raspberry pi kit through camera serial interface by using 15 pin ribbon cable. This helps in capturing 5MP clear image. it has some specification such as 1MP sensor resolution, 5G wide angle lens, USB 2.0 interface, manual focus, max image resolution is 5500*3640 pixels. and the main advantage of this camera is that it has Brightness controller.



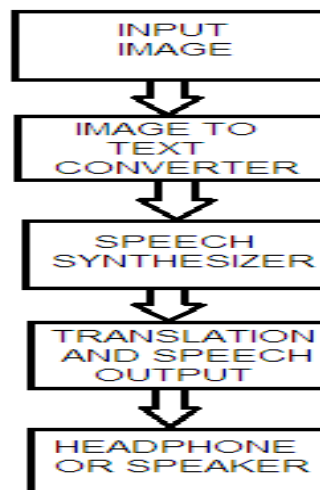
Fig 1.4: camera module

Speaker:

Speaker is used to convert the text audible to us after conversion. we can use here headphone also for our convenience.

V. IMPLEMENTATION

flow diagram:



A. Input Image:

The input image is captured by using camera. by focusing camera on printed text, after some millisecond delay the image is captured. so this captured input image is used for further processing.

B. Image to Text converter:

The input image is then processed by using image to text algorithm. The Tesseract is an optical character recognition engine for various operating systems. This Tesseract engine is installed in raspberry pi module. and is free software. it is considered as one of the most accurate open source OCR engines. This engine is used to convert the input image into text and storing it as .txt extension.

C. Speech synthesizer:

This is software is used to synthesize speech from text output.

The TTS engine converts text into speech. the espeak is engine is installed on raspberry pi.

D. Speech output:

The converted speech output is available at audio jack of raspberry pi 3. then this audio can be heard by using headphones or speaker.

VI. PROPOSED SYSTEM RESULTS:



Fig 1.5: proposed system

The camera will take some time to focus and capture the image and send to raspberry pi 3. then (TTS) text to speech Synthesizer will separate the text data from image. Then the algorithm OCR (optical character recognition) will identify the text and send to raspberry pi. The pi will convert the text into speech and apply them to the audio jack of raspberry pi 3 board. Then by using headphones or speaker we can hear this audio. According to captured image various morphological and filtering, noise removing processes are done on image. Hence the image processing is done on image for speech synthesis. This project is very useful for visually disabled persons.

VII. ADVANTAGES :

- It recognizes letters as well as numbers.
- TTS is useful for man-machine communication.
- It is a portable and user friendly device.
- Design is not complex.

VIII. DISADVANTAGES:

- If image is not captured within given time then further processing is failed.
- Camera need to be correctly focused, for clear and Noise free image.
- Position of object of interest should be placed at center of camera' s view.

IX. APPLICATIONS:

- Low cost PC/Tablets/laptop.
- Industrial/Home automation.
- It can be used in toy which can speak. some are available in market.
- Speech synthesizer is used in measurements and control systems.
- It can be used for a people who have literacy difficulty.
- It can used for any people who wants to hear the Text speech output.

X. FUTURE SCOPE:

- In future we can use more efficient and robust algorithms to character recognition.
- It helps traveler to hear their native language when they are in foreign country.
- We can also used this as language transformer.
- We can use advanced camera, so that captured image will be more noise free.

XI. CONCLUSION:

This system enables the visually impaired people to not feel the disadvantage of not reading the text written in language other than braille. The image processing is allowed for extraction of text region of required image for good quality image input to OCR. Then the text which is output of OCR is sent to TTS engine to produce the speech output. To enable the portability of device the adapter or battery is used to power up the system. Hence this is an economical and efficient device for visually impaired people. So this is compact and helpful for the society.

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