A Smart Navguide System for Visually Impaired

Kiran Rakshana R, Chitra C

Abstract— Nowadays, the Communication is generally takes place through speech and text. To access the information in a text, the vision plays the significant role. The visionless people can gather the information through their hearing ability. The proposed system is a novel implementation of smart guiding system for the visually challenged. The system is a novel and real-time cost beneficial technique. Instead of reading through them, the system allows the visually impaired to hear the contents of the text images. The Proposed system consists of Pi camera, audio microphone, ultrasonic sensor, Raspberry pi, headphone for voice and vibration motor. This system consists of three modules such as voice searching module, image processing module and voice-processing module. These modules are implemented by using the keyword operation search, which is in the form of voice, which is given by the user. After the keyword is received by the Raspberry pi, the pi camera will capture the image, according to the given keyword. This system integrates the Optical Character Recognition and Text to Speech Synthesizer concept. It comprises text extraction from image and translates the text into speech; this helps the user to read the text easier. In computer vision, the extraction of text is a difficult task from the color images. The image processing module stage includes binarization, de-noising, de-skewing, segmentation and feature extraction. It is also used to identify the bus name and bus number in the bus stop or bus stand for the visually impaired and it also achieve the obstacle avoidance by using the ultrasonic sensor and it is informed to the user by vibration sensing technique.

Keywords— Raspberry pi, OCR, TTS, Pi Camera, Visually Impaired

I. INTRODUCTION

By WHO, 285 million people are predicted as visually impaired worldwide. From that 39 million people are blind and 246 million people are having low vision. Reading is one of the main problems faced by blind people. With the help of the Braille, most of the materials can be read by the blind. If a person learn Braille, it is easy for them to read. If they didn't learn the Braille, it is unable to read. The trouble of Braille is that a mistake in understanding will bring about perusing incorrect information and the other drawback is that the books, documents etc. have to be changed into a form of raised dots for the blind to read. In Braille format, the books and papers which are available for the blind are fairly less when compared to the vast number of books which are printed daily. To access the information in a text, a person needs a vision. A visually impaired faces many troubles such as alignment, focus, accuracy, mobility and efficiency with accessing printed text using the existing technology. Today, there are few systems such as movable bar code readers are designed to help blind in order to detect the various products that helps the visually impaired to obtain the data about their products through communication and Braille. It is observed that they are still finding it as a huge problem to move their routine and it is primary to make basic strides with the upcoming methods to assist them with living the present independent of their inability.

Reading is one of the most essential one in today's society. Getting to content reports is very troublesome for visually impaired in much of the time, for example, perusing the content. The people who are blind or who are having significant visual impairments to read printed labels and product packages will improve independent living and foster economic and social self-sufficiency. Recent developments in computer vision, digital cameras, and portable computers are making accurate to support the individuals by developing camera-based products that combines the computer vision technology with other existing commercial products such as OCR systems. Learners with visual impairment face troubles in perusing and taking the book content, which needs a perfect examining. It achieves great scholastic execution when set in organizations. It is likewise discovered that in the field of preparing and business, the blind are discovering hard to persevere.

II. RELATED WORK

Identifying and locating object is the need for mobility of blind people by travel assistance and aid to navigation. Smart reader is developed as an efficient system for visionless people. The OCR (Optical Character Recognition) is used which has the functions of MATLAB for converting image to text [1]. A wearable visual aid for visionless people was used, in which the language commands are received from the people who created. Its usefulness tends to the distinguishing proof of obstacles and sign sheets. This encourages them to oversee everyday things and to explore through surroundings [2]. Raspberry Pi is the principle focus for the usage, since it gives an interface between camera, sensors, and picture handling results, and furthermore performs capacities to control the secondary units [4]. A camera based structure is worked with respect to the Raspberry Pi, which is converged with Image processing calculations, OCR and TTS synthesis element. The printed content picture is caught by the camera module and it is then exposed to pre-process before being encouraged into the OCR [3]. OCR is utilized with the goal that the visually

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impaired can tune in to the content which was proposed to be perused. To see objects and for subtitling them, the highlights are extricated utilizing the Histogram of Oriented Gradients and the grouping and naming of the article is finished by utilizing K-Nearest Neighbor classifier [6]. Reading is one of the main problems faced by the blind. Written text is a form of data which is not an accessible method for the blind but it is shown in Braille [10].The image recognition work was performed by utilizing a smart phone application ran by the artificial intelligence [11]. The tasks of collision and object detection uses ultrasonic sensors to give awareness to the blind about the obstacles exist in the way [7]. An approach is utilized to extricate and perceive content from image by utilizing PC vision innovation and is utilized to change over the perceived content into articulation so it tends to be joined with equipment to improve Electronic travel help for vision less people in future [8]. A blind can read document only by beating words which is then clearly accessible through text to speech engine [9].

III. METHODOLOGY

The proposed work enables the visually impaired to overhear the text image details instead of reading them. This is a smart device which assists the people to read the paper printed text effectively and efficiently. It uses the methodology in which the camera based assistive device is used by the visually impaired to read the text document. The Proposed system consists of Pi camera, audio microphone, ultrasonic sensor, Raspberry pi, headphone for voice and vibration motor. In order to deliver the printed text document for the purpose of digitization, the Pi camera is utilized as an input device. The software module OCR engine is used for processing the scanned document. This system is employed to identify the character sequence and the line of reading. This system consists of three modules such as voice searching module, image processing module and voice-processing module. These modules are implemented by using the keyword operation search, which is in the form of voice, which is given by the user. After the keyword is received by the Raspberry pi, the pi camera will capture the image according to the given keyword. It integrates OCR and TTS concepts. It includes the image text extraction and transforms the text into speech; this allows the blind people to read the text easily.

OCR is a process in which the system is associating with a symbolic meaning with letters, symbols and numbers with the character image. It is the method of transforming the machine printed scanned images into the process the computer process. OCR is utilized to digitize and recreate the writings that have been made with non-computerized framework.

The Proposed system comprises of a webcam interfaced with raspberry pi which gets the printed text pages. The Raspberry Pi coding is performed through PYTHON language. The camera captured image is then transformed into text. Raspberry pi contains the audio port in which the headphone or the speaker is used for hearing the output. After transforming the image into text, the raspberry pi acquires few milliseconds in order to transform the text as a voice or audio output. Depending on the user's choice, the final identified text document is given to the output. The headphone and the Raspberry pi are linked to the board or a speaker in order to spell the text document loudly without the help of others.

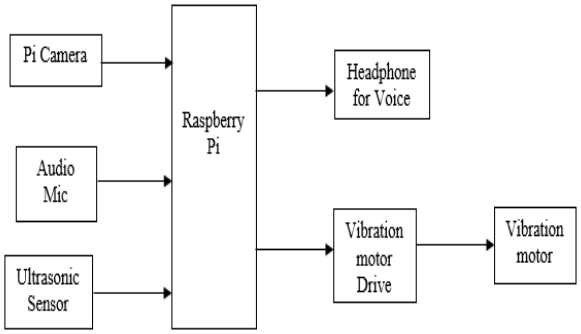

Fig.1.Block diagram

IV. RESULTS AND DISCUSSIONS

This system performs four techniques: Image Capturing, Pre-Processing, Segmentation and Image to Text converter. The flow of process is given as follows.

A. Image Capturing

In Image Capturing, if the keyword is given by the user, the system is conveyed over the printed page and the text image is captured by the pi camera. The captured image will be high quality and the perfect recognition, this is due to the high resolution camera.

B. Pre-Processing

In Pre-processing, it involves three steps, they are

- Noise removal
- Linearization
- Skew Correction.

The confined image is examined for skewing.

C. Segmentation

After the pre-processing stage takes place, the image without noise is handled to the segmentation phase. It is a method that accompanies an image to partition into sub-images. The binarized image is then checked for inter line spaces.

D. Image to Text Converter

After the extraction process takes place, the ASCII values of the characters are processed. Every characters is correlated with its corresponding template and revived it as a normalized text data. This process is further delivered to audio output by the audio jack.

From the fig.2, first the Pi camera is initialized and then the program is added to the Raspberry Pi kit. The program is in the form of Python. The program file is added to convert the text to audio. Then the Wi-Fi module is configured. After the configuration, the Application Programming Interface (API) is interfaced for the microphone interface. Then the API is interfaced for the Audio interface. If any keyword is found, it loads the API for audio search. If there is no keyword is found, it goes back to interface API for

microphone interface and then the following steps take place. If there is any keyword is found, it loads the API for the audio search. Then if the keyword is READ, it reads the book. If the keyword is BUS, it reads the bus number and bus name. After the keyword is identified, it loads the Pi camera file to capture the image. By using the OCR technique, it converts the image to text header processing. The text is converted into Audio file processing by TTS technique. Finally the audio file is interfaced with the output audio jack. Similarly, the next process takes place. By using this technique, the visually impaired can read the book and identify the bus easily.

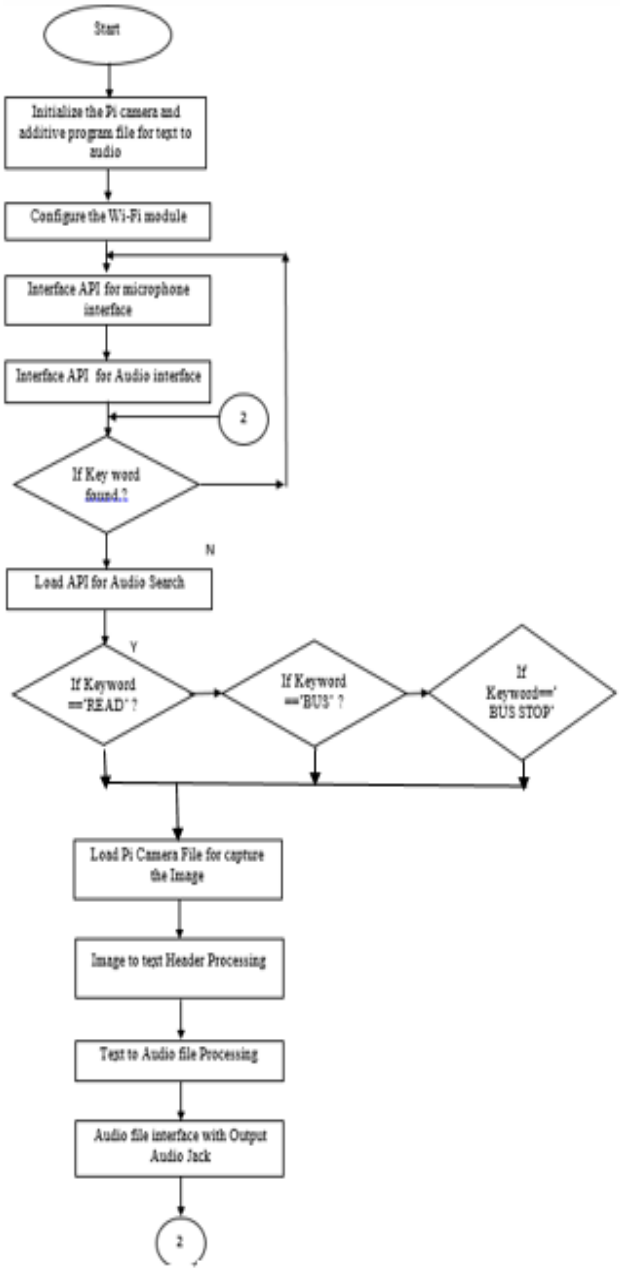

Fig.2.Flow diagram for Key Word search and Audio Processing

V. CONCLUSION

The Proposed System is a novel implementation of text to speech conversion using Raspberry pi for the visually challenged. It is a novel and real-time cost advantageous method which enables the blind to hear the text images contents rather than reading them or without the need of others. By using the Keyword search and Audio Processing algorithm, the bus name and bus number in the bus stop or bus stand for the visually impaired can be easily identified and it also helps in the obstacle avoidance by using the ultrasonic sensor and it is informed to the user by vibration sensing technique. The OCR and TTS synthesizer were actualized to extricate the content data from images and convert it into the sound.

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REFERENCES

1. Sandeep Musale, Vikram Ghiye, “Smart Reader For Visually Impaired,” IEEE Xplore International Conference on Inventive Systems and Control, June 2018.
2. Deepthi Jain B, Shwetha M Thakur and K V Suresh, “Visual Assistance for Blind using Image Processing,” IEEE International Conference on Communication and Signal Processing, April 2018.
3. Shalini Sonth, Jagadish S. Kalliman, “OCR based facilitator for the visually challenged”, International Conference on Electrical, Electronics, Communication, Computer and Optimization Techniques, Dec. 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. Pranab Gajanan Bhat, Deepak Kumar Rout, “Vision Sensory Substitution to Aid the Blind in Reading and Object Recognition,” IEEE International Conference on Image Information Processing (ICIIP), March 2018.
6. Sandesh Chinchole, Samir Patel, “Artificial Intelligence and Sensors Based Assistive System for the Visually Impaired People,” IEEE Xplore International Conference on Intelligent Sustainable Systems, Dec 2017.
7. Vikky Mohane, Chetan Gode, “Object Recognition for Blind people Using Portable Camera,” IEEE World Conference on Futuristic Trends in Research and Innovation for Social Welfare, March 2016.
8. Sonal I Shirke, Swati V Patil, “Portable Camera Based Text Reading of Objects for Blind Persons,” International Journal of Applied Engineering Research vol 13, no- 17 pp. 12995-12999,2018.
9. Akhilesh A. Panchal, Shrugal Varde, M.S. Panse, “Character Detection and Recognition System for Visually Impaired People,” IEEE International Conference On Recent Trends In Electronics Information Communication Technology, May 2016.
10. Shahed Anzarus Sabab, Md. Hamjajul Ashmafee, “Blind Reader: An Intelligent Assistant for Blind,” International Conference on Computer and Information Technology,Dec 2016.
11. Hanen abnoun, Faouzi Benzarti , Hamid Amiri, “Object Detection and Identification for Blind People in Video Scene,” IEEE Xplore International Conference on Intelligent Systems Design and Applications, Dec 2015.