International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 07 Issue: 01 | Jan 2020 www.irjet.net p-ISSN: 2395-0072

Review on Raspberry Pi Based Assistive Communication System For Blind, Dumb and Deaf Person

Rajath E S[1], Rajesh L[2], Rakshith Rao[3], Yogesh Gowda R[4], Narendra Kumar[5]

[1,2.3.4]*UG Scholar, Department of Electronics and Communication Engineering, RNS Institute of Technology, VTU, Bangalore, Karnataka, India*
[5]*Assistant Professor, Department of Electronics and Communication Engineering , RNS Institute of Technology, VTU, Bangalore, Karnataka, India*

Abstract – *Our project's main aim is to develop a device which aids blind, deaf and dumb people and also provides tracking the people with disabilities. For deaf and dumb we use sign language depicter which converts sign language into voice signal. For blind people we are developing a device which detects the characters in the image and isolate the characters and decode it. The decoded text is then converted into voice and is played through speakers. Our main challenge is to make the device portable at the same time we have to make it robust and accurate. We are designing our device in such a way that the camera captures most of the motion in accurate angles.*

Enabling GPS to the device helps in tracking the person, if he gets caught in any trouble. The use of Tesseract OCR helps in extracting texts from the images easily.

***Key Words*: Blind, Deaf, Dumb, OCR, Raspberry Pi 3, Ultrasonic sensor.**

1. INTRODUCTION

Around 37 million people in the world are blind, of which 15 million are from India. The devices which help these people are very expensive in the current market. As India is a developing country, these people cannot buy these expensive products. As Electronics and Communication engineers it is our duty to build a device which helps the people in need with low cost. Instead of different devices for different disabilities, we are trying to integrate different features in a single device. As the the number of features increases, the difficulty to design and implement also increases. Here we are trying to develop a device which is simple for portability, a the same time robust to work in different environments.

Here we capture the image using the camera, compress it without changing the details, preprocess it and then process it using Tesseract OCR, hence converting the text in the image to voice signal. The sign language is based on the movement of hands and body. The hand movement is detected based on the motion based images, in other words video. The received data is then processed and is compared with the predefined data and the decision is made based on compared results.

Dumb people communicate with other people using sign language, which is difficult to understand by normal people. When a dumb person communicates with blind, the resulted text is converted to audio signal and then it is played through speakers. The GPS module helps to track the movement of the disabled people and to help them when they are in trouble. Ultrasonic sensors are used to detect the obstacles and alarm the user. E-speak software is used to output the audio signal. By using microcontrollers we are trying to reduce the cost of the device. We have defined the necessary steps required to implement our project.

2. Literature Review

1. Portable Camera Based Assistive Text and Product Label Reading from Hand-Held Objects for Blind Persons by Chucai Yi, Yingli Tian, Aries Arditi (2007)

In this paper, the portability of device, use of OCR, Image Acquisition are studied. This paper talks about how to get a part of the image containing the text from the complex background using Gaussian Filters. It uses motion based techniques to solve the aiming problem for blind users by their shaking the object which is of our intrest for a brief period. It uses an algorithm of automatic text localization to extract text region from complex background and multiple text patterns. The captured video is processed and is run through our program to extract the desired parts of the text, later the text is extracted from the isolated part.

2. Embedded Sign Language Interpreter System for Deaf and Dumb People by Geethu.G.Nath, Anu.VS (2017)

In this paper, the study of different techniques to interpret the sign language are discussed and the optimum and efficient way is defined. This paper also talks about the speech to text conversion and displaying the same on a screen to aid deaf people. The author uses the concept of image acquisition, image segmentation, preprocessing the image. This uses motion based recognition of the sign meaning. This gives the better way of converting the sign language to text and then to speech.

3. A Novel Approach as an Aid for Blind, and Dumb people by Rajapandian .B, Harini .V, Raksha .D, Sangeetha .V (2017)

This paper talks about the integration of different techniques on a single processor to aid specially abled people simultaneously. Best suited for finger spell sign language. It uses Raspberry Pi 3 and Open CV for controlling the Device. Designing efficient device to work in different environments.

4. Document Segmentation and language translation using Tesseract OCR by Sahil Thakare, Ajay Kamble, Vishal Thengene, U.R. Kamble (2015)

In this paper, Tesseract OCR Algorithm for character recognition from a captured image. The Tesseract OCR uses SVM[System Vector Machine] and KNN[K nearest Neighbor] algorithm. The algorithm can be run on computational devices like Raspberry Pi kits using Open CV Operating System. This paper talks about the various libraries present in the Tesseract OCR. The codes are written in the form of Python Scripts to work in this OCR.

5. Bluetooth Communication using a Touchscreen Interface with a Raspberry Pi by Gopinath Shanmuga Sundaram, Banu Prasad Patibandala, Harish Santhanam (2013).

In this paper, it talks about different models of Raspberry Pi board and helps in selecting the best device. Explains interfacing different hardware components like Bluetooth, Wi-Fi module and external storage with the Raspberry Pi. The GPU provides usage of H.264 at 40M bits/s. Explains how to interface different LED modules like PWR, FDR, LNK and LOM LED's.

Fig – 1: Raspberry Pi 3 kit

6. Vehicle Theft Tracking, Detecting and Locking System using Open CV by S. Mohanasundaram, V.Krishnan, V. Madhubala (2019)

In this paper, it talks about the Open CV Library Python Open CV (Open Source Computer Vision Learning) it helps in solving recognition problems. It can be used in GPS and GSM model. It helps in detection and tracking the person and explains how to recognize and solve the problems.

7. Audio Guidance System For Blind By Madura Gharat, Rizwan Patanwala, Adithi Ganaparthi(2017)

In this paper, the audio guidance for blind people walking along streets he may come across disturbances. To face disturbances we normally using a blind sticks for blinds and one more method is white cane which is also effective device for blinds to walk freely along the streets without any disturbances. The ultrasonic technology of avoiding these kind of disturbances is by the use of ultrasonic sensors. In this technique ultrasonic sensor will sends the invisible laser radiations, If any disturbance founded in a direction of laser radiation the radiations will gets reflected back to the matching sensor present in the ultrasonic technology. By this way we can avoid the disturbances faced by blind people. Here we use ultrasonic sensor is interfaced with a inbuilt embedded kit for converting sensed radiations into voice commands. Saying that path encountered by an object.

Fig – 2: Ultrasonic Sensor

8. Comprehensive SVM based Indian Sign Language Recognition by Revanth K, Madhava Raja N(2017)

This paper talks about sign language recognition using machine learning. It uses Support Vector Machine for fast computation and better decision making. Skin masking is done by eliminating the background using Open CV packages. Feature extraction is done by Oriented FAST and rotated BRIEF (ORD). It uses clustering of the data with same similarities in signs. K nearest neighbor algorithm with weight of k value 150 is used for better efficiency. Different classifications algorithms are used and the results obtained are compared with each other and optimal solution is choosen. SKlearn module in python contains required functions.

9. Smart Walking Stick For Blind Integrated With SOS Navigation System by Savrav Mohapartha, Subham Ront, Varun Tripathi, Tanish Saxena(2018)

This paper describes about working of ultrasonic sensor interfaced embedded inbuilt blinds stick. And decisionare made based on the sensed data. It uses Ultrasonic sensors ranging 20cm-350cm, which can be programmed as per required. It tells us about how to interface and program the interfacing camera and Ultrasonic sensor. The operation performed on the command given by the push button. GPS tracking is done with the help of Volley, a Hyper Text Transfer Protocol library is used for networking in Android applications, which gives a JOSN array request, which is request for retrieving JOSN Array.

10. An Assistive Device For Deaf And Hearing Impaired by Md. Sadad Mahumud, Md. Saniat, Rahman Zishan(2017)

This paper talks about easy way to help deaf or hearing impaired people using a microphone, led display and a controlling unit [Microcontroller/Arduino]. The converted text signal is displayed on the led module. Voice authorization can be provided by developing a mobile app and communicated with the application using Bluetooth . As it is a just microcontroller based, hacking is very difficult. The portability is improved by reducing the size of the product, which is as small as a wrist watch.

11. Automatic Image-To-Text-To-Voice Conversion For Interactively Locating Objects In Home Environments by Nikolos Bourbakis (2018)

The above paper says about the conversion of image to text and text sentences to voice commands by a method called common representation model. This model will deals with the conversion of captured image to text sentences. And also image is converted to a global graphs. The image and text sentences conversion into speech is done by using existing commercial tool (Bell Labs).

12. Filtering of Gaussian filter based embedded enhancement technique for compressively sensed images by Sugnesh V, Florence Gnana Poovathy J, Radha S.

This paper uses Compressed Sensing (CS), which is a algorithm which converts image into degraded version and the signal can be recovered back. This provides efficient way of degrading the original image to small size without affecting the details of the image. Here the images are degraded to small size and are computated and converted back to normal image. This paper proposes an embedded image enhancement technique by compressing and reconstructing back the image with PSNR of 1dB. It has special algorithms which takes less time for computation, hence less computational time. Later edge detection is done based on the variation in brightness levels.

3. CONCLUSION

After reviewing a handful of papers, we came to a conclusion that a single device can be developed for aiding blind, deaf and dumb people. The sensors and the output devices can be interfaced easily by using their standard procedure. Tesseract OCR and Open CV modules helps in better localization of text in image. GPS tracking can be implemented by using GPS model and communicated with JSON. Based on the results of above papers we can develop a robust and accurate device.

REFERENCES

[1] Chucai Yi, Yingli Tian, Aries Arditi (2007) "Portable Camera Based Assistive Text and Product Label Reading from Hand-Held Objects for Blind Persons".

[2] Geethu.G.Nath, Anu.VS (2017) "Embedded Sign Language Interpreter System for Deaf and Dumb People", International Conference on Innovations in information Embedded and Communication Systems (ICIIECS).

[3] Rajapandian .B, Harini .V, Raksha .D, Sangeetha .V (2017) "A Novel Approach as an Aid for Blind, and Dumb people" , IEEE 3rd International Conference on Sensing, Signal Processing and Security (ICSSS).

[4] Sahil Thakare, Ajay Kamble, Vishal Thengene, U.R. Kamble (2018) "Document Segmentation and language translation using Tesseract OCR", IEEE 13th International Conference on Industrial and Information Systems (ICIIS).

[5] Gopinath Shanmuga Sundaram, Banu Prasad Patibandala, Harish Santhanam (2013) "Bluetooth Communication using a Touchscreen Interface with a Raspberry Pi".

[6] S. Mohanasundaram, V.Krishnan, V. Madhubala (2019) "Vehicle Theft Tracking, Detecting and Locking System using Open CV", 5th International Conference on Advanced Computing and Communication Systems(ICACCS) .

[7] Madura Gharat, Rizwan Patanwala, Adithi Ganaparthi(2017) "Audio Guidance System For Blind" .

[8] Revanth K, Madhava Raja N(2017) "Comprehensive SVM based Indian Sign Language Recognition", International Conference on Systems Computation Automation and Networking 2017.

[9] Savrav Mohapartha, Subham Ront, Varun Tripathi, Tanish Saxena(2018) "Smart Walking Stick For Blind Integrated With SOS Navigation System" ,2nd International Conference on Trends in Electronics and Informatics (ICOEI 2018).

[10] Md. Sadad Mahumud, Md. Saniat, Rahman Zishan(2017) "An Assistive Device For Deaf And Hearing Impaired" 4th International Conference on Advances in Electrical Engineering (ICAEE).

[11] Nikolos Bourbakis (2008) "Automatic Image-To-Text-To-Voice Conversion For Interactively Locating Objects In Home Environments"20th IEEE International Conference on Tools with Artificial Intelligence.

[12] Sugnesh V, Florence Gnana Poovathy J, Radha S(2016) "Filtering of Gaussian filter based embedded enhancement technique for compressively sensed images" IEEE WiSPNET 2016 conference.