IOT based Smart-Multi assistive device for visual, hearing and vocal impaired people.

P Revati [1]
BE 8th sem ,Department of Computer Science and Engineering
RYMEC, Ballari,
Visveswaraya Technological University

Raharshitha B[2]
BE 8th sem ,Department of Computer Science and Engineering
RYMEC, Ballari,
Visveswaraya Technological University

Ruchitha Yadav J S[3]
BE 8th sem ,Department of Computer Science and Engineering
RYMEC, Ballari,
Visveswaraya Technological University

Saigeetha[4]
BE 8th sem ,Department of Computer Science and Engineering
RYMEC, Ballari,
Visveswaraya Technological University

Roshan D[5]
Assistant Professor ,
Department of Computer Science and Engineering
RYMEC, Ballari,
Visveswaraya Technological University

***Abstract*— Solving the problems of People with Visual, Hearing and Vocal Impairment through a single aiding system is a difficult task. Many recent researches focus on addressing the issues of one of the above challenges, but not all. The present work focuses on identifying a unique technique that aids the visually impaired by letting them hear what is represented as text, and it is achieved by the technique that captures the picture through a camera and converts the text available as voice signals. The present work provides a way for the people with deaf to visualize or read which is in audio form by speech to text conversion technique, and we also provide a way for the dumb to represent their sign language by the aid of sign to text conversion technique, and for the blind person colour detection method is implemented so colour image can be captured and output will be generated in the form of voice and text. All these four functions were modulated to be in a single unique system. All these five functions are coordinated with the use of Raspberry Pi. The blind people are helped by the process in which the image to text and text to speech is given by the Tesseract OCR(online character recognition) and colour detection method. The deaf people can read the text which displays on the screen using app which makes them to understand what the person says can be displayed as the message. Dumb people can convey their message by sign so the other people can read the text message on a screen.**

Keywords—Tesseract, Python, Espeak, Noobs, OpenCV.

I.INTRODUCTION

One of the most precious gifts to a human being is an ability to see, listen, speak and respond according to the situations. But there are some unfortunate ones who are deprived of this. Communication between deaf-dumb and normal person has been always a challenging task. The proposed device is an innovative communication system framework in a single compact device. We provide a technique for a blind person to read a text and it can be achieved by capturing an image through a camera which converts a text to speech. It provides a way for the deaf people to read a text by speech to text conversion technology. Also, it provides a technique for dumb people using text to voice conversion and the gestures made by them can be converted to text. In resolving the difficulties with visually and vocally impaired people we have used the tiny credit card sized computer named raspberry pi. The proposed system consists of input – microphone to record voice modulation, camera to capture an image, keyboard to type a message and output – speaker and device screen to display the texts and the images. The user can give reply as a text message and the device does text to speech conversion. The output is obtained from an earphone. The image is captured through the camera and the reading of a text can be achieved by text to speech conversion. Then the device does speech to text conversion and displays it on the device screen, based on what the normal person conveys. It takes inputs from the microphone.

II. MOTIVATION

In our society we have people with disabilities. Visual impaired people can read documents only in Braille Script. The technology is developing day by day but no significant developments are undertaken for the betterment of these disabled people. About 900 crores people in the world are deaf and dumb Communications between deaf-mute and a normal person have always been a challenging task. Sign language helps hearing and vocal impaired people to communicate with other people. But not all people understand sign language. In order to overcome these problems ,we are undergoing the IOT based smart multi-assistive device for visual, hearing and vocal impaired people.

III. BACKGROUND AND RELATED WORK

In this paper to propose a new system-prototype in an effort to make the process of interaction between the Blind, Deaf and Dumb people much easier. This will make use of the Portable Technology and Arduino Circuit Boards to provide a means of communication to differently-abled people having one or all of the above mention disabilities [1]. In this paper we have proposed a method based on hand gesture recognition to recognize the different gesture used by deaf person to communicate using scale invariant feature transform algorithm. This will make a bridge between deaf and dumb people and normal public. In earlier system the uses of color markers and gloves for gesture recognition has been used but it resulted in delay in processing time and sometimes inconvenient for the user. This system will focus on hand gesture recognition and development of human computer interface system which will achieve accuracy, real time implementation of gesture processing and reduced processing time

[2]. In this paper the solution is rather simple, introduce a smart device with a multimodal system that can convert any document to the interpreted form to a blind. A blind can read document only by tapping words which is then audibly presented through text to speech engine. “Blind Reader” – developed for touch devices which is user friendly and effective interactive system for visionless or low vision people [3]. This paper presents a vision-based approach where continuous sequence of frames of dynamic hand gestures have been taken. Pre-processing, Segmentation, Feature Extraction and Classification these four are main steps to recognize the dynamic hand gestures. After that, dual way communication is performed. First the recognized gesture has converted into text message and voice format, so that the normal person can understand it. Second, voice has converted into text message and its corresponding gesture, so that physically impaired humans can understand it. This can break a barrier between deaf-dumb and normal people [4].

IV. SYSTEM ARCHITECTURE

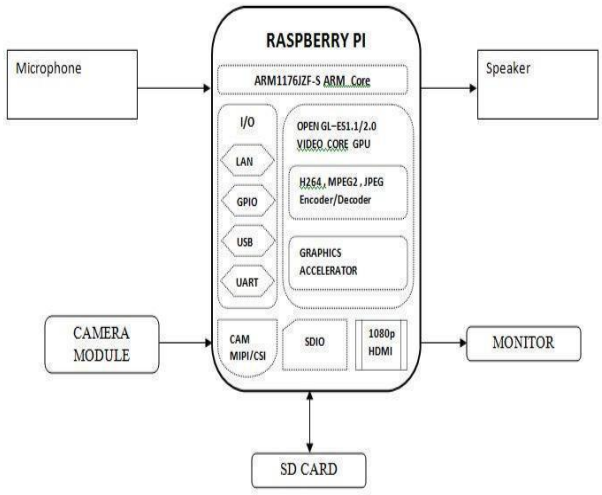

Figure 4.1: Architecture of the system

A system architecture is a comprehensive solution based on principles, concepts and properties logically related and consistent with each other. And it is a conceptual, global, and focused to achieve the mission and life cycle concepts of the system.

The figure 4.1 shows a general block diagram describing the activities performed by this project.

V. IMPLEMENTATION

The project is divided into 5 different Modules
1.Text-to-speech (TTS)
2.Image-to-speech using camera (ITSE)
3.Gesture-to-speech (GTS)
4.Speech-to-text (STT)
5.Color-detection-method (CDM)

Module Description
1.Text-to-speech (TTS) algorithm:
Step1: Start.
Step2: Choose option 1 to convert text to voice.
Step3: Call the function Text-to-speech ().
Step4: Convert text to speech using e-speak synthesizer.
Step5: Voice is generated.
Step6: stop.

2.Image-to-speech using camera (ITSC) algorithm:
Step1: Start.
Step2: Choose option 2 to convert image to speech.
Step3: Call the function image-to-speech ().
Step4: Capture the required image.
Step5: Convert image to text using tesseract OCR.
Step6: Split the text into paragraph.
Step7: Text is displayed on the screen.
Step8: Next, call Text to speech () function. Step9: Convert text to speech using e-speak synthesizer.
Step10; Voice is generated.
Step11: Stop.

3.Gesture-to-text (GTT) algorithm:
Step1: Start.
Step2: Choose the option 3 to convert gesture-to-text.

4.Speech-to-text (STT) algorithm:
Step1: Start.
Step2: Choose option 4 for speech-to-text conversion.
Step3: Call the function speech-to-text ().
Step4: open chromium browser and connect to the website speechtexter.com
Step5: Select any universal language.
Step6: speak now, by turning on microphone.
Step7: Check, if the voice is perfect.
7.1: clear the screen.
7.2: The text is displayed.
Step8: Recognize it as error and resend the voice, go to step4.
Step9: Execute the above steps, recursively, until correct output is obtained. Step10: stop.

5.Colour-detection-method (CDM) algorithm:
Step1: start.
Step2: choose option 5 convert image color to speech.
Step3: call the function logic.
Step4: capture the required image.
Step5: color name is displayed on the screen.
Step6: Next, call the text-to-speech () function.
Step7: Convert text-to-speech using e-speak synthesizer.
Step8: voice is generated.
Step9: Stop.

VI. RESULTS AND DISCUSSION

5.1 Text-to-speech (TTS)

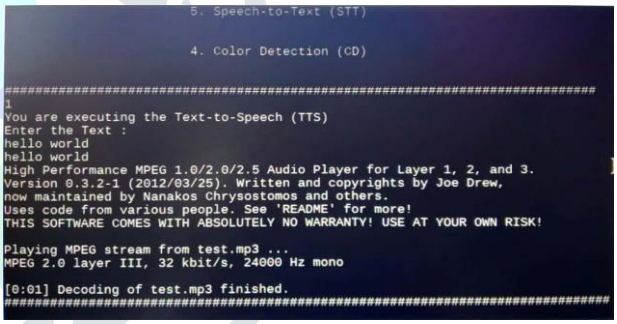

Figure 5.1.1 Text-to-Speech

The first process Figure 5.1.1 text to speech conversion is done for the dumb masses who cannot speak. The Dumb people convert their thoughts to text which could be transferred to a voice signal. The converted voice signal is spoken out by e-speak synthesizer. After selecting the option OP1 the OS and sub process imported. Call text to speech function and enter the text as input. After entering the text from keyboard, the e-speak synthesizer converts text to speech. The process also provided with the keyboard interrupt ctrl+C.

5.2 Image-to-speech using camera (ITSC)

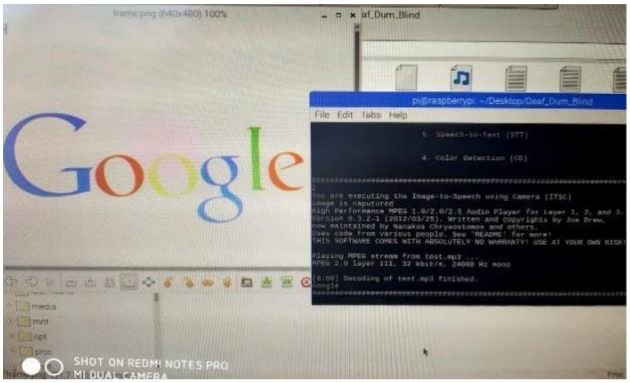

Figure 5.2.1 image-to-speech

The second process is developed for blind people who cannot read normal text. In order to help blind people, we have interfaced the Logitech camera to capture the image by using OPENCV tool. The captured image is converted to text using Tesseract OCR and save the text to file out.txt. Open the text file and split the paragraph into sentences and save it. In OCR, the adaptive thresholding techniques are used to change the image into binary images and they are transferred to character outlines. The converted text is read out by the e-speak.

5.3 Gesture-to-text (GTT): -

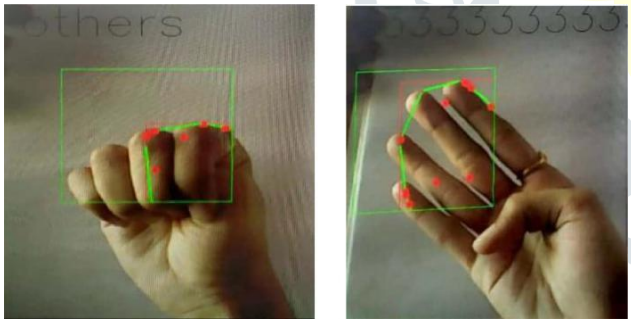

Figure 5.3.1 gesture to text

The third process is developed for the vocally impaired people who cannot exchange the thoughts to the normal people. Dumb people.
Figure 5.3.1 uses gesture to communicate with normal people which are majorly not understandable by normal people. The process starts with the capturing of image and crops the useful portion. Count the number of angles which is less than 90 degree which gives the number of defects. According to the number of defects, the text is printed on display on the screen.

5.4 Speech-to-text (STT)

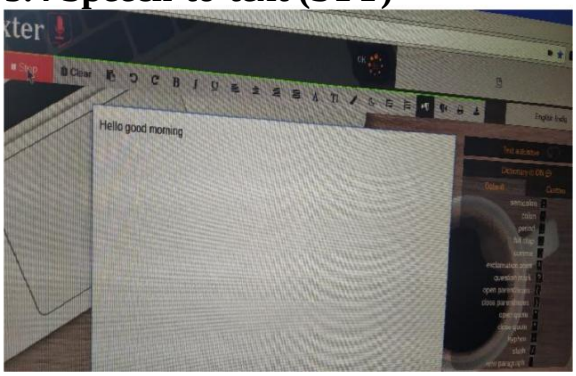

Figure 5.4.1 Speech to Text

The fourth process Figure 5.4.1 developed for the hearing impairment, people who cannot understand the words of normal people. In order to help them, our project is provided with a switch which is used to convert the voice of the normal people text. We have used a chromium browser which is automatically connected to URL speechtexter.com. The process is performed by assigning a minimum threshold voltage to recognize the voice signal. The input is given through a microphone which is converted into a text format. The URL supports a variety of languages. If the voice signal recognizable it will print the text else it gives the error signal.

5.5 Color detection method (CDM)

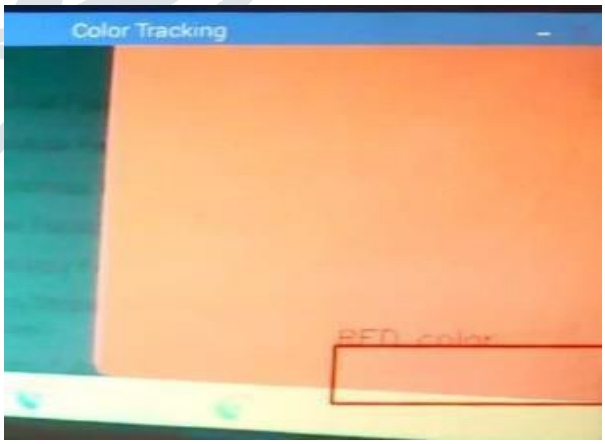

Figure 5.5.1 Color detection

The fifth process Figure 5.5.1 color detection method which captures color image through a camera and generates output in the form of voice and text.

VII. CONCULSION AND FUTURE WORK

This project aims to lower the communication gap between the deaf or mute community and the normal world, help them to lead standard lifestyle. The device is used to convert text/image to voice for blind, speech to text conversion for deaf and conversion of hand gestures to text for dumb people. We have designed the prototype model for blind, deaf and dumb people into a single compact device. The advantage of this device is that it can be easily carried (portable) due to its less weight and size. The device can be used as smart assistant for differently abled people to communicate with others and it is a language independent system. ***Future work*** **:** There can be number of future advancements that can be associated with this project work and some of which are described as follows:

- The system can be further expanded for the alphabets, numbers in gesture control.
- The input can be also taken in the form of videos and they are divided into frames and then it is converted into text.
  And can also add grammatical structure for sign language.
- The system can be made handy by incorporating it into a mobile phone.
- We can produce a product for blind people that converts the information in any hand-written notes, newspaper or books into a audio signal that these people can here.

REFERENCES

[1]. A novel approach as an AID for blind, deaf and dumb people. B. Rajapandian; V. Harini; D. Raksha; V. Sangeetha 2017 Third International Conference on Sensing, Signal Processing and Security (ICSSS) Year: 2017.

[2]. Bhavina P a t e l , Vandana S h a h , R a v i n d r k S h i r s a g a r , " Microcontroller B a s e d gesture Recoginition System for the Handicap People"in Dec-2011.

[3]. Chucai Yi, Student Member, IEEE, Yingli Tian, Senior Member, IEEE, and Aries Arditi "Portable Camera-Based Assistive Text and Product Label Reading v Hand-Held Objects for Blind Persons" 2013 IEEE.

[4]. Surbhi Rathi, Ujwalla Gawande, Development of Full Duplex Intelligent Communication System for Deaf and Dumb People, 978-1-5090-3519-9/17/$31.00_c 2017IEEE