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PI-BOT FOR PERSONAL ASSISTANCE

[1]Roshan Melanta, [2]Siddhesh Naik, [3]Mayuresh Patole, [4]Prof.S.R.Jajoo
Department of Electronic Engineering Datta Meghe College of Engineering Airoli, Mumbai

ABSTRACT

Addressing the issues of People with Visual, Hearing and Vocal Impairment through a single aiding system is a tough job. Many modern-day types of research focus on addressing the issues of one of the above challenges but not all. The work focuses on finding 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 theimage through a camera and converts the text available as voice signals. The paper provides a way for the people with Hearing impairment to visualize / read which is in audio form by speech to text conversion technique and we also provide a way forthe vocally impaired to represent their voice by the aid of text to voice conversion technique. All these three solutions were modulated to be in a single unique system. All these activities are coordinated with the use of Raspberry Pi. The visually impaired 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). The deaf people help with the process of an app which makes them to understand what the person says can be displayed as the message. Vocally impaired people can convey their message by text so the other persons can hear the message in aspeaker.

Terms-RaspberryPi3,Python,TesseractOpticalChar-acterRecognitionOCR,GoogleAssistant,Espeak.

INTRODUCTION

The Google Assistant Library for Python is a turnkey solu- tion for anyone who wants to quickly integrate the Assistant into a prototype device. Raspberry Pi's multimedia capabilities are used to host an image to speech audio broadcast service. The project enables to understand the content of an image. It quickly classifies images into thousands of categories, detect individual objects and faces within images, and finds and readsprintedwordscontainedwithinimages.Theinputimages taken in previous works have no complex background, i.e. the test inputs are printed on a plain white sheet. It is easy to convert such images to text without pre-processing, but such an approach will not be useful in a real-time system. For our project, we wanted the device to be able to detect the textfrom any complex background and read it efficiently. Inspired by the methodology used by Apps such as "CamScanner", we assumed complex background. The image is processed by the OCR and TTS to give audio output. The device we have used for this is raspberrypi.

Approximately 285 million people are judged to be visually impaired worldwide in which 39 million are blind and 246 are said have low vision. Approximately 90 percent of this world's visually impaired is from the dispirited incomepeople

and 82 percent of people living with blindness aging persons and above. The numbers of people visually impaired from eye related diseases have been brought down in the past 20 years according to global estimated work. In which 80 percent of all visualrestitutioncanbepreventedorcured.Indiaisconsidered to be the home for

the world's largest act of blind people. In this world, about 37 million are blind, in which 15 million are fromIndia.

In lodge to facilitate these people will developed the assis- tive device for blind people who do not want the assistance of other neighbors. The development our project helps the multitude to experience loose and go independently. In all around the world about 9.1 billion people are deaf and mute. In their daily life they face plenty of problems on their communication. Sign language is a linguistic process which is employed for communication among the normalpeople and handicapped people. Sign language relies on sign patterns such as body language of the person and movements of the arm to facilitate the discernment between the great unwashed. The deaf and vocally impaired people don't simply have to learn the customized sign language, but the core issue is that they can communicate with the usual sort of multitude in the society. It is similarly not possible for all the masses to learn the sign language to understand whatever is said through gestures. Therefore, the communication gaps still exist between the deaf and dumb people. Dumber people can simply tilt the message by sign language which could not be understandable by other people. In resolving these difficulties with visually and vocally impaired people we have used the tiny credit card sized computer named raspberry pi. By this device we provide the solution for blind, deaf and dumb people. The dumb persons conveyed their message through text instead of sign language which is delivered via e-speak. We have provided necessary steps to resolve the problems of those masses.

LITERATURESURVEY

It proposes a camera-based assisting text reading framework to help blind persons read text labels and product packaging from hand-held objects in their daily lives. To isolate the object from cluttered backgrounds or other surrounding objects in the camera view, we first propose an efficient and effective motion-based method to define a region of interest (ROI)in the video by asking the user to shake the object.[1]

This device will be a solution for people who are challenged with speaking and/or Hearing. Its purposeis toaidcommunicationforthephysicallychallenged.[2]

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In the extracted ROI, text localization and recognition are conducted to acquire text information. To automatically localize the text regions from the object ROI, we propose a novel text localization algorithm by learning gradient features of stroke orientations and distributions of edge pixels in an Adaboost model. Text characters in the localized text regions are then binarized and recognized by off-theshelf optical character recognition software. The recognized text codes are outputtoblindusersinspeech.[3]

"Speech" and "gestures" are the expressions, which are mostly used in communication between human beings. Learning of their use begins with the first years of life. In human communication, the use of speech and gestures is completely coordinated. Machine gesture and sign language recognition is about recognition of gestures and sign language using gloves. A number of hardware techniques are used for gathering information about body positioning; typically either image-based (using cameras, moving lights etc) or device-based (using instrumented gloves, position trackers etc.),althoughhybridsarebeginningtocomeabout.[4]

Addressing the issues of People with Visual, Hearing and Vocal Impairment through a single aiding system is a tough job. Many modern day researches focus on addressing the issues of one of the above challenges but not all. The work focuses on finding 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 image through a camera and converts the text available as voicesignals.[5]

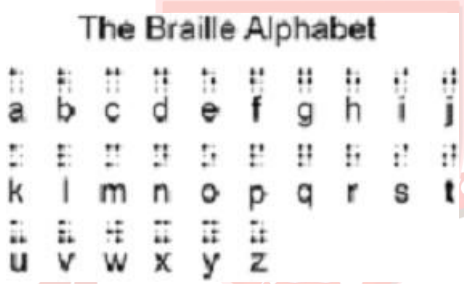
Most of these physically impaired communities are dependent on sign language translators to express their thoughts to rest of the world. This causes isolation of these people in society. Hence, Sign language recognition is one of the most growing fields of research today. A sign language is composed of various gestures formed by physical movement of body parts i.e. hand, arms or facial expressions. In this project, a method is proposed that makes the use of hand gestures for recognition of indian sign language. Hand gesture recognition system provides us an innovative, natural, user friendly way of interaction with the computer which is more familiar to the humanbeings.[6]

The system consists of a webcam interfaced with raspberry pi which accepts a page of printed text. The OCR (Optical Character Recognition) package installed in raspberry pi scans it into a digital document which is then subjected to skew correction, segmentation, before feature extraction to perform classification.Onceclassified,thetextisreadoutbyatextto

speech conversion unit (TTS engine) installed in raspberry pi. The output is fed to an audio amplifier before it is read out.[7]

EXISTINGMETHODS

Braille System :



This is a scheme which was used for 150 years, consists of one to six dots where a symbol is provided for each character so that the blind will feel the symbol made on the dots and recognizes what it is exactly. But it might result in finger injury. The appearance of the braille system is shown in the figure.

Screen Reader/Keyboard System :

It is a computer sized program which enables the blind to read what is displayed on the screen through speech. This is done using a keyboard where the arrow is controlled andthe user will hear what is displayed on screen. In the above figure the screen reader or the keyboard system is shown. It doesn't hold good for spelling certain medical terms and scientificterms.

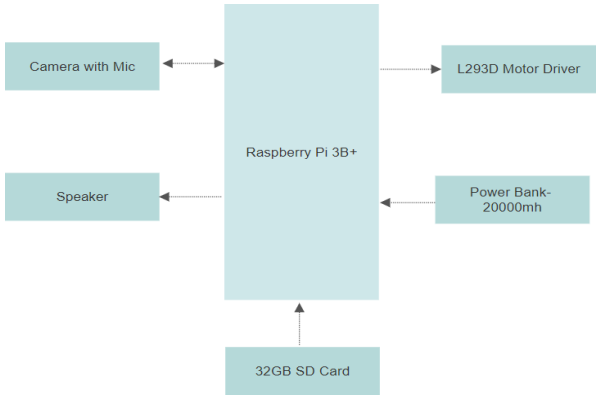
Finger Reader :

It is a ring type model that can be used for real time which is worn to the index finger. It consists of a camera that converts the text to speech. The technique of finger reader is shown in figure.The concept of optical character recognition isused in this device. Optical Character Recognition (OCR) is mechanical or electronical conversion of typed, handwritten or printed text into machine-encoded text. It widely accepts datafromanysortofdocument.

Sign Languages for Deaf and Dumb :

Earlier days, we can see the sign languages as shown in the figure.Each character is represented through a sign language translator. But these sign languages are very hard to understand for normal people and it is a difficult task for all real-time communication.

I. BLOCKDIAGRAM



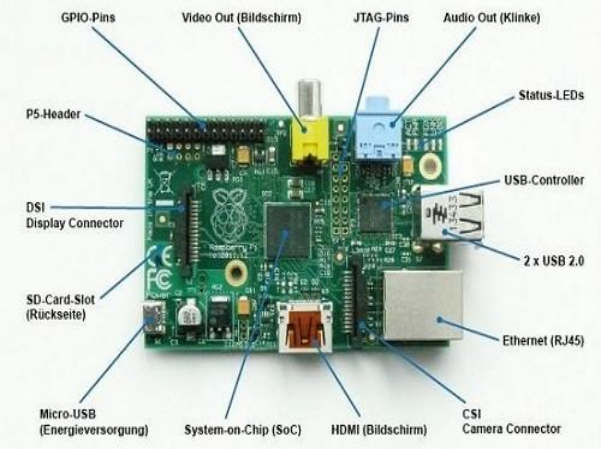
IMPLEMENTATION OF THE PROJECT

The visually impaired people can able to understand the words easily by Tesseractsoftware.The vocally impaired people can communicate their message through text which can be read out by espeak.The deaf people can able to hear others speech fromtext.

A. HARDWAREIMPLEMENTATION:

The required components are: Raspberry Pi 3b+, Camera with Mic, L293D Motor Driver, Speaker, SD Card, Power Bank (20000mh) for power supply.

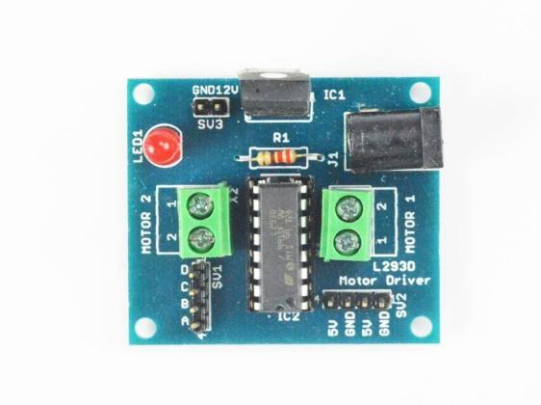
1) RASPBERRY PI 3B+: The Raspberry Pi is a bargain basement priced, credit-card sized computer which can be easily plugged into a computer monitor or TV. We utilizea standard keyboard and black eye. It is a minute device that enables people of all ages to research computing, and to learn how to program in languages like Scratch and Python. It is capable of doing everything we would expect a desktop information processing system to perform, surfing from the net and playing high-definition videos, to making databases, word-processing, and live games. Raspberry pi has the capability to intercommunicate with the exterior world, and has been used in a spacious array in digital projects, from music equipment and sensors to weather stations and chirping birdhouses with infraredcameras.



*POWER SUPPLY::*We need to provide a portable power supply to the Raspberry Bi board. For this we use a 20000mh power bank for the sole purpose of providing powertotheRaspberryPiboard

5) S-TEK CAMERA:: S-TEK camera is a plug and play setup and soft to apply. With this camera we will be able to use Tesseract OCR for object detection and text reading. With this camera VGA sensor the video captured appears in natural color. It has a 8MegaPixel camera with high results. Arrangement The camera selects the built in Mic with noise reduction. XVGA video recording system has a reach of about 1024*768 resolutions. It is a camera with motion detection and universal clip and has a broadband of 256 kbps for uploading. It is provided with 512 MB RAM or more and 200MB hard drive space. We can interfaces hi-speed USB to other devices for easyutiliti

*L293D MOTOR DRIVER::*L293D H-bridge driver is the most commonly used driver for Bidirectional motor driving applications. This L293D allows DC motor to drive on either direction.ItcancontrolasetoftwoDCmotorssimultaneously in any direction. It means that you can control two DC motor with a single L293D. Because it has two H-Bridge Circuit inside. The L293D can drive small and quiet big motors as well. We will use this motor driver for the operation and movement of our board. This motor driver is connected to theRaspberryPiformovementofbot.



1) *SECURE DIGITAL CARD::*In raspberry pi the required details can be stashed away in the form of SD, Mini SD, Micro SD. The storage levels depend upon the storage cards.Types of Card – SDSC (SD): 1MB to 2GB – SDHC: 4GBto32GB–SDXDupto2TB.

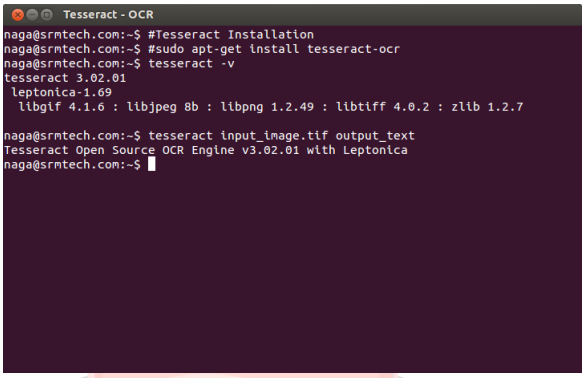
*6) SPEAKER::*With the help of a speaker the user will be able to listen to the text to speech output. Also it will

provide the output given through Espeak of Raspberry Pi and output of the Tesseract OCRdetection

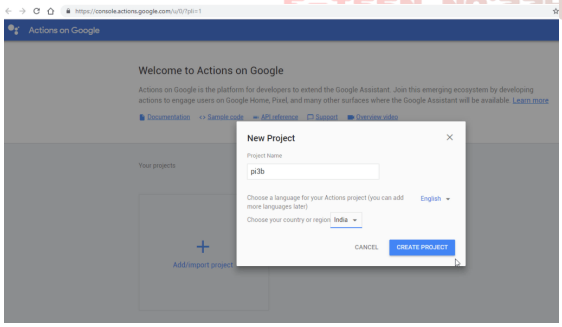
A. SOFTWAREIMPLEMENTATION

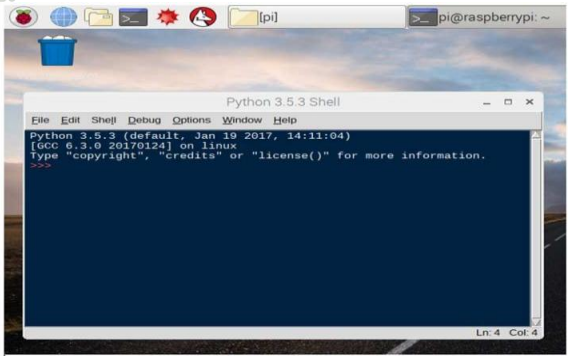
Thefollowingsoftwaresareusedinourproject:

1) TESSERACT OCR: Python-Tesseract is an optical character recognition (OCR) contrivance for python. It will be familiarized and understand the text embedded in icons. It is a binding for google's OCR. It is too functional and a stand- alone incantation script to Tesseract, as it can read all image types supported by the Python Imaging library and others, whereas Tesseract-occur by default, it ropes tiff and bmp. To boot, if practiced as a script, Python-Tesseract will print the recognized text instead of writing it to a file.Tesseract Features: 1)Page layout analysis. 2)More languages are supported.3)Improveforecastaccuracy.4)AddUI.



2) GOOGLE ASSISTANT SERVICE: Google Assistant isan artificial intelligence-powered virtual assistant developed by Google that is primarily available on mobile and smart home devices. The Google Assistant Service gives you full control over the integration with the Assistant by providing a streaming endpoint. Stream a user audio query to this endpoint toreceiveaGoogleAssistantaudioresponse.Youcangenerate bindings for this API from a variety of languages (forexample, Go, Node.js, C++, and Java) on all platforms supported by gRPC.





3) PYTHON LIBRARY: Python is a wonderful and powerful programming language that's easy to use (easy to read and write) and, with Raspberry Pi, lets you connect your project to the real world. Python syntax is very clean, with an emphasis onreadability,andusesstandardEnglishkeywords.

4) OPENCV: OpenCV (Open Source Computer Vision) is a compilation of encoding functions primarily aimed at factual-time computer vision, originally shaped by Intel research and subsequently supported by Willow Garage and now maintained by Itseez. It is the collection of cross-platform and free for use under the open source. OpenCV includes foremost changes to the C++ interface, aiming at ease, more case-safe designs, and better implementations for existing ones in terms of execution. It is used in diverse purposes

for Facial recognition system, Gesture recognition, Motion understood.

PROJECTOVERVIEW

In our task we have identified the above software which have been initially employed in the procedure before it has taken into account. Here, the visually and vocally impaired people are catered with the raspberry pi based assistive devices and the system follows three important processes for blind, deaf and dumb people. The total project is catered with the source code of Python. It is the easiest programming language to interface with the raspberry pi. The total project is run by the source code of python to assisting the blind, deaf and dumb masses in a single device which is so compact andeasyforthemtomanage.Threestagesareasfollows:

A. IMAGE TO VOICE(FORBLIND)

The first process is for the blind people,in this process, the visually impaired people have to buy some products or any wordings in the image, in order to help them, we have interfaced the Logitech camera to capture the image by openCV2. The picture which is captured is is being first converted to text by Tesseract OCR. In this OCR, they apply the adaptive thresholding techniques to change the image to binary images. And so they were transferred them to character outlines and these characters outlines were converted into speech. And the group of words forms the text and it has beenreadoutbytheespeak.

B. TEXT TO VOICE(FORDUMB)

The second process gets on for the dumb masses who cannot speak and then they convert their thoughts by text which could be transferred to voice signal. The converted voicemessageissentovertheespeak.

C. VOICE TO TEXT(FORDEAF)

The third process, we supply for the hard of hearing people who cannot learn the words of others. To help them we have used this assistive device for deaf people. This procedure is held out by assigning the minimum threshold voltage to recognize the voice signal and begin entering the voice signal through the microphone and later obtaining the signal it convertthemintomessagetootherindividuals.

CONCLUSION

By this paper, we have designed the prototype model for blind, deaf and dumb people by employing a single compact device. The important key factor of this project to facilitate these people and to fix them more confident to manage their sites by themselves. The primary advantage is that the device can be taken away easily and is of about less weight.

FUTUREWORK

To further this project can be followed out with any other advanced devices by using simple coding language to get it less complicated. The complication can be reduced by a tiny gadget which could be more useful those people in this electronicworld.

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