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Deaf - Blind Communication Using IOT

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Abstract: Deaf/Dumb and Blind people, due to their special needs, face certain issues while communicating with others in their everyday life. They have a lot of difficulties communicating in their day to day life. Sign language is the most prominent method, using which hearing and speech impaired people can interact with the other peoples. It is inconvenient for normal people and almost impossible for a blind to communicate this way. Focusing and addressing the problems faced by the differently abled people such as visually, audibly and vocally challenged, through a single device is a tough job. A lot of research has been done on each problem and solutions have been proposed separately. But not all of them are addressed together. The aim of the project is to create a single device solution in such a way that is simple, fast, accurate and cost-effective. The main purpose of the device is to make the differently abled people, feel independent confident by seeing, hearing and talking for them. The paper provides a raspberry pi based aid for blind, deaf and dumb person. The proposed device enables visually challenged people the audio to text conversion and speech synthesis is done, converting it into an text format. For the audibly challenged, the input is in form of speech taken in by the microphone and convert it into text and it will display on the LCD screen. The vocally impaired are aided by taking the input by the user as text through the built-in customized on-screen keyboard where the text is identified, text into speech conversion is done.

***Keywords*:** Deaf-Blind communication, raspberry pi, deaf-blind-dumb communication, speech to text conversion, text to speech conversion, bidirectional conversation system etc.

I. INTRODUCTION

When we encounter a deaf, blind, or dumb individual, we wonder how they would communicate with other people or with each other if they wish to converse. However, we can show that they understand some languages, such as tactile sign language, tactile fingerspelling, print on palm, tadoma, Braille, speech, and speech reading. However, persons who are not deaf, stupid, or blind do not use these approaches since they do not understand these languages. We all know that communications technology has become an integral part of our daily lives, first upgraded telephone systems took over, and then came the age of mobile communication, which makes it much easier to communicate on the go. Despite all of the advancements in the realm of telecommunications, physically disabled persons have restricted access to these technologies. So, in order to facilitate communication between deaf and blind people, or to allow deaf, blind, or stupid people to grasp their language, we are developing a text to speech or voice to text conversion module for them that is simple to use. So, in this system, we have a controller that controls the entire system, as well as a microphone that is connected to the controller, a speaker, and an LCD display. This approach is extremely useful for deaf and blind communication, as well as deaf and blind people and stupid people. Dumb people can also use this technique to speak by converting text to speech. As a result, this technique is more effective in communicating with all of these people who are disabled. The Raspberry Pi serves as the primary controller, and it is programmed in Python to control the entire system. The Thonny Python IDE is a programme that allows us to programme the Raspberry Pi in Python. We can then upload the code and the Raspberry Pi will carry out the project's operations. As a result, Deaf, blind, and stupid people will be able to communicate with one another, which is the system's primary goal.

II. LITERATUE SURVEY

1] "Literature Survey on Braille to Text Conversion for Visual and Hearing Impaired Persons," by Sruthi Ramachandran1 et al. This technology works by converting text to Braille and vice versa. Raspberry Pi, PIC16F877A microcontroller, and FPGA were used in this system. The fundamental idea is that the camera captures the raw text and delivers the image to the Raspberry Pi controller. This is then converted to Braille

text. To capture the image (which comprises of English text) with greater quality, a high resolution camera, such as a webcam, is employed. The Raspberry Pi is a good choice for image processing because it is less complicated. In order for a handicapped person to provide input, a simple connection of six push buttons is used. Both Braille to text and text to Braille data are converted using the PIC16F877A microcontroller. Xilinx impact software is used to develop and implement the conversion of basic Braille to English language using FPGA. FPGA also interfaces with a Braille keyboard and an LCD monitor. However, this approach is both complicated and pricey.

2] "Communication system for deaf and blind people," by Raj S. Mamarde and colleagues. A modular gadget that is easily accessible by blind people is built for this system. As a result, the project's foundation is the Braille language. For reading and writing, blind individuals use the Braille language. As a result, in this technology, a Braille pad is linked to a cell phone, allowing the visually challenged to use the SMS system. As an additional function, this system has a voice announcement system. Microcontroller, GSM modem, speaker, 16*2 LCD, and input pad are also included in this system. This is a fully automated system that uses very little power and has very little downtime. However, this technique has the drawback of reading SMS characters by character.

3] "Smart Glove for Blind and Deaf Blind People" by Riham AL Nazer and Nadeen Shaheen. This project builds a communication device out of small and inexpensive components that overcomes the concerns discussed above. It features a Smart-Glove that converts the braille script, which is defined as "a pattern of raised dots that can be recognized with finger sensation by blind and vision disabled people all around the world in their native languages"[1. The Smart-Glove allows blind and deaf-blind people to compose text messages by pushing properly arranged push button switches on the glove. The message is then transferred to the other mobile user through Bluetooth.The Smart Glove can also expect to receive messages via microscopic vibration motors on the glove's back, allowing the blind to sense the alphabets. One of the system's main advantages is that it does not necessitate individuals to know braille in order to engage with the blind person

4] Prof. Surendra K. Waghmare2 and Shraddha R. Ghorpade1 "A Deaf and Dumb People's Communication System" Hand gesture recognition is a smart and natural way for humans to connect with computers (HCI). Human-computer interaction (HCI) is a scientific discipline concerned with the creation of algorithms that take experimental sensed data or databases as input and produce patterns or predictions that are assumed to be aspects of the exact cause that created the data. The building of algorithms that recognise complicated patterns and make logical judgments based on incoming data is a key focus of HCI research. The building of algorithms that recognise complicated patterns and create intelligent judgments based on incoming data is a key focus of HCI research. As the usage of digital cameras in personal computers becomes more common, there is a genuine possibility to create more natural HumanComputer Interfaces that depends on human gestures. Hand gesture recognition is a branch of computer science and language technology that focuses on using mathematical methods to define human gestures. Humans can engage organically with machines without the use of mechanical instruments thanks to gesture recognition. Among the various gestures, the hand gesture is one of the most evocative and widely utilised. Hand gesture detection has a wide range of applications, from gestures to virtual reality. As a result, they offer a new technique for dumb people called artificial speaking mouth, which will be extremely valuable in communicating their ideas to others. Mute people can make hand gestures with their fingers, which will be transformed into speech so that regular people can understand them.

III. BLOCK DIAGRAM OF THE SYSTEM

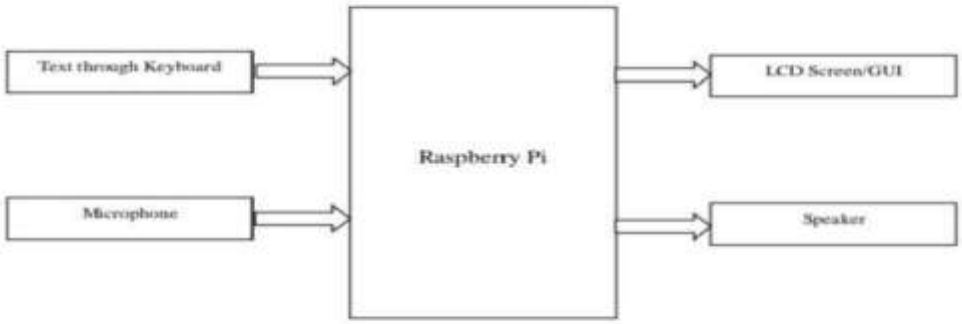

Fig 1. Block diagram of the system

This is the block diagram of the project. Following are the main parts of the projects which are explained.

Text through Keyboard: Raspberry pi has a port to connect keyboard and accordingly it is able to type the text through keyboard from Raspberry Pi. So here we can type text through keyboard on the terminal unit.

Microphone: USB Microphone is necessary for the voice recognition for the conversion. It takes voice from the user and send to the Raspberry Pi.

LCD Screen: LCD screen is used to display the message. It shows the message, which is converted by giving voice or speech by the user. We are using 16*4 LCD screen to display the long message or text on it.

Speaker: Speaker is a output device like LCD screen. It is used to listen voice which is converted from text i.e. text to voice. The voice will be able to listen by other user.

IV. HARDWARE REQUIREMENT:

A. Raspberry Pi:

The Raspberry Pi Foundation, in collaboration with Broadcom, developed a series of miniature singleboard computers (SBCs) in the United Kingdom. It's a credit-card-sized computer that connects to a computer display or television and uses keyboard and mouse as input devices. The Raspberry Pi 3 model B is used in this project; the board's characteristics are listed below.

Fig 2. Raspberry Pi

Specifications:

• Quad Core 1.2GHz Broadcom BCM2837 64bit CPU

• 1GB RAM • BCM43438 wireless LAN and Bluetooth Low Energy

• 40-pin extended GPIO

• 4 USB 2 ports •

4 Pole stereo output and composite video port

• HDMI with full size

• To connect a camera CSI camera port is available

. • DSI display port for connecting a Raspberry Pi touchscreen display

• Micro SD port for loading your operating system and storing data

• The power source for Micro USB upto 2.5 A

B. LCD Screen:

Fig 3. LCD Display 16*4

This is a basic Alphanumeric display with 16 characters and four lines. The text is white on a blue background. Uses the HD44780 parallel interface chipset, which is very common. The interface code is open source. To connect to this LCD screen, you'll need at least 6 standard I/O pins. LED backlight is included. Both 4bit and 8bit modes are supported.

C. Microphone:

Fig 4. Microphone compatible with Raspberry Pi

Using Python and a USB to audio input on the Raspberry Pi: Raspberry Pi USB Plug and Play Desktop Microphone is a USB microphone that works with any plug-and-play activated Raspberry Pi Model B+, 2 Model B, Raspberry Pi 3 as well as PC and Mac. It's ideal for video chat on Skype or sound recording. The Mic's sophisticated digital USB connection provides higher clarity while maintaining the convenience of a single USB plug and play connection. The microphone pivots on the base to maintain a desired position.

D. Speaker:

Speaker

The process of connecting a Bluetooth speaker to a Raspberry Pi is the same as attaching any other Bluetooth device. To set up your Bluetooth connection, follow the instructions below:

1. Check to see if your speaker is on and in pairing mode.

2. Go to the top-right corner of the screen and select the Bluetooth icon.

3. Select "Add Device" and navigate to your speaker.

4. If your speaker does not have a name, you may have to use its MAC address, which is a hexadecimal code, to identify it. This code is normally found on the device, and it can be found there. You should receive a notification that the pairing is successful after clicking on the speaker.

5. Now that the Raspberry Pi is connected to the speaker, the next step is to get it to output audio. It is now employed as an output device.

V. SOFTWARE REQUIREMENT:

In this we have covered the software part which we are using in our project. We are using Thonny Python IDE software which uses Raspberry Pi OS. Below we have explained Thonny IDE.

Fig 6. Thonny Python IDE

An IDE contain all the features in one software. So you can focus on writing code, which is the most important thing. The Thonny IDE will then allow you to be more productive when you write the programs of Python. Also, when you start with coding or programming, using an IDE is great because you do not have to think about all the configuration, you can just begin and learn step by step directly by programming. And the main thing is after you install Raspberry Pi OS ,then there is no extra step.

B. Espeak:

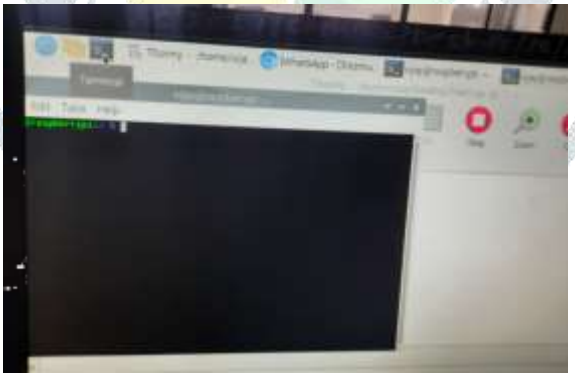

Fig 7. Espeak through terminal unit

It is a small and open source speech synthesis software which is used for convert text to voice on the platforms like Linux and Windows. The programming for espeak software is done using rules files with feedback. In this project espeak is used for the conversion of text to voice.

VI. HARDWARE DESIGN AND IMPLEMENTATION:

The Working of the project is so simple.

A. Voice to text

B. Text to voice

A. Voice to text: The first is voice or speech to text, which is useful for blind and deaf person to communicate. In which the blind person or any person can speak through microphone which is then sent to the controller that is Raspberry Pi 3 Model B here. we have written the code in Thonny IDE in Python language. The code is used to convert voice or speech into text. Then the text is display on LCD screen which able

to see by deaf person who cannot listen words but can see LCD screen and read that message. The input voice is taken from the microphone and converted here into text as a output message. This message is acceptable and understandable by the receiver.

B. Text to Voice: The second is text to voice or speech, which is helpful for deaf and especially for dumb person. Here Raspberry Pi needs internet for the conversion. Using Raspberry Pi OS on Thonny IDE, it give option for Wi-fi as this is Raspberry Pi 3 Model B which has a feature of Wi-fi Here in Thonny IDE there is Terminal unit in which the dumb or any disabled person can able to type the text or input message by using python library, that input message which is in the form of text firstly send to the Raspberry Pi controller.Then the controller convert text into voice which comes from the output as a speaker. So the blind person can able to listen on the long distance as well. But mainly this system is useful for the dumb person as he gets artificial mouth to speak.

Fig 8. Hardware implementation with pc

VII. TESTS AND RESULTS:

As we can see now in the figure given below, the user spoke “Deaf-blind communication system using IOT” and that voice or speech is converted into text as it can see on the 16*4 LCD screen “deep blind communication using iot”. So in this way the deaf person can read and understand the message which is spoken by other disabled person. But we have tobe good in the pronouncing so the controller can convert into correct text message. So this is the result when voice is converted into text.

Fig 9. Voice to text conversion

Here the terminal unit or block is used to type the text and that text is converted into voice which comes through speaker. terminal unit is opened on which the dumb person can type a message which he has to speak. By using “espeak” the user can able to type the text message. After typing the text message within espeak, suppose user type the message – espeak “How are you?” then the sound or voice “how are you” will come through speaker.

Fig 10. Text to voice conversion

VIII. CONCLUSION

Thus we conclude that this system is very useful for blind and deaf people to communicate. This system is also helpful for dumb peoples, using text to voice conversion they can able to speak. And using this system we can help many impaired person. This system is also economical which can afford by common people who are deaf, dumb or blind. So from the above study again we can do some modifications in this system which can include large number of physically or challenged people in communication system. And an impaired person will easily handle the system in the future.

REFERENCES:

1] Raj S. Mamarde1, Rasika A. Lodhi2, Rahul D. Bhor3, "Communication System For Deafblind Persons". International Journal of Engineering Research Technology (IJERT),ISSN: 2278-0181,Vol. 2 Issue 4, April – 2013.

[2] Sruthi Ramachandran1, Subashree2, Suchithra S3, Sonal B4, "Literature Survey on Braille to Text Conversion for Visual and Hearing Impaired Persons". High Technology Letters, ISSN NO : 1006-6748, Volume 26, Issue 6, 2020.

[3] Shraddha R. Ghorpade1, Prof. Surendra K. Waghmare2, "A Communication System for Deaf and Dumb People", International Journal of Science and Research (IJSR),ISSN (Online): 2319-7064, Volume 4 Issue 9, September2015.

[4] Suvarna Nandyal, Shireen Kausar, "Raspberrypi Based Assistive Communication System for Deaf, Dumb and Blind Person", International Journal of Innovative Technology and Exploring Engineering (IJITEE) ISSN: 2278-3075, Volume-8 Issue-10, August 2019.

[5] "Assistive technologies for people with disabilities" EPRS—European Parliamentary Research Service Scientific Foresight Unit (STOA) PE.

[6] Amit Gupta1 , Likitha B S2 and Venkatrao P3, "Blind, Deaf and Dumb Communicator", International Journal for Research in Applied Science Engineering Technology (IJRASET) ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 6.887 Volume 6 Issue VI, June 2018.

[7] Vernandi Dyzel 1†, Rony Oosterom-Calo1†, Mijkje Worm2 and Paula S. Sterkenburg, "Assistive Technology to Promote Communication and Social Interaction for People With Deafblindness: A Systematic Review"

[8] Apoorva Na , Gowri U Ursb , Meghana Rao Jc , Roshini Md , Prof.Syed Salim, "Hand Gesture Recognition System for Deaf and Dumb Using IOT", International Journal of Research Publication and Reviews Vol (2) Issue (7) (2021) Page 809-814.

[9] A*,Anushka Sharma, Muktak pandya, Diksha Garg "IoT based Assistive Device for Deaf, Dumb and Blind People", INTERNATIONAL CONFERENCE ON RECENT TRENDS IN ADVANCED COMPUTING 2019, ICRTAC 2019.