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COMMUNICATION MEDIUM FOR HEARING IMPAIRD USING ANDROID

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Abstract --- There are lot of deaf people who face lot of struggles and difficulties in communicating with others in daily life. Already available helping aids are not up to the mark when considering few parameters. This system proposes an approach for getting immediate attention to deaf people by vibrating their Smartphone when calling upon their name. There is also an option for speech to text conversion where they can let the other person to speak and have it displayed as a text. There is also a space given to the other person where he can input a text message and show it the user. Hearing aids are also not that efficient and not sure to work in all the cases. In an emergency this may come in handy without any other requirements. A regular Smartphone is enough which can be seen with everyone today. The input is given through the microphone which is compared with the already provided name, if match, then it vibrates for tactile intimation. The application also provides video calling feature. The user is provided with an instant speech to text conversion under the video feed similar to subtitles enabling the user to make video calls as any normal person does.

Keywords: Android, Voice Recognition, Speech-to-Text.

I. INTRODUCTION

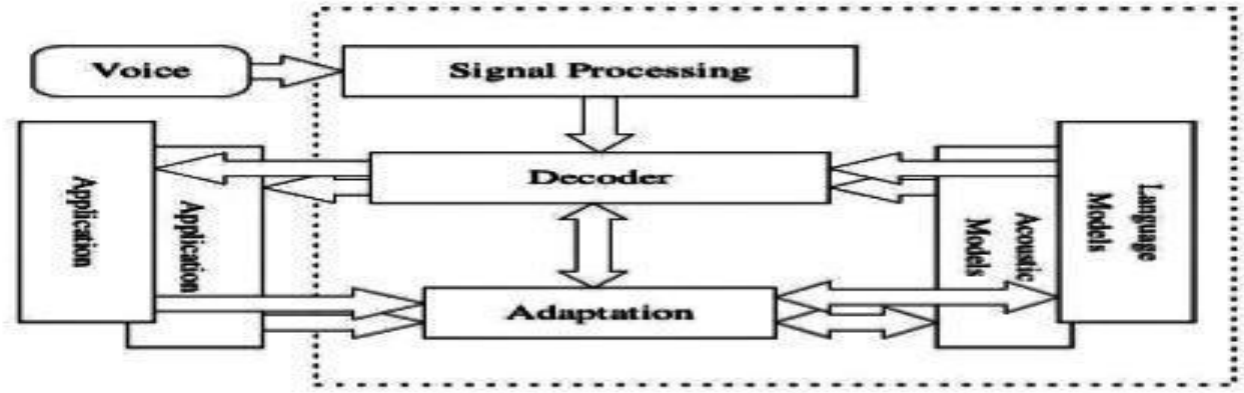
Deaf people face many challenges in their daily life for communication. There are so many causes for deaf. Nowadays, many devices are available to help deaf to improve communication, adapt to their environment, and function in society more effectively. The methods they use vary, depending on the causes of their combined vision and hearing loss, their status of literacy most probably they use hand gesture to communicate i.e. through actions. There is no common sign language, it varies for each part of the world and even among the same country. Sign language, finger spelling, paper and pen method comes in handy in some situations but not in all.

In this paper, we present a new approach which can provide benefits for deaf people with speech recognition. Communication with deaf people becomes tougher if the distance between them is more. For example, Imagine a scenario in which a normal person wants to communicate with a person having a hearing disability situated at a far distance from him ,then he won't be able to exchange his/her thoughts. By using our application it is easier for their communication if the person is away from normal person.

II. LITERATURE REVIEW

The first instrument used for hearing impairment was Hearing trumpet, and then came the Electrical hearing aid, which used vacuum tubes. Further improvement of hearing aid was brought up by the integrated circuits, making simple to users and was wearable model of hearing aid, with implementation of digital signal processing technique and programmable type ability with accordance to need of users. In [1] proposed the Android Based Hearing Aid Using Wireless Communication uses Bluetooth for short distance communication and for long distance communication they use an android based system. They employ GSM in their system so that a hearing-impaired can make phone calls to both normal and hearing-impaired people. To overcome this limitation they had used Bluetooth in their system which will kick-in while the GSM goes off. In [3] IOT Based Real Time Communication for Deaf People. The main aim of their paper is to develop an advanced method of communication for deaf people with the help of IOT.

Speech Recognition system architecture



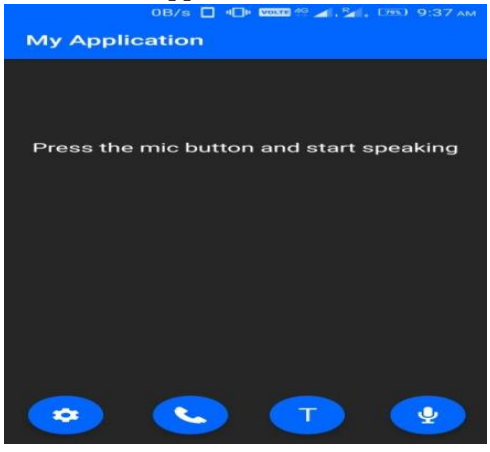
The proposed system would make good use of new technology that is based on Embedded Linux board named Raspberry Pi with an added advanced feature of converting speech to text in Real Time. Normal person will speak into raspberry pi device and it will detect the sound using speech recognition module. After that the Speech will be converted into text and sent to the deaf person's Mobile Application by using Wi-Fi, Bluetooth or Cloud Server according to the situation. In [5] Speech Recognition of Deaf and Hard of Hearing People Using Hybrid Neural Network. In their paper they use combination of SOFM and BPN neural network for recognition. Initially the input is sampled, filtered, and windowed and Perceptual Linear Predictive Coefficients are determined for each frame. These coefficients are applied as input to the SOFM neural network. The output of this network is given to BPN neural network comprising of 3 layers for learning. A hybrid neural network composed of a Kohonen map and a Perceptron is proposed for speech recognition task. The benefits of their system are speed and simplicity. Most of the hearing aid devices include speech recognition techniques.

III. IMPLEMENTATION:

i. Features of the application:-

The main purpose of this system is to create an Android application for the deaf people. Our system proposes four features for comfortable communication, they are speech-to-text, typing space, vibration feedback on someone mentioning their name and video calling with subtitles.

Application UI:-

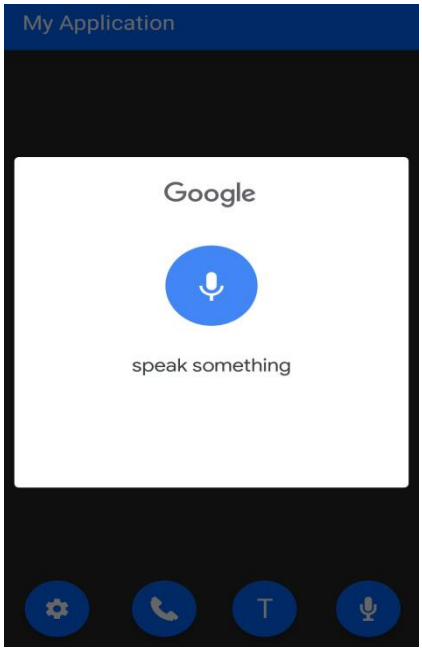


ii. Typing space

There is also a typing space given in the application which helps the other to type the text and show it to the deaf person. So the sign language is not required for the communication. There are still a lot of deaf people who don't understand sign language. A regular Smartphone is enough which can be seen with everyone today. It works all the time without internet connection

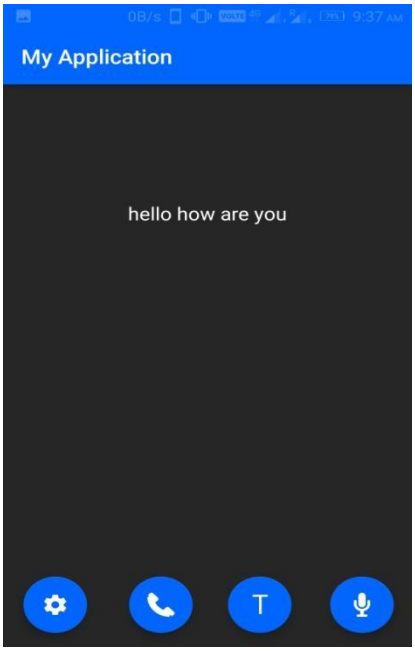
iii. Speech to text

The option is speech to text conversion where they can let the other person to speak and have it displayed as a text. In that we are using Google speech recognition API which is also called speech recognizer intent. This API is provided in the Android as a default API so the speech-to-text feature works offline. The voice input by the other person is given to the API and then it is converted and displayed as text. So the deaf people can understand what the other person is speaking. This does not require any data connection. It works fine in offline. However we need data connection for accurate results.



Input

Output



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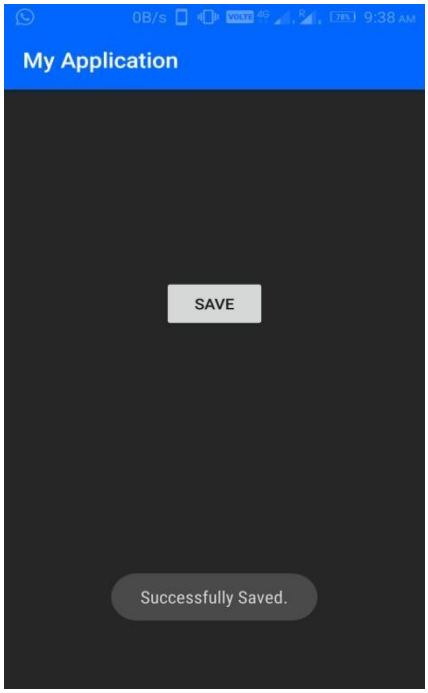
iv. Video calling

Video calling feature is included in this application. While the other user speaks it the voice is converted to text and it is displayed at the bottom of the video feed similar to subtitles. So the user can use this feature to communicate with the normal person easily without any bother. For this video calling we are using Sinch API which is provided as PaaS (Platform as a service). Sinch offers software development kits (SDKs) for Video Calling that you integrate with your mobile or web application for easily adding video calling features. Video calling is supported on ios, Android, JavaScript SDK and video calls can be placed seamlessly across the three platforms. The Sinch SDK is a cloud-based product that allows developers easily add video calling to the mobile apps.

v. Vibration

These applications have the feature that if someone calls the name of the user then it vibrates. So the user can easily identify if someone is calling behind them. The user name is saved into the application and then the input is given through the microphone which is compared with the already provided name, if match, then it vibrates for tactile intimation. For the vibration the application should run all the time in the background. For this also we are using speech to text intent API which gets the name and convert it into text and then compare it with the saved name. If the name matches with the already provided name then the mobile will vibrates.



IV. CONCLUSION

This paper describes about the implementation of the android application for deaf people. The advantage of our system is that it supports real time communication for the hearing impaired. Our application tries to reduce the difficulties in communication faced by them. Vibration feature is included in our application so that the hearing impaired people can identified if someone is calling behind them. And also our application works in the offline mode. A regular Smartphone is enough which can be seen with everyone today, they can carry anywhere. Video calling is also included for their efficient and easy communication.

V. FUTURE WORK

Perfect syncing of video and voice-to-text conversion may not be possible with the available technologies. It is believed that with rapid growth of technology in this information age and developing technologies like 5G and Quantum computing, instant voice conversion will be available in near future.

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