

SIGN LANGUAGE RECOGNITION SYSTEM

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Abstract – Assistive technologies are being developed for speech and hearing-impaired people in order to live confidently. This project work proposes a camera-based assistive gesture reading framework to help speech and hearing-impaired people to communicate with others. Here we are using sign detection using AI systems in which each sign can be easily detected (Ex: sign detection to voice command, and from voice to typing any words, etc.,) using the hand sign which is detected using a camera and sign detection is done using AI and also, we convert speech to text and display it in LCD.

Key Words: Sign, Hearing-impaired, Visually-impaired, Recognition, Dumb.

1. INTRODUCTION

In computer technology, contemporary Human-Computer Interaction (HCI) devices / techniques have become essential in an individual's daily life. It has been statistically seen that, out of the 7.4 billion people on earth, at least 285 million people are visually impaired out of which 39 million of them are completely blind i.e., have no recognition of the color black.

Ordinary people have the difficulty of speaking with disabled people (hearing and speaking impaired), since they cannot understand the sign language. Thus, many hearing-impaired people communicate using common types of sign language and do not need custom sign language. It is also difficult for others to learn sign language. We provide a system that helps normal, hearing, speaking and visually impaired to communicate effectively. We used a small credit-card-sized computer called Raspberry Pi to address these hearing, visual and speech impairments and worked to provide solutions for the blind who are also deaf.

1.1. Sign Language

American signing is taken into account because it is the most ordinarily used signing by the hearing and speaking impaired people. It can be learned so easily that is why people are going for this sign language system. ASL also includes finger spelling which is employed for showing a letter i.e. an alphabet. Some of them know the advanced signing which tells a sentence for one sign but it's tough to know them by normal people.

Finger spelling is most ordinarily used for spelling out an object which is difficult to point out them through signs. It is also used when people gets confuse on choosing which sign is used for that particular word.

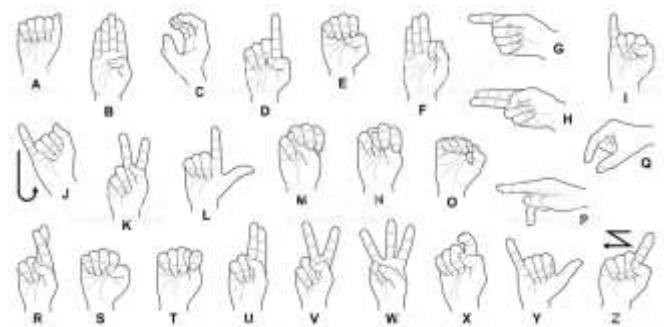


Fig.1 Signs used for English Alphabets

1.2. Methodology Used

Different types of signs that is being used by the deaf and dumb peoples are collected and then trained to the controller using Artificial Intelligence algorithms in the tensor flow developing environment.

A camera is used for giving the input signs to the controller in our case Raspberry Pi 3.

It recognizes the signs and then for the corresponding sign the output both as voice through a voice module and as text through a LCD display.

The Tensor flow is used for writing the code for respective signs which is obtained as output.

2. LITERATURE SURVEY

2.1. Existing System

The existing System uses Flex sensors to recognize gestures and Arduino is the heart of the set up. The flex sensor will give different output as they bend, this principle is used in this system. For each sign there will be corresponding output and this shown as text through the LCD.

Disadvantages

- The level of accuracy is low.
- The flex sensors will get easily damaged.

2.2. Proposed system

In our system we are using Raspberry pi 3, camera, voice output module and LCD. The Raspberry pi is considered as fast processor than the Arduino, so it will save more time while processing. Artificial Intelligence is used in this case for recognizing the signs so it gives more accuracy. The signs are recognized through the camera.

2.3. Proposed block diagram

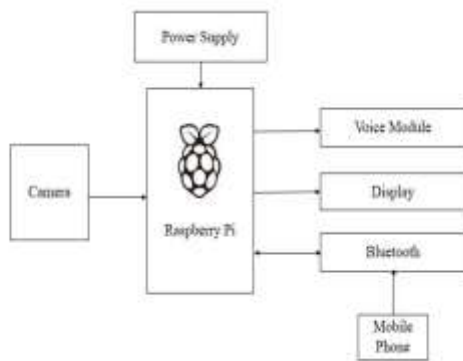


Fig.2 Block diagram of proposed system

Table -1: HARDWARE USED

S.No.	Components	Quantity
1	Raspberry Pi 3	1
2	LCD display	1
3	Camera	1
4	Voice output module	1
5	Power supply cable	1
6	Mobile Phone	1

Fig.3 Table of Hardware components

1. Raspberry Pi 3 is the controller used which is used for recognizing the signs and for giving the output. This is connected to a LCD display and a voice module through which the output is obtained. The Raspbian OS is used for operating this controller.
2. LCD (16 x 2) display is used for displaying the output as text. The sign processed in the Raspberry Pi will give output as a text to the LCD display. This

display will help the opposite person to understand what they are trying to say. For each sign there will respective text outputs which is trained using Tensor flow.

3. Camera is used for giving the input signs that has to be converted as voice and as text. It recognizes the signs and gives corresponding signals to the Raspberry Pi controller. The sign processed through this camera is converted into corresponding output as text and as voice and it will be obtained through the LCD display and voice output module.
4. The output is also obtained as voice which can be heard through this voice output module. The text which is converted is then converted into audio through the Raspberry Pi. This will be useful for the communication between a blind person and a deaf and dumb person.
5. A mobile phone with Bluetooth compatibility is used. The mobile phone is used for recording the speech which is to be converted as text. The mobile phone is connected with Raspberry Pi through the Bluetooth. The Raspberry Pi will convert the voice input into text output which is displayed through the LCD display. This will be helpful for the communication purpose between a blind person and a deaf and dumb person.

3. PROJECT DESCRIPTION



Fig.4 Hardware image of proposed system

The project consist of a controller which is Raspberry Pi 3 which does all the main function of the system in this case converting the voice into text and signs into text as well as voice. The LCD display is used for displaying the text which is converted by the controller. The speaker will give the output as voice. The camera is used for receiving the signs which gets processed through the

controller. The camera is considered as the eye of the project and Raspberry Pi as heart of the project.

3.1. Result and Output



Fig.4 Output of LCD

The output will be obtained as text as well as voice. The text output will be obtained through the LCD display and the voice output will be obtained through the speaker.

The result will be more useful for the visually-impaired as well as the hearing and speaking-impaired for the communication between them.

4. CONCLUSIONS

This project aims to develop a useful gizmo that uses gesture recognition for reducing the communication barrier between the deaf and dumb community and also the normal people. This project was meant to be a prototype for checking the feasibility of recognizing gestures using image processing. Using the designed project it's possible to convert hand gestures into speech which may be understood easily by normal people. The idea of the proposed system has greater possibilities of future expansions. If more programming logic is introduced, more number of gestures might be incorporated, and also we implement Speech to text conversion application has been successfully implemented using Raspberry Pi.

5. REFERENCES

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