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Sign Language Hand Glove

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The impact of hearing and speech can cause people to become friends or feel lonely, adversely affecting their social and professional lives. Figuring out the meaning of a sign is not an easy task. Sign language is a well-structured gesture code where each gesture has a meaning assigned to it. Sign language is the only means of communication for the deaf. With the advancement of science and technology, many kinds of research and techniques have been born that not only reduce difficulties for deaf and dumb people but also can be deployed in different fields of work. Sign language is a language that instead of voice or sound patterns uses human communication and body language to convey the meaning. This involves mostly the mixing of shapes, orientation, and movement of the hands. Sign language is not only used by the deaf but also by those who can hear but cannot physically speak to any other people. Sign language is the language used by deaf and mute people that uses gestures instead of sound to convey or to express fluidly a speaker`s thoughts. A gesture in sign language is a particular movement of the hands with a specific symbol made out of them. The main objective of this paper is to present a system capable of converting sign language gestures to auditory speech efficiently. A glove can help people who cannot speak. In glove sign language, we'll convert the sign into sentences so that we can easily communicate with this person. Several languages are spoken around the world. So this system aims to provide voice output in different regional languages

Keywords – Sign language, deaf and dumb people, gestures to auditory speech, glove.

I. Introduction

Deaf persons, in general, have difficulty communicating with others who do not comprehend sign language. Even those who do talk openly have a "deaf voice" that makes them self-conscious and causes them to be reluctant. The Sign Language glove is a regular rubber glove with a flex sensor built-in. The sensor sends a stream of data that varies depending on how much the sensor is bent. They convert the degree of bend to electrical resistance; the resistance value is proportional to the degree of bend. The sensor's output is translated to a digital value and processed by a controller (Arduino UNO), after which it reacts to spoken commands using any electronic device. Hearing and speech can have a significant impact on a person's social and professional life. It may make it difficult to meet new people. Here It is not simple to look up the meaning of a symbol. The goal of Sign Language is to convert basic symbols representing the 26 English alphabets into a well-structured code gesture. Many studies and techniques have been produced as science and technology have progressed, notonly to reduce the difficulties of speech-impaired persons but also to utilize in other domains of work. Sign Language is mostly made up of the mixing of shapes, orientations, and movements of the hands, and it is utilized not just by the deaf but also by those who can hear but cannot physically communicate with others. In sign language, a gesture is a precise movement of the hands that creates a specific signal. The major goal of this work is to offer a stem that can effectively translate Sign Language movements to auditory voices and reduce the amount of time a hearing and speech impaired person spends conversing.

II. Related work

[1] in their paper presented a system that can efficiently translate American Sign Language gestures to both text and auditory voice. The interpreter here makes use of a glove-based technique comprising of flex sensor, tactile sensors, and accelerometer. For each hand gesture made, a signal is produced by the sensors corresponding to the hand sign. The controller matches the gesture with pre-stored inputs. The evaluation of a Deaf-mute communication interpreter was carried out for ten beginners for letters ‘A’ ‘B’ ‘C’ ‘D’ ‘F’ ‘I’ ‘L’ ‘O’ ‘M’ ‘N’ ‘T’ ‘S’ ‘W’. Word formation from letters is also performed using an end signal. The overall gesture recognition for the letters showed an accuracy of about 90%.
[2] in their paper proposed a system using the data glove technique. It consists of flex sensors that are used to detect finger gestures.
[3] in their paper presented a system in which a pair of gloves with flex sensors along each finger, thumb, and arm is used to capture the movement of the user. With the help of flex

sensors, the degree of fingers, thumb, and arm are calculated in voltage terms using the voltage divider rule.

[4] Sign language differ from country to country it is not universally same. America developed American Sign Language (ASL); British developed British Sign Language and so on. Most of the countries follow the American Sign Language and our system is also based on the same. The gloves convert the specific gestures to text then to speech using Arduino as the heart of the system.

We utilized a Google plugin called Text to Speech in this case. Because the project is not dependent on any application, it is portable. This project can run on any device with a good internet connection. Using an OTG instead of a Bluetooth kit saves money and eliminates the risk of the Bluetooth device not working properly due to cache and data storage or other issues.

IV. PROBLEM STATEMENT

.The method is used with a microcontroller (Arduino UNO) and a flex sensor-based data glove in the suggested system. While the data is being transferred, the LED illuminates. Flexsensors are installed on the inside of the glove. The flex detector generates a proportional change in resistance for eachspecific gesture and monitors the hand's orientation. The controller is exiting the process of those hand gestures. The gestures are compared in the database, and output in the form of speech audio and LCD data is generated.

V. SYSTEM ARCHITECTURE

As the deaf person finds it more convenient to show hand signs, communication will be quicker and on a personal level.

- The deaf person shows hand signs and the text is generated subsequently. It goes as:

Hand gesture -> Text -> Audio

- It will also help the deaf person to communicate easily with a normal person as well.

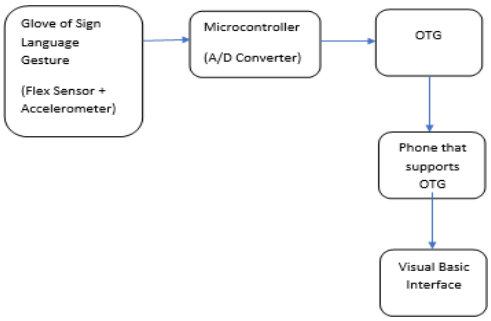


Fig.1: Working process of sign language hand glove

VI. CIRCUIT DIAGRAM & CONNECTIONS

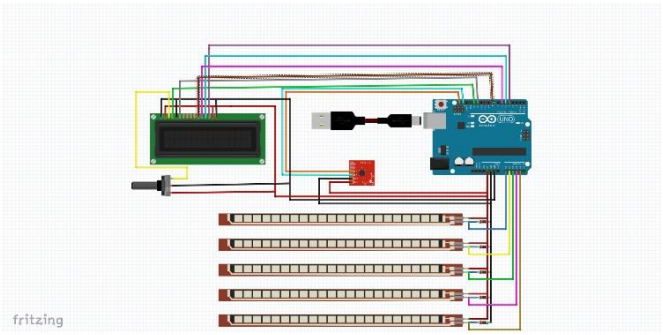


Fig. 2: Sign language hand glove design in a simulator

VII. FLOW CHART OF THE PROPOSED MODEL

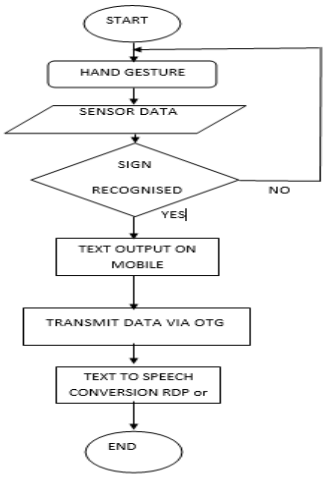


Fig. 3: Sign language hand glove working step

VII. WORKING PROCESS

1) Figure [fig:1] shows the flow of the algorithm used in the system. The sign language glove is glued with 5 flex sensors and an accelerometer that recognize the exact movement of the fingers and the palm.

2) Each flex sensor is supplied with the initial voltage, as per the movement of the fingers, there will be a voltage drop because of the change in resistance due to the bending of the flex sensor on the fingers.

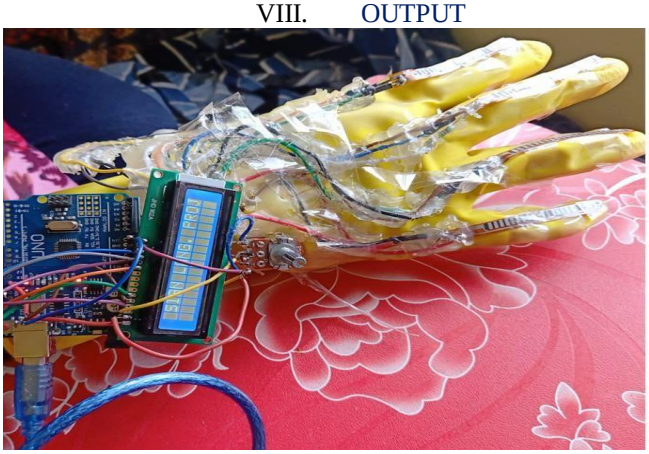
3) The voltage thus obtained will be analog in nature. This analog voltage is then converted into digital voltage using an analog to digital converter using the Arduino Uno.

4) The digital value is then compared with the preloaded values of the sensor in the system for the alphabets and numbers, if the digital output matches the preload values, then the recognition takes place of the gestures and the following text output is shown on the LCD.

5) Now, this same output is transmitted to a smartphone or a personal computer via OTG and it consists of text to speech conversion software(application) or a google text to speech

extension. The output received from the TTS application can be heard through a phone speaker. This will help the hearing and speech impaired person to communicate with the world easily.

VIII. OUTPUT



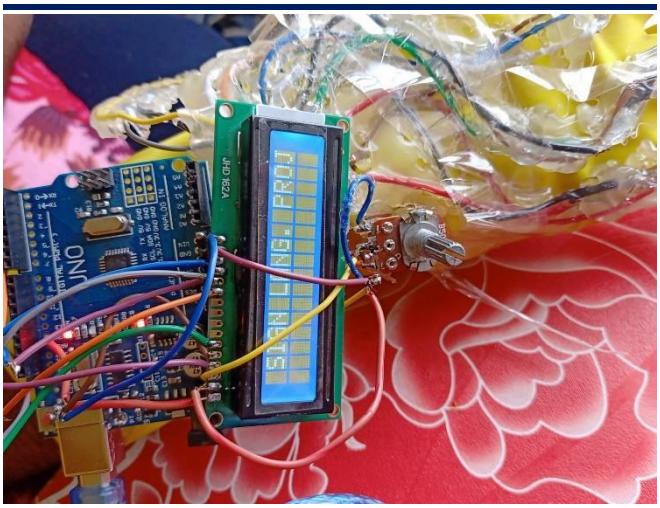


Fig.3: Sing language showing in LED's screen

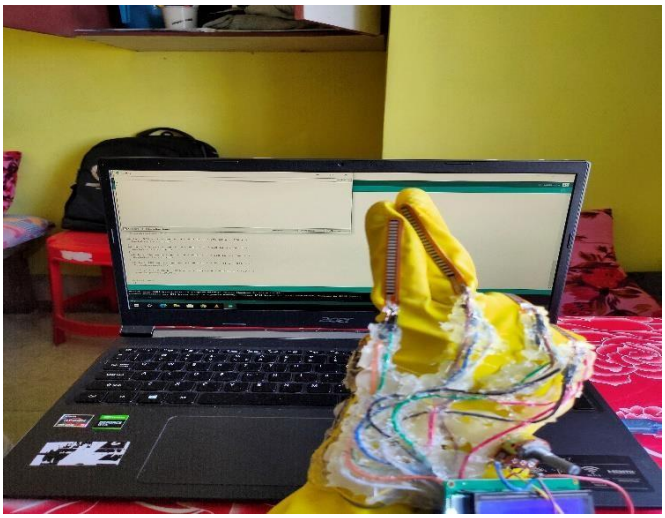


Fig.4: sing language showing in laptop's screen

We can see in [fig3] that if we conduct different sign languages with the hand glove, it will display the output on an LED screen, and if we connect it to an OTG port, it will display it on a laptop or mobile screen.

IX. CONCLUSION

Sign language is a great tool for deaf and mute people and the general public to communicate more easily. Because there is a communication gap between these communities and the rest of society. This initiative is beneficial to patients who are differently-abled, speech-impaired, or paralyzed and are unable to communicate correctly. This research was done to see if it was possible to recognize sign language using flex sensors and display the data, and it turned out to be a successful system. Integrated with a variety of services and assisted in the creation of jobs for the deaf. Combined with a fitness sensor to track the individual's health. Communication can potentially take place in languages other than English.

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