GLOVE BASED SIGN LANGUAGE INTERPRETER FOR DEAF AND APHONIC PEOPLES

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Abstract - *Sign language is a natural way for communication between normal and dumb people, but often they find difficulty in communicating with normal people as we don't understand their sign language. For deaf and mute people to communicate with normal people, sign language is introduced. The disadvantage of this method is that we must know the sign language to understand the conveyed message. So this project aims to facilitate individuals by means of a glove based deaf-mute communication interpreter system. The glove is internally equipped with accelerometer. These sensors sense the movement of hands and fingers. For every specific gesture, the accelerometer measures the orientation of hand. The process of these hand gestures is interpreted in controller. Using this device deaf-mute and a standard person can be able to communicate with each other in an affordable and convenient way. This project analyses the data from an instrumented data glove for use in recognition of signs and gestures. A system is developed for recognizing these signs and their conversion into speech. The hardware components used in this project are Renesas microcontroller, ADXL337 accelerometer, voice module, LCD, speaker, regulated power supply.*

Key Words: **Sign language, ADXL337 accelerometer, Glove, Renesas microcontroller, Gestures.**

1. INTRODUCTION

The method of communication between deaf-mute and normal persons has becomes a difficult task. People who are audio and speech impaired face a lot of difficulty in communicating with others and expressing themselves. Hence, they adopt the method of hand gestures or sign language in order to talk or communicate. But, for the normal people find it difficult to comprehend as they are unfamiliar with these signs and gestures, hence resulting in a communication gap between the impaired and the normal ones.

1.1 Aim and Objectives

The Glove Based Sign Language Interpreter forms a bridge of communication for deaf-mute and normal people. It mainly targets the dumb and deaf to be able to communicate their ideas through hand recognition and voice recognition gesture.

2. LITERATURE SURVEY

In [1], Human beings interact with each other to convey their ideas, thoughts, and experiences to the people around them. But this is not the case for deaf-mute people. Sign language paves the way for deaf-mute people to communicate. Through sign language, communication is possible for a deaf-mute person without the means of acoustic sounds. The aim behind this work is to develop a system for recognizing the sign language, which provides communication between people with speech impairment and normal people, thereby reducing the communication gap between them. Compared to other gestures (arm, face, head and body), hand gesture plays an important role, as it expresses the user's views in less time. In the current work flex sensor-based gesture recognition module is developed.

Generally dumb people use sign language for communication but they find difficulty in communicating with others who don't understand sign language. This project aims to lower this barrier in communication. It is based on the need of developing an electronic device that can translate sign language into speech in order to make the communication take place between the mute communities with the general public possible. A Wireless data gloves is used which is normal cloth driving gloves fitted with flex sensors along the length of each finger and the thumb. Mute people can use the gloves to perform hand gesture and it will be converted into speech so that normal people can understand their expression. Sign language is the language used by mute people and it is a communication skill that uses gestures instead of sound to convey meaning simultaneously combining hand shapes, orientations and movement of the hands,

arms or body and facial expressions to express fluidly a speaker's thoughts. Signs are used to communicate words and sentences to audience.

This system facilitates communication between silent, hearing-impaired and blind people and normal people. It also helps the mute, hearing-impaired and blind to interact among themselves. It is not an easy task for the normal people to perceive the intended meaning of these sign language used by the hearing-impaired and silent. Moreover, the blind people cannot watch their gesture. Official sign language is used by the dumb and deaf but is not familiar with the normal world and the people who are blind cannot follow sign language. This device converts gestures into voice and vice-versa which is suitable for both disabled and normal people. To help the deaf people the gestures are converted into text. This text gets displayed on a screen.
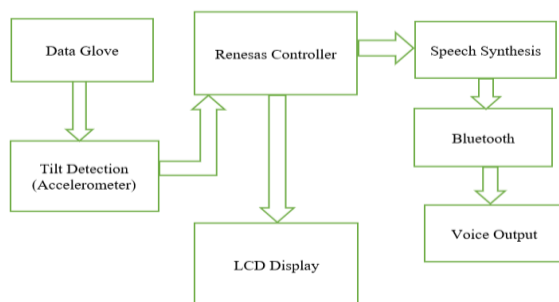
3. TECHIQUES

Fig-1: Block diagram.

I.   ADXL337 Accelerometer sensor:
ADXL335 accelerometer sensor is used for tilt sensing. The ADXL337 is a complete 3-axis acceleration measurement system. The ADXL337 has a measurement range of ±3 g minimum.

II.   Microcontroller:
The controller used in the device is the Renesas microcontroller. The program that is developed is stored in the memory of the controller.

III.   LCD Display:
A 16x2 display is very basic module and is commonly used in various devices and circuits. A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. It is used to display the data from the Renesas microcontroller.

IV.   HC-05 Bluetooth serial module:
Bluetooth module is used to make wireless communication between two devices. HC-05 Bluetooth module has RF transmit power up to +4dBm and

typical sensitivity - 80dBm. It has inbuilt antenna to transmit signal/data to other devices.

4. WORKPLAN

In this project all operations were performed on Indian Sign Language (ISL). In the ISL manual alphabet, fingerspelling is used primarily for spelling out names or English terms which do not have established sign. The database consists of 26 ISL alphabets others are static gestures. A low-cost hand glove circuit developed with multiple accelerometer is used to capture the hand gestures performed by the performer. It produces the finger flexion of each finger, the movement and orientation of the hand and the electrical signal from the muscle activities of the hand. The system works online gesture recognition i.e., the real time signal from the gloves is given as an input and the system tells us the matched gesture. It is purely data dependent.

5. PROPOSED SYSTEM

Sign language interpreter consisting of accelerometer sensor which helps to measure the movement of the three-axis direction (x, y and z). The accelerometer sensors are placed on the glove. The data from these sensors are sent to the microcontroller for further processing purpose. Once data is recognized at the microcontroller that is sent to the android phone via Bluetooth module. At android phone side, app is developed which is text to speech converter that helps to convert text signal to voice signal. LCD module is also used to display recognized data from the microcontroller.

6. FUTURE SCOPE

- To develop a system supporting a wider range of signs and modes.
- Developing a Gesture Vocalizer which uses wireless transceiver system.

7. OUTPUT

A- A closed fist, all finger folded against the palm, thumb is straight, alongside the index finger.

B- All fingers are straight. Thumb is folded across palm.
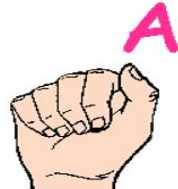
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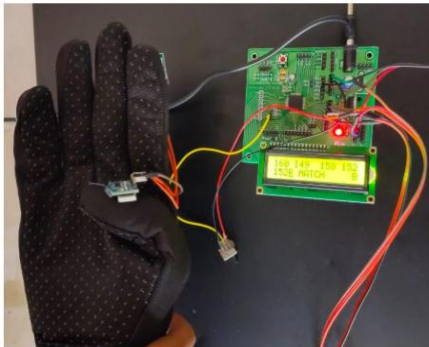
8. CONCLUSION

This system is useful for deaf, dumb and blind people to communicate with one another. The dumb people use their standard sign language which is not easily understandable by blind and normal people. The sign language is translated into some text form, to facilitate the deaf people as well. This text gets displayed on a screen. To rehabilitate the deaf, dumb and blind, we can use it to monitor the hand movements. The same can be used for the advanced virtual interactive gaming and telerobotic surgery.

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