ISSN (Print) : 2320 – 3765
ISSN (Online): 2278 – 8875

International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

(An ISO 3297: 2007 Certified Organization)

Website: www.ijareeie.com

Vol. 6, Issue 3, March 2017

Sign Language Glove with Voice Synthesizer

Dr.Pramod Sharma[1], Pooja Raghav [2], Arpita Gupta [3], Ankur Kudaisya [4], Vivek Garg[5]

Faculty, P.G. Dept. of ECE, R.B.S. Engineering Technical Campus, Bichpuri, Agra, India[1]

B.Tech. Students, P.G. Dept. of ECE, R.B.S. Engineering Technical Campus, Bichpuri, Agra, India[2,3,4,5]

ABSTRACT: This project is based on the need of developing an electronic device that can translate finger gesture into text or speech in order to make the communication take place between the mute communities with the normal people. A data glove is used to convey the finger gesture of a mute person. The data glove is normal rubber or cloth glove, fitted with flex sensors along the length of each finger. Mute people can use the glove to perform hand gesture and the same will be converted into text as well as in speech so that normal people can understand the mute person expression. This device contains a set of 4 flex sensors which give data as input resistance to the microcontroller according to the bending of flex sensors, this resistance is converted into display through a 16 bit LCD display on which the person on the other side with normal abilities can easily read the converted message or if the person is blind can listen the converted message from the speaker or earphones through voice recording and playback device based on APR33A3 IC. This project can also be used as biomedical instrument in hospitals like intensive care unit or operation theatre.

KEYWORDS: Gesture, Mute, Communities, Flex Sensor, Microcontroller. .

I. INTRODUCTION

Sign language is a language which instead of acoustically conveyed sound patterns, uses manual communication and body language to convey meaning. This can involve simultaneously combining hand shapes, orientation and movement of the hands, arms or body, and facial expressions to fluidly express a speaker's thoughts. Wherever communities of deaf people exist, sign language will be useful. Sign language is also used by persons who can hear, but cannot physically speak. While they utilize space for grammar in a way that spoken languages do not. Sign languages exhibit the same linguistic properties and use the same language faculty as spoken languages do. Hundreds of sign languages are in use around the world and are at the cores of local deaf cultures. Some sign languages have obtained some form of legal recognition, while others have no status at all. Deaf and dumb people use sign language to communicate with themselves and with common people. It is very difficult for the common people to understand this language. Though they can show their message in writing, it is not conveyable to the illiterate people. Sign language translating equipments helps in conveying their message to the common people. It translates their message in sign form to the normal understandable text or voice form. All over the world there are many deaf and dumb people. They are all facing the problem of communication. Our project is one such effort to overcome this communication barrier by developing a glove which senses the hand movement of the sign language through sensors and translates it into text and voice output.

II. LITERATURE REVIEW

All the reviewed literature describes the system that overcomes the problem faced by the speech and hearing impaired some of them were discussed here:

(a) P.B. Koli, Ashwini Chaudhary, Sonam Malkar, Kavita Pawale & Amrapali Tayde [1], proposed a method using Image Processing Technique. Here, the gestures of alphabets is used to communicate, the webcam captures the exact positions of the alphabets to determine the co-ordinates. The co-ordinates captured is mapped with the one previously stored and accordingly that exact alphabet is produced. Later the word is translated into speech and it will be audible to everyone. Continuing in this way, the deaf and dumb persons can able to go through the entire sentence that they wants to communicate.

(b) Harshith.C, Karthik.R.Shastry, Manoj Ravindran, M.V.V.N.S Srikanth, Naveen Lakshmikhanth [2], proposed a methodology using Gesture recognition which mainly apprehensive on analyzing the functionality of human wits. The

ISSN (Print) : 2320 – 3765
ISSN (Online): 2278 – 8875

International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

(An ISO 3297: 2007 Certified Organization)

Website: www.ijareeie.com

Vol. 6, Issue 3, March 2017

main goal of gesture recognition is to create a system which can recognize specific human gestures and use them to convey information or for device control. The approaches present can be mainly divided into Data-Glove Based and Vision Based approaches. An important face feature point is the nose tip. Since nose is the highest protruding point from the face. Besides that, it is not affected by facial expressions. Another important function of the nose is that it is able to indicate the head pose. Knowledge of the nose location will enable us to align an unknown 3D face with those in a face database.

(c) Dama Sampath & B. Narsimha Chary [3], proposed a system in which they used the sensors to measure the parameters of sign language and send the values to the microcontroller. Here MEMS is used in communication with the respective direction of hand movements. The microcontroller gives the voice announcement as the temperature is increases.

(d) Dalia Nashat, Abeer Shoker, Fowzyah Al-Swat and Reem Al-Ebailan [4], proposed a methodology using mobile application. They introduce a Mobile application that enables communication between uneducated Deaf-Dumb and normal people in our society. They also develop an aid tool for deaf and dumb which can be useful in many fields like restaurants, hospitals and transportation. Moreover, their application introduces an easy translator from sign language to English or Arabic language and vice versa.

(e) Priya Matnani [5], proposed a technology using hand ,body and facial gestures as a means for interacting with computers and other physical devices. This paper discusses the rationale for gesture based control technology, methods for acquiring and processing such signals from human operators, applications of these control technologies, and anticipated future developments. The gesture recognition plays an important part of human-machine interaction systems. The focus is done in systems that are based on accelerometers and on glove based equipments.

III. METHODOLOGY

To convey the sign language of a mute person, a sign language translating equipment help in conveying their message to the common people. It translates their message in sign form to the normal understandable text or voice form. Our project is one such effort to overcome this communication barrier by developing a glove which senses the finger movement of the sign language through sensors and translates it into text and voice output as illustrated by the block diagram shown in Fig 1. The user (mute person) has to wear the data glove and form a sign using his fingers, provides the output voltage accordingly as resistance of a flex sensor is proportional to its bending to ensure recognition of change in resistance with the pre-programmed instructions in the microcontroller. Once the change is recognized, the system will transfer the pre-recorded message visibly as well as audibly. Designing of gesture vocalizer with PIC and LM339N is device which is based on digital and analog electronics both. The whole circuitry works on analog circuitry but the flex input circuitry is made on digital electronics basic (of binary input 0 or 1) with the help of LM339N IC which compares the input of flex sensor and gives output as 0 or 1. We can produce the output by each change in resistance observed. A 16 Bit LCD display is used to display the messages corresponding to a particular finger gesture while IC APR33A3, which is basically a Voice Recording and Playback Board, is used to provide the message in audio form.

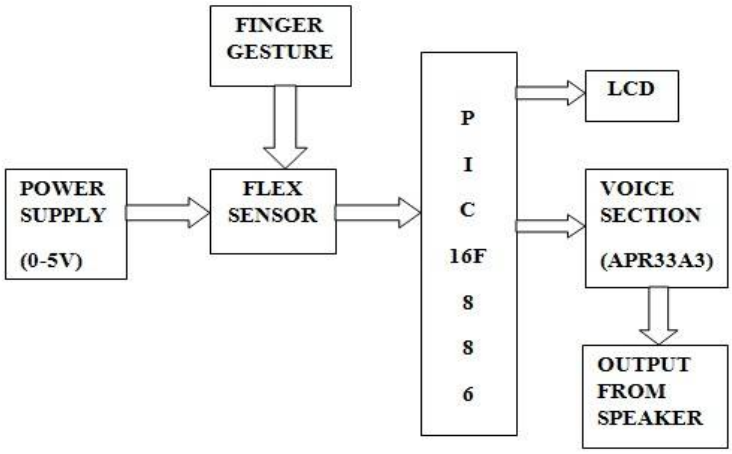

Fig 1. Block Diagram of Gesture Vocalizer

ISSN (Print) : 2320 – 3765
ISSN (Online): 2278 – 8875

International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

(An ISO 3297: 2007 Certified Organization)

Website: www.ijareeie.com

Vol. 6, Issue 3, March 2017

IV. WORKING PRINCIPLE OF SYSTEM

The objectives of the research are as follow:

1. To design and develop a system which lowers the communication gap between speech-hearing impaired and normal world.
2. To build a communication system that enables communications between deaf-dumb person and a normal person.

The working of the project for audio output can understand with the help of flow chart as shown in Fig.2. When a mute person bends his finger, the bending of finger is sensed by the Flex sensor and a corresponding voltage is produced. This sensor data is fed to the microcontroller where analog data is converted to digital data for further processing. After processing if data matched with the stored data then a pre-recorded voice output is listen through speaker, otherwise if data is not matched then the person has to made finger gesture again and process repeats.

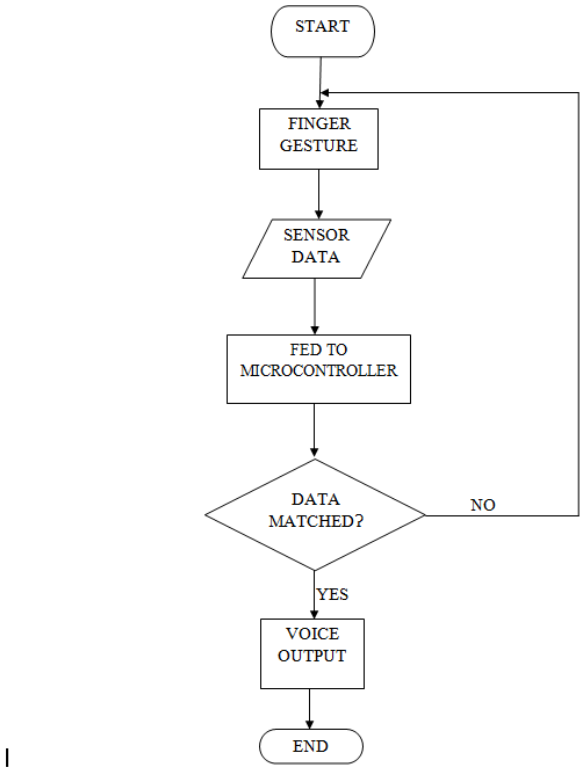

Fig.2. Flow diagram describing the working of the project.

V.CIRCUIT DESCRIPTION

The circuit is shown in the Fig.3. A 5 V regulated supply, using IC 7805, is used for the working of different modules. The Flex sensors are energised by the 5V supply. Depending on the finger gesture, the flex sensor will get bended and provides the output voltage accordingly as resistance of a flex sensor is proportional to its bending. Thus output voltage of flex sensor varies with the amount of bending of a finger i.e. finger gesture. This variation of voltage is given to the Comparator IC LM339N, which compare it with the preset reference voltage and detects the signal as high. In our project we have used four flex sensors being used by the four fingers. All the flex sensors were working in the similar manner as described above. The output of comparator IC is fed to the microcontroller (PIC16F886A).

ISSN (Print) : 2320 – 3765
ISSN (Online): 2278 – 8875

International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

(An ISO 3297: 2007 Certified Organization)

Website: www.ijareeie.com

Vol. 6, Issue 3, March 2017

The microcontroller is pre programmed for its different inputs. Thus the microcontroller fleshes its output on the LCD provided according to which one of its input is activated by the comparator. We have also used a Voice Recording and Playback Board APR33A3 VPRB for our project to provide voice output as well. This VPRB board can be used to record 7 messages at a time. The VPRB board is connected through the adaptor (speaker), which gives the output in voice form.

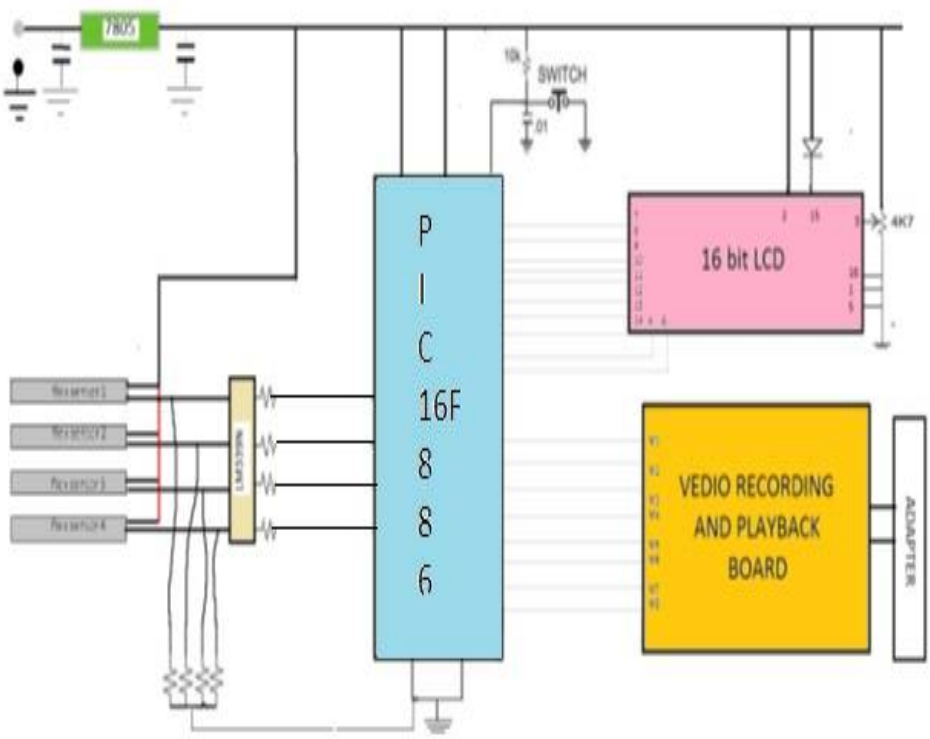

Fig 3. Circuit of PIC andLM339N Based Gesture Vocalizer

It works as a sign translator, which takes the input from the sensors and the sensed data is compared with the instruction fed into the microcontroller. As soon as the sensor data is matches with the instruction, the output is produced in the form of voice from the voice section and in written/text from the LCD display according to the sign made by users.

V. RESULTS

We have designed the project to counter the four basic need messages for a dumb or ICU patient during his/her treatment. The user (mute person) has to wear the data glove and form a sign using his fingers, which he has to hold for some moment to ensure recognition of change in resistance by the microcontroller. Once the change is recognized, the system will transfer the pre-recorded message visibly as well as audibly. We have used four flex sensors (fingers), one on each finger and programmed the system for the four different messages. Each one of the message is associated with the particular flex sensor. The tested results are shown in Table 1. The actual photograph of the designed hardware is shown in Fig. 4.

ISSN (Print) : 2320 – 3765
ISSN (Online): 2278 – 8875

International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

(An ISO 3297: 2007 Certified Organization)

Website: www.ijareeie.com

Vol. 6, Issue 3, March 2017

Table 1 : Tested Result of the Designed System

Gesture or Sign	Message on LCD & Playback
First finger bending	I NEED WATER
Second finger bending	I NEED FOOD
Third finger bending	I WANT SLEEP
Fourth finger bending	DON'T DISTURB

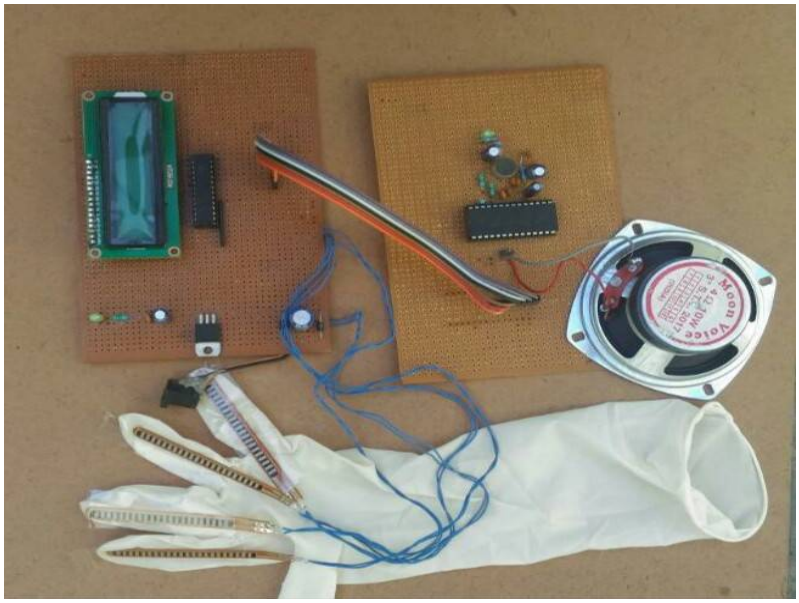

Fig 4. The actual photograph of the designed hardware.

VI. CONCLUSION

1. The completion of this prototype suggests that sensor gloves can be used for partial sign language recognition.
2. More sensors can be employed to recognize full (more) sign language.
3. Although the designed system is compact but with embedded circuitry it can be compacted further.
4. It is affordable by everyone and easy to use.

VII. FUTURE ASPECTS

1. The more number of output and sign is possible by reading the change in resistance value and apply them in programming.
2. Can also be modified for long distance communication in big hospitals via GSM.
3. Can also be used for the Robot control system to regulate machine activity at remote sensitive sites.

REFERENCES

1. P.B. Koli, Ashwini Chaudhary, Sonam Malkar, Kavita Pawale & Amrapali Tayde , **"Image Processing Based Language Converter for Deaf and Dumb"** IOSR Journal of Electronics and Communication Engineering (IOSR-JECE) e-ISSN: 2278-2834/p-ISSN: 2278-8735 /20-23 Dec 2006/pp. 25-30.
2. Harshit.C, Karthik.R.Shastry, Manoj Ravindran, M.V.V.N.S Srikanth, Naveen Lakshmikanth, **"Survey on Various Gesture Recognition Techniques for interfacing Machines based on Ambient Intelligence"** 2010 International Journal of Computer Science and Engineering Survey, Department of Information Technology, Coimbatore, vol.1, No.2 ,November 2010/pp.31-42.

ISSN (Print) : 2320 – 3765
ISSN (Online): 2278 – 8875

International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

(An ISO 3297: 2007 Certified Organization)

Website: www.ijareeie.com

Vol. 6, Issue 3, March 2017

3. S.Ganesh, Dr.Saravana Kumar, Dr. Shankar, Samuel D.Raj, R.Kartik, **"A Novel Voice Recognition System For Dumb People",** Journal of Theoretical and Applied Information Technology, Vol. 53 No.1/10th July 2013/pp.45-53.
4. Aditi Kalsh N.S. Garewal, "**Sign Language Recognition for Deaf & Dumb**", International Journal of Advanced Research in Computer Science and Software Engineering, Volume 3, Issue 9, September 2013/pp.103-106.
5. Dalia Nashat, Abeer Shoker, Fowzyah Al-Swat and Reem Al-Ebailan, **"An Android Application To Aid Uneducated Deaf-Dumb People",** Dalia Nashat *et al*, International Journal of Computer Science and Mobile Applications, Vol.2 Issue./ 9 September- 2014/ pp. 1-8
6. Priya Matnani, **"Glove Based and Accelerometer Based Gesture Control : A Literature Review"** 2015 International Journal of Technical Research and Applications, Department Of Information Technology, Maharashtra, India. Volume 3, issu 6 (November-December,2015)/pp.216-221.
7. Sushmita Mitra and Tinku Acharya, **"Gesture Recognition: A Survey"**, IEEE Transactions On Systems, Man, and Cyber- netics—PART C: Applications and Reviews, VOL. 37, NO. 3, MAY 2007, pp. 311- 324.
8. Ata-Ur-Rehman, Salman Afghani, Muhammed Akmal and Raheel Yousaf, **"Microcontroller and Sensors Based Gesture Vocalizer",** 7th WSEAS International Conference on SIGNAL PROCESSING, ROBOTICS and AUTOMATION (ISPRA '08), University of Cambridge, UK, February 20-22, 2008.
9. Anbarasi Rajamohan, Hemavathy R., Dhanalakshmi proposes a **"Deaf-Mute Communication Interpreter".** Proceedings of the International MultiConference of Engineers and Computer Scientists 2009 Vol I IMECS 2009, March 18 - 20, 2009, Hong Kong
10. Kunal Kadam, Rucha Ganu, Ankita Bhosekar, Prof. S. D. Joshi, **"American Sign Language Interpreter"**, Proceedings of the 2012 IEEE Fourth International Conference on Technology for Education.