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Hand Gesture Recognition System for Deaf and Dumb Persons

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ABSTRACT

Generally deaf-dumb people use sign language for communication, but they find difficulty in communicating with others who don't understand sign language. Due to which communications between deaf-mute and a normal person have always been a challenging task. We propose to develop a device which can convert the hand gestures of a deaf-mute person into speech. This methodology provides a map for developing a digital wireless glove which is fitted with Flex sensors. These sensors sense the gestures of a person in the form of bend of fingers and tilt of the hand fist. This system includes a voice playback IC to give the real time speech output in regional language as well as a LCD module to display the text. The text display being in English, the voice output of this device will be in regional language. So this device acts as a communicator as well as a translator providing more flexibility in communication. The gesture sign also controlled the home appliances using relay.

Keywords: LCD module, Deaf-dumb people and Relay.

1. INTRODUCTION

General: Humans communicate with each other by conveying their ideas, thoughts, and experiences to the people around them. There are numerous ways to achieve this and the best one among all is the gift of "Speech". The only means of communication for deaf and dumb people is the "Sign Language". It will be injustice if we ignore those who are deprived of this invaluable gift. Deaf- Dumb people need to communicate with normal people for their daily routine. There are some difficulties when they come across in certain areas like banking, hospital. India constitutes 2.4 million of Deaf and Dumb population. These people lack the amenities which a normal person should own a survey analysis. This decreasing ratio of Literate and Employed Deaf and Dumb population is a result of the physical disability of hearing for deaf people and disability of speaking for dumb people so it yields to lack of communication between normal person and Deaf and Dumb Person.

It actually becomes the same problem of two persons which knows two different language, no one of them knows any common language so its becomes a problem to talk with each other and so they requires a translator physically which may not be always convenient to arrange and this same kind of problem occurs in between the Normal Person and the Deaf person or the Normal Person and the dumb person. To overcome this problem, we introduce a unique application. Our application Model is a desirable Interpreter which translates sign language to synthesized text and voice. Gesture recognition is mainly categorized into vision-based approach and Haptic-based approach. The vision based approach captures the movement of the signer's hand using cameras, on the other hand, haptic-based approach deals with instrumented gloves affixed with measurement devices which track hand movements. Owing to large data and complex computation involved in vision-based approach, this paper specifically deals with Haptic-based approach. The evolution of gesture based recognition system initiated with the invention of Sayre Glove in 1977. These sensors track hand movements accurately, and pass the information to PIC MICROCONTROLLER placed within each sub-system.

This paper focus on developing a help for disabled people using this gesture recognition technique. In this system the gestures are converted into text messages for communication. A number of techniques are used to convert these gestures into required output, typically either image based or device based, although hybrids are beginning to come about.

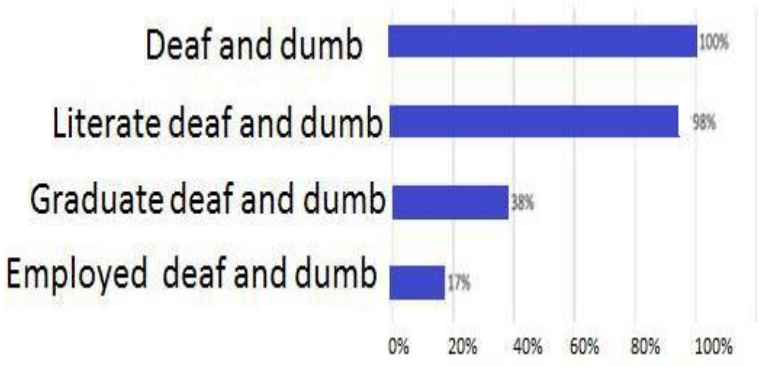


Fig 1: Employment analysis of deaf and dumb population of India

However, that is not the same as understanding that there might be a causal relationship between deafness and "dumbness" (deaf, and *therefore* not speaking). And a "dumb" person can also be "dumb" due to other reasons than deafness, i.e. there exists "dumb" persons who are not deaf, and a dumb and deaf person might have one etiology for the dumbness and another for the deafness. Deaf earnings are approximately 72% of those in the general population.

Fig 2: Sign Languages

The first part of our hypothesis above would seem to be corroborated. However, with all care in the risky comparison with Kirchner and Peterson's data, deaf people seem to have a higher average income than blind people.

Although this technology is still in its emerging state, a number of applications have been implemented in real time. The basic concept involves the use of data gloves worn by disabled people. These gloves are designed using Flex sensors.

The flex sensors are normally attached to the glove. Flex sensors are analog resistors that function as analog voltage dividers. The details of flex sensors are studied in further chapters.

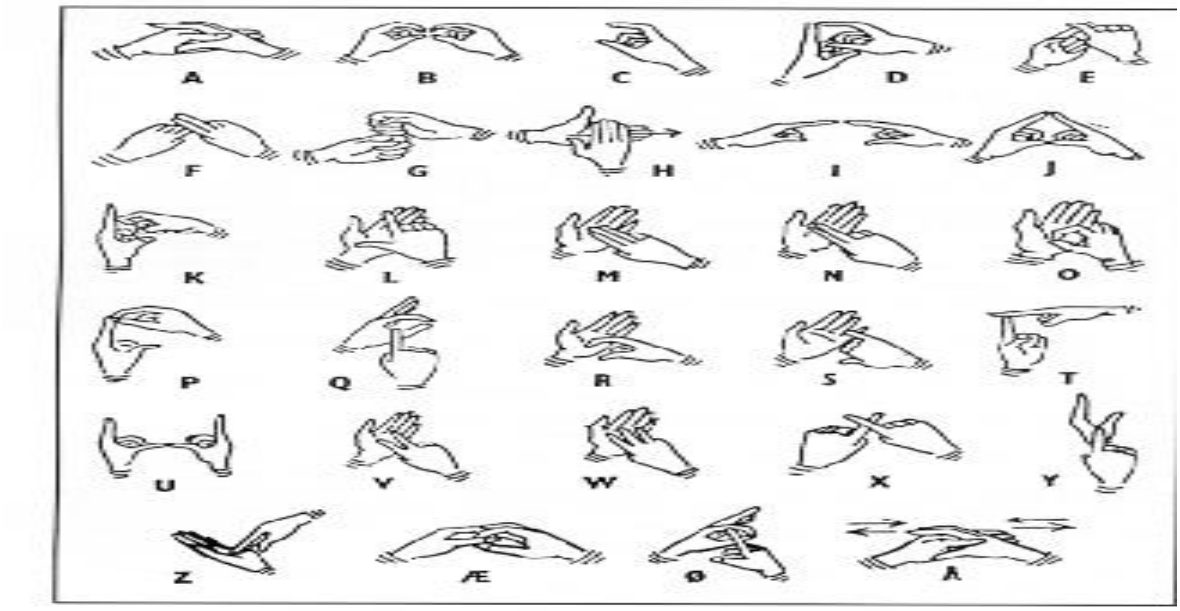


Fig 3: Sign Languages using two hands

The system of communication called "finger spelling" involves spelling out words in an alphabetical language by using the letters of the manual alphabet -with hand shapes and positions corresponding to each letter of the written alphabet Conversations can be entirely finger spelled, but among deaf individuals, finger spelling is more often used in conjunction with sign language for proper names and terms for which there are no signs.

The manual alphabet can be modified for use with deaf-blind people by making hand shapes and movements on the palm of the receiver of the message finger spelling alone is used more often among people who are both deaf and blind, presented either at close distance or inside the hand. It takes only a few hours to learn the individual hand shapes, but becoming fluent as a finger speller is quite difficult.

This paper focus on developing a help for disabled people using this gesture recognition technique. In this system the gestures are converted into text messages for communication. A number of techniques are used to convert these gestures into required output, typically either image based or device based, although hybrids are beginning to come about.

2. PROPOSED SYSTEM

In this project we will be using three flex sensors, microcontroller, LCD, speaker and voice board. By comparing three flex sensors ADC values different signs are display in LCD. Depending on signs the voice is announced using speaker and after few seconds a message is sent using GSM module to the concerned person. In this proposed system we are implementing the FLEX sensor. FLEX signals, which indicate the activities of related muscles during a gesture execution, have advantages in capturing new motions such as wrist and finger movements and can be utilized to realize human–computer interfaces. Since three FLEX sensors have their own advantages in capturing hand gestures, the combination of both sensing approaches may improve the performance of hand gesture recognition. A wireless wearable gesture capture device is designed to acquire FLEX signals, and an algorithm framework is proposed to realize gesture classification on mobile devices. Here both sensor working and compare the output values for various voice announcement for deaf and dump person. FLEX sensor will give the output for analog values for various angels. The FLEX output values are in a range for comparison and sent through the microcontroller. The Microcontroller receives the data from flex sensor unit and announce the varies voice using voice APR board. The relay is already in the open condition when the gesture is given for on/off condition it checks the gesture for on/off condition and the circuit is closed then it will works.

3. COMPONENTS USED

FLUX SENSOR

Flex is ideal for any application or device that requires the measurement of a repetitive bending, striking deflection, acceleration or range of motion Additionally, Flex is proven for high speed impact measurements. The Flex sensor is based upon a screen printed resistive ink thin films sensors with introduced stress fractures and voids of uniform dimension and known characteristics. Through this patented fretting process Flex derives its unique characteristic of being able to repeatedly indicate the degree of a bending moment. Other sensors are sometimes capable of indicating when they are bent, but none of them are specifically designed for this purpose and they fail to be repeatable accurate.

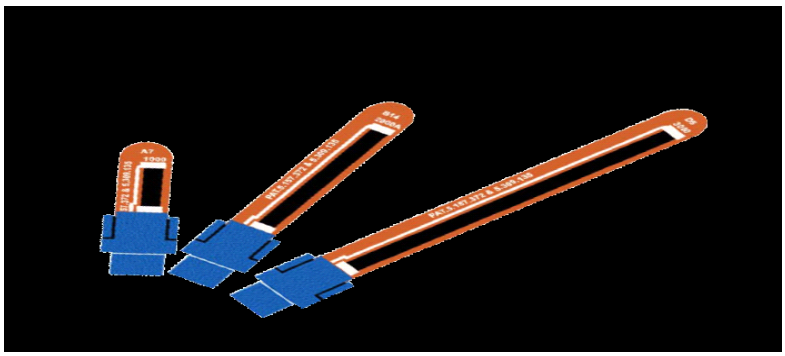


Fig 4: Flux Sensors

Humidity sensors are of great importance in many human activities like industrial production, air quality control in home and in working areas, meteorological applications, library and picture-gallery monitoring.

Electrical Specifications

-Life Cycle: >1 million

-Height: 0.43mm (0.017")

-Temperature Range: -35°C to +80°C

-Flat Resistance: 25K Ohms

-Resistance Tolerance: ±30%

-Bend Resistance Range: 45K to 125K Ohms

(depending on bend radius)

-Power Rating : 0.50 Watts continuous. 1 Watt Peak.

RELAY

We know that most of the high end industrial application devices have relays for their effective working. Relays are simple switches which are operated both electrically and mechanically. Relays consist of a n electromagnet and also a set of contacts. The switching mechanism is carried out with the help of the electromagnet. There are also other operating principles for its working. But they differ according to their applications. Most of the devices have the application of relays.

RELAY USED

The main operation of a relay comes in places where only a low-power signal can be used to control a circuit. It is also used in places where only one signal can be used to control a lot of circuits. The application of relays started during the invention of telephones. They played an important role in switching calls in telephone exchanges. They were also used in long distance telegraphy. They were used to switch the signal coming from one source to another destination. After the invention of computers they were also used to perform Boolean and other logical operations. The high end applications of relays require high power to be driven by electric motors and so on. Such relays are called contactors.

RELAY DESIGN

There are only four main parts in a relay. They are

- Electromagnet
- Movable Armature
- Switch point contacts
- Spring

It is an electro-magnetic relay with a wire coil, surrounded by an iron core. A path of very low reluctance for the magnetic flux is provided for the movable armature and also the switch point contacts. The movable armature is connected to the yoke which is mechanically connected to the switch point contacts. These parts are safely held

with the help of a spring. The spring is used so as to produce an air gap in the circuit when the relay becomes de-energized.

WORKING OF RELAY

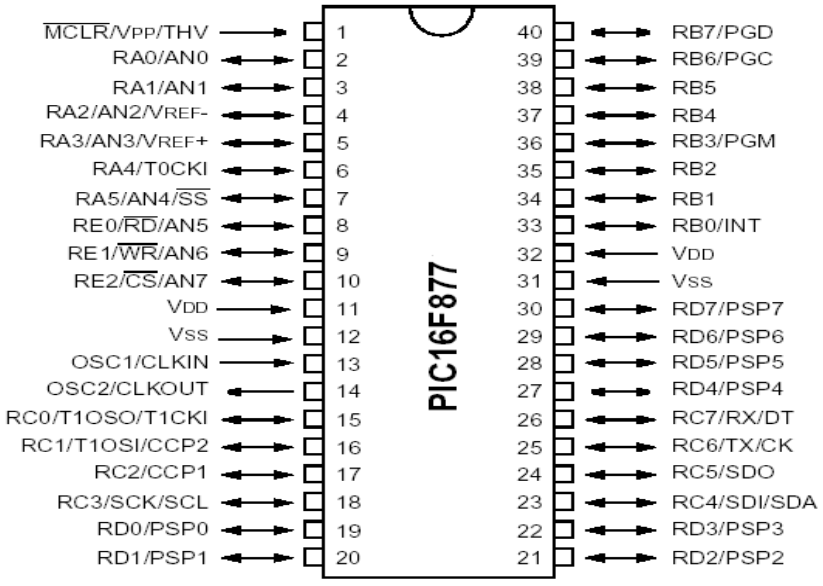
The working of a relay can be better understood by explaining the following diagram given below.
The diagram shows an inner section diagram of a relay. An iron core is surrounded by a control coil. As shown, the power source is given to the electromagnet through a control switch and through contacts to the load. When current starts flowing through the control coil, the electromagnet starts energizing and thus intensifies the magnetic field. Thus the upper contact arm starts to be attracted to the lower fixed arm and thus closes the contacts causing a short circuit for the power to the load. On the other hand, if the relay was already de-energized when the contacts were closed, then the contact move oppositely and make an open circuit.

As soon as the coil current is off, the movable armature will be returned by a force back to its initial position. This force will be almost equal to half the strength of the magnetic force. This force is mainly provided by two factors. They are the spring and also gravity.

Relays are mainly made for two basic operations. One is low voltage application and the other is high voltage. For low voltage applications, more preference will be given to reduce the noise of the whole circuit. For high voltage applications, they are mainly designed to reduce a phenomenon called arcing.

PIC CONTROLLER

The microcontroller that has been used for this project is from PIC series. PIC microcontroller is the first RISC based microcontroller fabricated in CMOS (complementary metal oxide semiconductor) that uses separate bus for instruction and data allowing simultaneous access of program and data memory.



The main advantage of CMOS and RISC combination is low power consumption resulting in a very small chip size with a small pin count. The main advantage of CMOS is that it has immunity to noise than other fabrication techniques.

Various microcontrollers offer different kinds of memories. EEPROM, EPROM, FLASH etc. are some of the memories of which FLASH is the most recently developed. Technology that is used in pic16F877 is flash technology, so that data is retained even when the power is switched off. Easy Programming and Erasing are other features of PIC 16F877.

4. RESULT

This system is capable of recognizing signs more quickly than this existing system. In this system by using gesture we controlling home appliances also.

5. CONCLUSION

Sign language being the only communication means for deaf-dumb community hampers their interaction with the normal people who lack the knowledge of sign language. This paper has the potential of minimizing this communication barrier by working as an automated translator and converting sign language directly into vocal and textual format for the understanding of normal people using various flex sensor, PIC microcontroller.

The input data glove detects the hand gesture done by the deaf-dumb person wearing it and provides the analog input to the microcontroller for further interpretation according to the database and the final output is observed on the LCD display and the speaker. Thus, hand gesture can be automatically converted with the help of this system into understandable form for the normal person.

REFERENCES

[1] Fact Sheet No.300, “Deafness and Hearing Loss”, World Health Organization (WHO).

[2] “Sign Language”, World Federation of the Deaf .

[3] D. J. Sturman and D. Zeltzer, "A survey of glove-based input," in IEEE Computer Graphics and Applications.

[4] S. A. Mehdi and Y. N. Khan, "Sign language recognition using sensor gloves," Neural Information Processing, 2002. ICONIP '02. Proceedings of the 9th International Conference on, 2002, pp. 2204-2206 vol.5.

[5] Wu Jiangqin, Gao Wen, Song Yibo, Liu Wei and Pang Bo, "A simple sign language recognition system based on data glove," Signal Processing Proceedings, 1998. ICSP '98. 1998 Fourth International Conference on, Beijing, 1998, pp. 1257-1260 vol.2.

[6] C. Preetham, G. Ramakrishnan, S. Kumar, A. Tamse and N. Krishnapura, "Hand Talk-Implementation of a Gesture Recognizing Glove," India Educators' Conference (TIIEC), 2013 Texas Instruments, Bangalore, 2013, pp. 328-331.

[7] T. Chouhan, A. Panse, A. K. Voona and S. M. Sameer, "Smart glove with gesture recognition ability for the hearing and speech impaired," 2014 IEEE Global Humanitarian Technology Conference - South Asia Satellite (GHTC-SAS), Trivandrum, 2014, pp. 105-110.

[8] T. D. Bui and L. Thang Nguyen, "Recognizing Postures in Vietnamese Sign Language With MEMS Accelerometers," in IEEE Sensors Journal, vol. 7, no. 5, pp. 707-712, May 2007.

[9] L. T. Phi, H. D. Nguyen, T. T. Q. Bui and T. T. Vu, "A glove-based gesture recognition system for Vietnamese sign language," 2015 15th International Conference on Control, Automation and Systems (ICCAS), Busan, 2015, pp. 1555-1559.

[10] Rung-Huei Liang and Ming Ouhyoung, "A real-time continuous gesture recognition system for sign language," Proceedings Third IEEE International Conference on Automatic Face and Gesture Recognition, Nara, 1998, pp. 558-567.

[11] M. B. Waldron and Soowon Kim, "Isolated ASL sign recognition system for deaf persons," in IEEE Transactions on Rehabilitation Engineering, vol. 3, no. 3, pp. 261-271, Sep 1995.

[12] H. Sekar, R. Rajashekar, G. Srinivasan, P. Suresh and V. Vijayaraghavan, "Low-cost intelligent static gesture recognition system," 2016 Annual IEEE Systems Conference (SysCon), Orlando, FL, 2016, pp. 1-6.

[13] Rishikanth C, H. Sekar, G. Rajagopal, R. Rajesh and V. Vijayaraghavan, "Low-cost intelligent gesture recognition engine for audio-vocally impaired individuals," IEEE Global Humanitarian Technology Conference (GHTC 2014), San Jose, CA, 2014, pp. 628-634.