

Hand Talk Assistance

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Abstract:- In this paper we propose an intelligent system for translating sign language into text. This approach consists of hardware and software. The hardware is formed by flex, contact, and accelerometer sensors mounted on a polyester-nylon glove. In India, 30% of the people suffer with deafness and muteness. These mute/deaf individuals have a communication problem dealing with other people. It is hard for such individuals to express what they want to say since sign language is not understandable by everyone. This project is to develop a communication interpreter system that translates the sign language into text and voice that can be read by anyone. This is Hand Talk Assistance. A smart glove has been developed to capture the gesture of the hand and interprets these gestures into readable text. This text can be sent wirelessly and displayed in the LCD display. As a result of the experiments conducted it is clearly visible that gestures can be captured by set of inexpensive sensors, which measure the positions and the orientation of the fingers. The system we have made is able to interpret 20 out of 26 letters with accuracy of 96%.

Keywords:- sign language translation, gesture recognition, American Sign Language (ASL).

I. INTRODUCTION

Sign language is a way of communication where the communication does not required any sound. Instead the communication is being done with the help of sign patterns. The body gestures, orientation and movements are all the things which relies the information. In all around the world about 9.1 million peoples are deaf and dumb. In their day to day life they faced lot more problems on their communication. The greatest percentages of hearing impaired persons that comprise the deaf community are seniors that are 75-years-old and over. They account for 47% of all cases of deafness and hearing impairment. Of the children born deaf, nine of 10 have hearing parents. Irrespective of background and cultures the people of different ages are comprised under the deaf community. Due to congenial conditions there are certain cases in which there are few babies which are born deaf. But in certain condition there are few people who became deaf in particular period of their age due to some reasons .A statistics says that currently in The United States of America

approximately there are one-two million people who are deaf. Trudy Sugg’s book describes sign language as the sixth most spoken language in the world. The sign language translator we have developed uses a glove fitted with sensors that can interpret the 26 English letters in American Sign Language (ASL). This project is used reduce gap between normal people and disabled people. The glove uses flex sensors, contact sensors, and accelerometers in three dimensions to gather data on each finger’s position and the hand’s motion to differentiate the letters. The data is been transmitted to the base station for further processing of the data into text and display the text

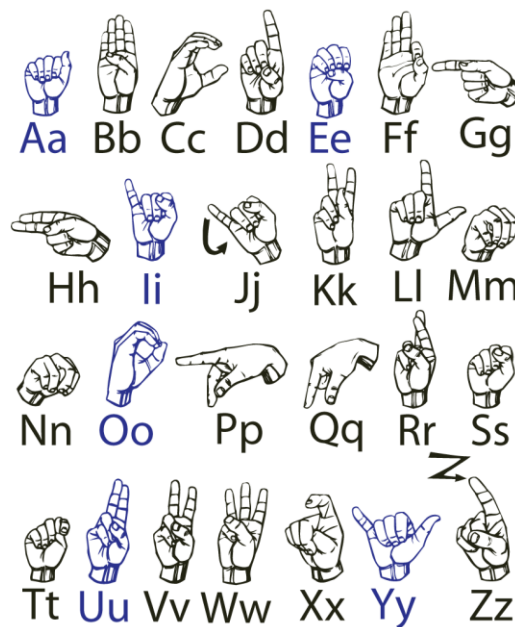


Fig 1:- Asl Language

II. MOTIVATION

Our motivation is two-fold. Aside from helping deaf people communicate more easily, the system also teaches people to learn the ASL. Our product, hand talk assistance has two modes of operation: Teach and Learn. The system uses a glove to recognize the hand positions and outputs the ASL onto an LCD. We here develop a system with the help of

gloves that contains sensors and circuits fitted to it. Those sensors interpret all the available 26 English letters. We here use the American Sign language (ASL).The sensors used in the gloves are flex sensor, contact sensor and a three dimensional accelerometer which is used in recording the position of the fingers And motion of the hand to gather data and recognize the letter. The gathered data is transmitted to the base station to be display as text. The glove detects the positions of each finger by monitoring the bending of the flex sensor.

III. DESCRIPTION OF THE DEVELOPED HARDWARE

In this section, we describe the structure of the developed prototype including the sensors and the processing stage of their signals. The sign language translator starts with the Glove, the heart of the project.The system contains two units namely Detection unit and the Base unit.All the sensors used in this work were mounted on aglove.The flexion and extension signals of the fingers were acquired using flex sensors. Two flex sensors were attached to each finger, except in the case of the thumb where we used only one sensor. We used two flex sensors because the two phalanges are needed for representing the movement of a finger . The flex sensors are the most critical sensors because most letters can be distinguished based on fingers’ flexes. The Contact sensors distinguish the relationship between the two fingers when the flex sensors are ambiguous in two cases. For example in the letters like 'u' and 'v' both the letters have the same pattern in flex sensors. Where the contact sensors are used. The contact sensors track the orientation of the fingers and find the contact between the fingers. This is then converted into letters along with the flex sensors reading. Then next is the accelerometer which is used to detect the orientation and movement of the hand. The letters 'J' and 'Z' can be differentiated only by their specific hand motion. Similarly for the letters 'G' and 'Q' can be differentiated only by their orientation. So on this cases the accelerometer is used to record the hand gesture. The output from the sensors on the Glove is connected to the Detection Unit, which is mounted on the user’s arm through the use of Velcro straps. The second part of the Detection Unit is the radio transmitter which transmits the letters signed to the Base Station. This makes the project to be wireless and easily portable. This completes the Detection unit. The Base Station receives its input through a radio receiver and outputs its results to an LCD screen.

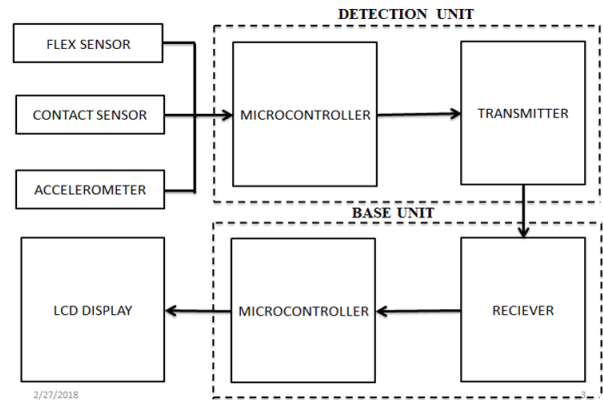


Fig 2 :- Block Diagram

IV. MATERIALS

A. Flex Sensor

The flex sensors are the same as the variable resistors in which the change in flex is calculated by the change resistance. Whenever there is a bend in the flex sensors there will be a change resistance according to the bend. Originally the flex sensors are 6 inches long which cannot be used in this system because the fingers are very much smaller when compared to those sensors and there will very small amount of deviation in flex which will not have huge effect in the value. So here with use a 2 inch flex sensors. We totally use 9 flex sensors. Two flex sensors on each fingers one on knuckles and the other on the lower joint of each finger and only one on the thumb finger.

B. Contact Sensor

The contact sensor is a special sensor with a simple design. The contact sensor is used to check whether there is a contact between any of the two fingers. The contact sensors are made up of copper tapes wound over all the fingers. Where the Middle finger, ring finger and the pinky finger are given a positive supply and the fore finger and the thumb finger are given a negative supply. The positive supply is given by the pull up resistors of the microcontrollers COM port. Whenever a positive and negative supplied sensor comes in contact there is a sudden change in the pull up resistance and the change denotes that a contact is being made. This reading is recorded. The main advantage of contact sensor is that it provides a very stable signal as output.

C. RF Transmitter And Receiver

The main reason for the usage of the radio Transmitter to make the project to be wireless and easily portable. The transmitter signal is accessed on the base station by radio receiver. The receiver filters its incoming transmissions

according to an address specified by the Detection Unit. It receives the letter signed by glove and sends the letter to the microcontroller on the base station. The main advantage in using this wireless transmitter and receivers are the device can be made portable only because of this.

D. Microcontroller

The output signal from the accelerometer is inputted to the Adc port of the microcontroller. The contact sensor output and the comparator circuit are given to the other ports of the microcontroller. The microcontroller performs a prime purpose of analyzing sensor data and processing it as per the signed letter. Then the processed data is requested to be transmitted. The second microcontroller has a request from the receiver to receive the incoming data. The data is then made into letters with code available. The 16*2 LCD is being interfaced with the microcontroller which then prints the output.

E. Lcd 2x 16 Modules

We here use a Innovati's 16*2 LCD. It is being used because it has a versatile display options. With a simple connection the LCD display achieves a wide range of application. As per its name the display have 2 lines and 16 characters in each line. We can change the position of the character to be changed by using the CCC (Cursor Control Command) option. Due to the unique background light the text can be read easily.

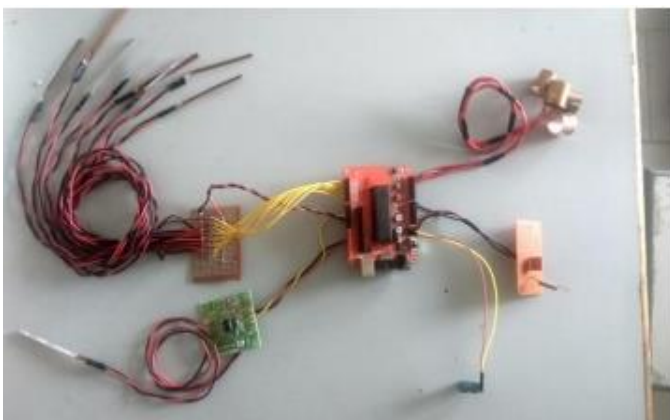


Fig 3 :- Hardware Display of Detection Unit

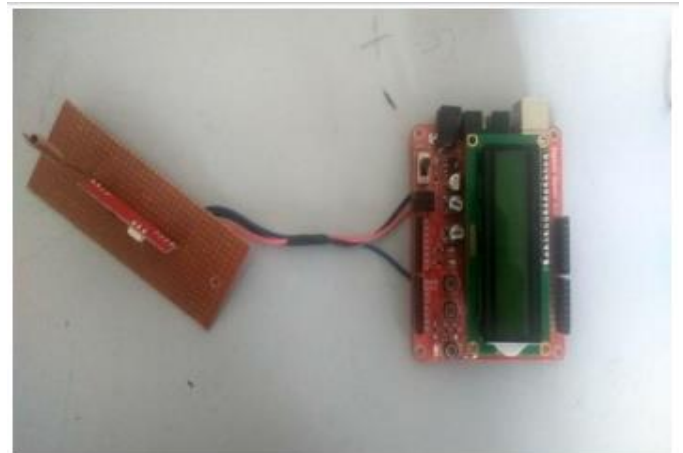


Fig 4 :- Hardware Display of Base Unit

V. RESULT

This system Handtalk Assistance works in the real time by identifying the finger's position the system can recognize most of the letters correctly. Most are detected fastly stably some letters U and E, V and W, G and Q have some recognizing issues. This may be due to the sensitivity of the flex sensors. Due to the sensitivity, the flex sensors are easily activated with the smaller movement of the fingers. Another reason can be due to the flex sensor not having the fixed position, it is not activated for some letters the maximum rate at which the system can recognize is 1 to 2 letters per second. the 2 solder board in the detection unit do not have any contact with the user's arm this is done with the help of another solder board to avoid the chance of getting shocked. The internal pull up resistor are always enabled as there is Vcc on the copper tape for the contact sensors thus reducing the chance of damaging other electrical components the wires are insulated even though unregulated based is transmitted by the detection unit, it sends a address byte before the data being transferred. The address byte was generated so long randomly and as long as anybody else address is same as of the address byte. Based on the address others filter and important thing is being noted is there should not be any interference with other designs. Anyone who have vision are able to learn the usage of glove some letters are easily confused so that it take some time for learning and manipulate the glove. If the completed the initial learning process the result will be accurate

VI. CONCLUSION

This sign language is a useful tool to easily communicate between the deaf and mute people and others. But still there was many barriers between these people. This project aims to fill the gap between these kind of people with this project, the disabled people can easily learn the sign language by using the glove and thus it will be displayed on the LCD screen allowing the normal people easily understand.

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