

## Gesture Vocalizer For Deaf And Dumb People

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**ABSTRACT:** This research paper proposes the implementation of a system which can convert sign language into voice by which dumb people can easily communicate with the normal people and trying to make the communication smooth with dumb people with normal people. Research is being done on several aspects to enhance their communication with the external world, of which, one is “The Gesture Vocalizer” that works precisely on hand movement where different gesture can be installed. This system conjointly offers highreliability and fast response. Gesture Vocalizer for deaf and dumb people is a large scale multi-controller based system. It is design to facilitate the communication among deaf, dumb, blind communities and their communication with normal people. And also the deaf or dumb people is communicate with the blind people. It is also work as smart device for the home appliances.

**Keywords:** Flex Sensor, ATmega328, LCD, Text to Speech converter, Servo motor.

### I. INTRODUCTION

In the recent few years, there has been a rapidly increase in the number of hearing damage and speech disabled, handicaps, or virtual impairment peoples due to birth defects, oral diseases and accidents. When a speech impaired person wants to speaks with a normal person, the normal person finds it difficult to understand and may be the person not understand what is the need of that deaf and dumb people and asks them to show gestures for his/her needs. Dumb persons have their own sign language to communicate with us; the only thing is that we need to understand their sign language we must know their sign language. The sign language is used by deaf and mute people and it is a communication skill that uses gestures instead of sound to convey the

meaning simultaneously doing the combinations of hand shapes, orientations and movement of the hands, fingers, arms or body and by using the facial expressions to express easily a speaker’s thoughts. But so many time normal people find it difficult to understand this sign language. The people who cannot able to speak or have lost their ability to speak in some accident, it becomes very difficult for them to convey their message within the society. To overcome this, we have come up with a project called “GESTURE VOCALIZER FOR DEAF AND DUMB PEOPLE”. In this project, Flex Sensor plays the major role means it is the heart of the project. The flex sensors are fitted on the glove along with the length of every finger and the thumb. The flex sensors give output in the form of voltage variation that varies with degree of bend when the sensor is bend the resistance is changes. This flex sensor output is given to the ADC channels of microcontroller atmega 328p . It process the signals and perform analog to digital signal conversion. Further the processed data is sent in a wireless manner to the receiver section. In this section the gesture is recognized and the corresponding output is displayed on LCD and simultaneously a speech output is play backed through speaker. The portability of this project is a major advantage. Thus with the help of this project, the barrier faced by these people in communicating with the society can be reduced to a great extent. We are also implementing some home appliances using this gesture vocalizer.[1] Humans possess the voice capability for interaction and communication among each other. Unfortunately, not everybody has the capability of speaking and hearing. Sign language used among the community of people who cannot speak or hear as the means of communication. Sign language is a gesture representation that involves simultaneously combining hand shapes, orientation and movement

of the hands, arms or body, and facial expressions to express fluently with a speaker's thoughts. The people who cannot speak makes use of the sign languages to communicate with other fellow vocally impaired person and even with other normal people. [2] Humans possess the voice capability for interaction and communication among each other. Unfortunately, not everybody has the capability of speaking and hearing. Sign language used among the community of people who cannot speak or hear as the means of communication. Sign language is a gesture representation that involves simultaneously combining hand shapes, orientation and movement of the hands, arms or body, and facial expressions to express fluently with a speaker's thoughts. The people who cannot speak makes use of the sign languages to communicate with other fellow vocally impaired person and even with other normal people who knows the meanings of sign languages or an interpreter is needed to translate the meanings of sign languages to other people who can speak and do not know the meanings of sign languages. However, it is not always possible for an individual to be around all the time to interpret the sign languages.

## II. RELATED WORK

### A. ASL Interpreter

American Sign Language (ASL) interpreter is a visual language system based on hand gestures in which a glove with flex sensors deals with the 26 letters of the English alphabet and saves into the EEPROM of the microcontroller. The LCD display is employed as a reference for the bending of each finger to correctly define a letter. The user is expected not to apprehend ASL and can use a table of sign language letters for reference. The product generated as a result can be used at public places like airports, railway stations and counters of banks, hotels etc. where there is communication between different people.

### B. Smart glove

Physically challenged patients or bed-ridden patients typically got to rely on others to control switches for light, fan, TV etc. Remote controls do facilitate such people. But, certain illnesses will not allow the patient to function even a remote controller, due to lack of flexibility in the movement of the hands. The solution for these people would be a smart glove to be worn on their hands, wherein with a diminutive movement of the finger, a relay can be made to activate a switch. This device is designed to help a physically challenged person to perform simple operations like switching on a light, fan etc. These actions can be performed

by just a simple gesture like folding a finger and mapping the gestures to a suitable action.

## III. METHODOLOGY

- A system which can convert sign language to voice by which vocally impaired people can easily communicate with other people is implemented. The system follows Sign Language standard (SL). In automatic sign language translation, one of the main problems is the usage of spatial information in sign language and its proper representation and translation. Such locations are encoded at fixed points in signing space as spatial references for motion events. We present a novel approach with a large vocabulary speech recognition system which is able to recognize sentences of continuous sign language speaker independently. The hardware is implemented by fixing a flex sensor on each finger. The variation in the finger movement can cause a voltage difference in output of flex sensor read by the microcontroller. These voltage variations are compared with mapped values between 0 to 1023 now as the value matched to mapped value the gesture will convert into text and now these text get converted into speech form by text to speech module. After that there is switch on PCB used for appliances as it is turned on the gestures defined by flex sensor and accelerometer by the variation of the figure or by varying the hand appliances will turn on like opening door, turning on the fan, or turning on the lamp. The power consumption of this product is 2W. And the current consumption is 400mA.

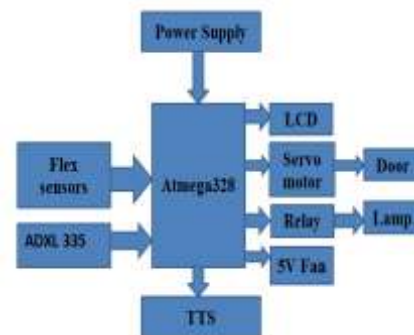


Fig 1: Block diagram of gesture vocalizer

### 3.1 Research

Research is one of the important stages to developing any system. In this stage firstly we finding out the product which is available for deaf and dumb people to communicate with the normal people. After that we also visit orphanage and

communicate with the staff and understand to what is the basic needs and what problems they are facing. We are doing the market survey which of the product we use to help of that people and we try think on that product to add some advance feature in to that product. And we decide to make to “Gesture Vocalizer for deaf and dumb people”. This product is user friendly, simple , understandable and flexible.

### 3.2 Component selection

After research the main part is component selection. In the component selection first we found on google image processing unit we study on it and the we realise that the working is complex and in future it will create the problem surely. Then we found the flex sensor also we collect some information also we was refers datasheets and then we compare this flex sensor with the image processing then we conclude that the flex sensor is giving us more advantages than the image processing and we decide to use the flex sensor. There are the popular size of flex sensors are available in market is 2.2 (5.58cm) inches and 4.5 inches (11.23cm). We select the 2.2 inches flex sensor it is sufficient for this application. Also the flex sensors are available into the different sizes. It is based on the resistance. By bending the sensor the resistance is changes.

Electrical specification of the flex sensors are

- Flat Resistance =10K ohms.
- Resistance Tolerance: ±30%
- Bend Resistance Range: 60K to 110K Ohms

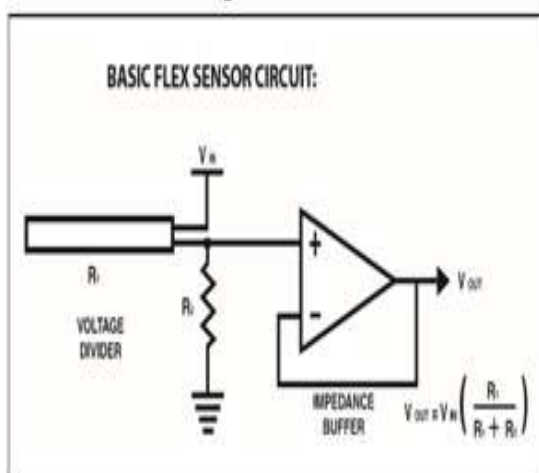


Fig no. 2 Basic Flex sensor circuit

Methodologis	Advantages	Disadvantages
Flex sensor	1.Simple programming 2.Simple calibration 3.Simple construction	1.Expensive
Image Processing	1.Less costly 2.Require only camera	1.Programming is difficult.

Fig no. 3 Advantages and disadvantages

After selecting the flex sensor we are selecting the speech module which is APR 33A3 but when we check its specification at that time there are the limitation of storing the messages after that we find the another option for the APR33A3 module after the searching we found the Sunrom TTS(Text To Speech) converter in this module there is no limitation of storing messages. And also it has various of facilities are provided like earphone jag, speaker connection unit and it is easily for the connection so we decide to select this Sunrom TTS Speech module.

After that we use the ADXL335 accelerometer. The ADXL335 is a small, thin, low power, complete 3-axis accelerometer with signal conditioned voltage outputs. The product measures acceleration with a minimum full-scale range of ±3 g. It can measure the static acceleration of gravity in tilt-sensing applications, as well as dynamic acceleration resulting from motion, shock, or vibration. This is the basic working of the ADXL335 This 3 main component selection are very important.

**3.3 Testing on available software.**After selection of components the testing of the sensor. We need calibration, value checking of the sensors. For the testing we use the Arduino ide software. By using this software we did coding of this project and it is used for testing. For the testing we use the Arduino Uno.

### 3.4Component mounting and testing.

After testing and calibrating the component mounting is next development stage at this stage the PCB making process and the drilling is done. Also mounting of components are done. So after mounting the components we take again testing.

### 3.5 Back-end Development

In this stage the coding is done on the Arduino IDE software. So with increase in bent of

FLEX sensor voltage increases linearly. With that we have VOLTAGE parameter representing the flex. We can take this VOLTAGE parameter and feed it to ADC to get the digital value which can be used conveniently. After that the serial data is given to the speech module it reads the data and speak it out. This is done in the back end development stage.

### 3.6 Front-end Development

In this stage by bending the flex sensor at the fixed angle it showing the appropriate gesture output on the LCD screen. Also by changing the position of the ADXL 335 turning ON the appliances.

After Huge Success of Pi 0 V1.3, Raspberry Pi has launched a new Upgraded version Raspberry Pi 0 W (Wireless) Board comes with inbuilt Wi-Fi and Bluetooth technology for easy communication. Most important about this board is cost effective. 0 W is the Smallest in Raspberry pi family measures only 65mm long by 30mm wide & 5mm deep. It provides connectivity with two Micro USB Ports (1 port for Power supply and other for USB Connectivity), 1 mini HDMI Port and 1 Micro SD Car Slot and has 512MB of RAM. It has same Processor as Pi one i.e. Broadcom BCM2835 processor but clock speed is 1 GHz..

## IV. RESULT

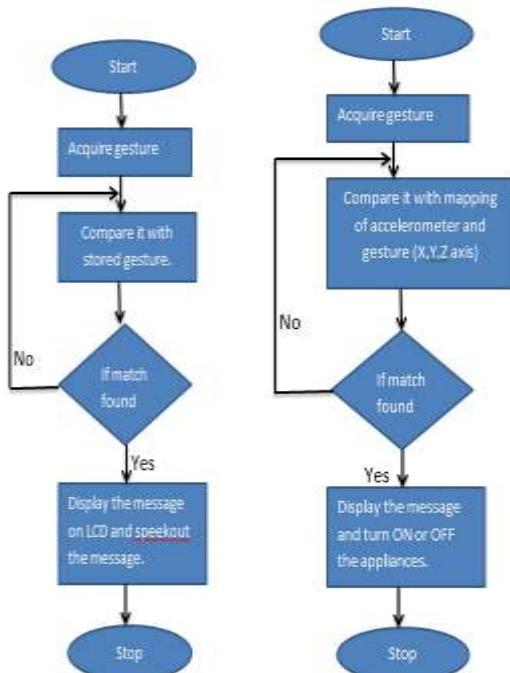
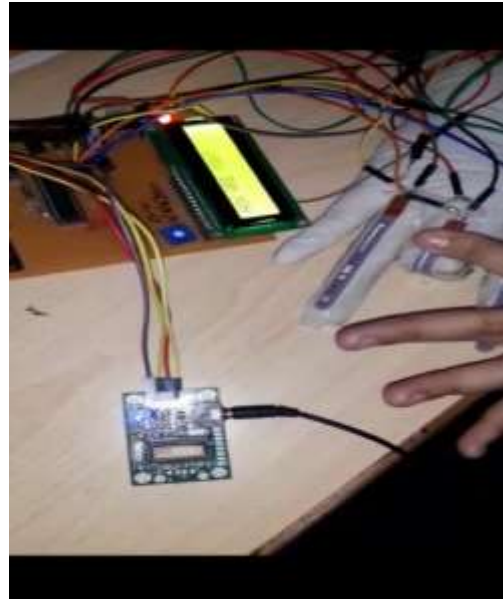


Fig 4: Resultant Flowchart 1

Fig 5: Resultant Flowchart 2

## PHOTOGRAPH OF PROJECT



## V. CONCLUSION

This research paper describes the design and working of a system which is useful for dumb, deaf and blind people to communicate with one another and with the normal people. The dumb people use their standard sign language which is not easily understandable by common people and blind people cannot see their gestures. This system converts the sign language into voice which is easily understandable by blind and normal people. The sign language is translated into some text form, to facilitate the deaf people as well.

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