

# Smart hand gesture recognition system to Give voice to voiceless people

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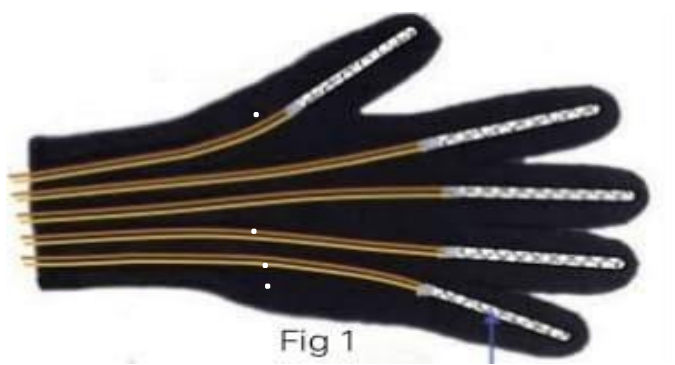
**Abstract**— Glove based gesture recognition system is the most sophisticated system for hand gesture recognition. Usually dumb persons cannot communicate ,they only manage sign language ,which will be challenging for normal persons. We can utilize this system to overcome this problem. While using this device mute people very easily can convey their message to normal people. This system will convert hand sign into voice and text so that can comfortably realize the message.

**Index Terms**— Flex sensor, Voice module, Raspberry pi PICO, Glove based gesture, Hand sign language, Data

## I. INTRODUCTION

Advancement in Technology has given many answers to many unsolvable problems. Technology advancement not only give answers to unsolvable questions but also gives new ideas to create new things. Development of Glove based gesture control recognition system has started many years ago for different purpose.

Communication is the interchange of data among two or more entities inform of voice, signals, data etc. We can use glove-based gesture control systems for communication purpose to give voice to voiceless people.



For mute people Hand sign language is the only way to communicate to outside world. We can convert this hand sign language to sounds language using certain system. First, we need to identify hand sign movements using Flex sensor. This gesture recognition sensors shows change in

resistance based on the amount of bend occurs in sensor. when we embedded this sensor to a Hand Glove, we can measure amount of bend in hand using flex sensor to recognize movement and convert it using rasp-berry pi system to get sound commands out.

This hand sign language which will be converted into sound commands and it make bridge line between voiceless people and

normal people. Hand gesture technology used in a wide variety of aeras where pin point accuracy is must.

## II. LITERATURE SURVEY

This system converts hand-gesture to voice commands using Flex sensor , Arduino Mega , Accelerometer and voice module . They used Arduino Mega to make it simple. [1]

Sign Pro is application for mute community. In this application hand gestures are converted to text messages using image processing. The process includes gesture sensing , analysis of gesture and gesture to text conversation[2].

A system where sign language is detected by a camera matches with the data in database gives the output of the sign in voice command. This system involves Hand gesture recognition by OpenCV, Database and machine learning to match the hand sign to voice command .[3] In this system, hand gestures are converted into voice commands by using ARM controller which contains data of hand gestures and voice outputs this system also has GSM module which is used connect to other devices [4]

This system converts hand signs to voice commands using image processing and ARM controller using RF module . In this system every sign language has its unique code which is identified by the system and convert it into respective voice command.[5]

Designed hand talk assisting system, basically a embedded system.

In this system Arduino microcontroller is used to process

the data and processed data will be received by an android phone instead of voice module. Both hardware and software very important in this system [6].

A device for voiceless people in which hand gestures are converted to recorded voice commands using Arduino microcontroller to process data and flex sensors to input data , the output comes out via speaker and displayed in LCD panel [7].

This system recognizes hand gesture as input and gives output as voice commands respectively . It includes Accelerometer , Flex sensors , Data glove , AVR microcontroller and playback voice module .The output comes out through Speaker [8]

### III .BLOCK DIAGRAM

In Hand gesture recognition system has both Hardware and Software. In hardware we use Raspberry pi Pico Rp2040, flux sensor, APR33A3 voice module, 16\*2 LCD Display, battery and a speaker. Software contains programming of Arduino language. Raspberry pi plays important role in whole project.

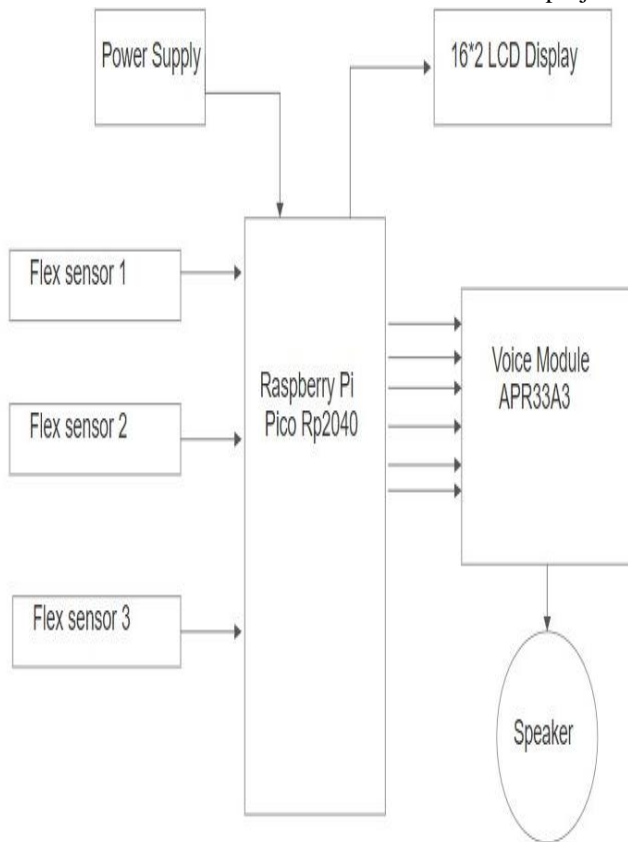


Fig 2: Block diagram of proposed work

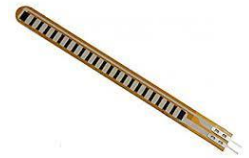
### IV .WORKING

Each flex sensor sticks to each finger and these sensors directly connected to microcontroller(rasp-Pico).

Whenever the finger was taken out, these flex sensors will gives analog signal based on bending. Later it was sent to micro - controller will convert this analog signal from flex sensor into digital signal, based on these digital signal certain programmed commands will be given to the LCD display and voice output speaker.

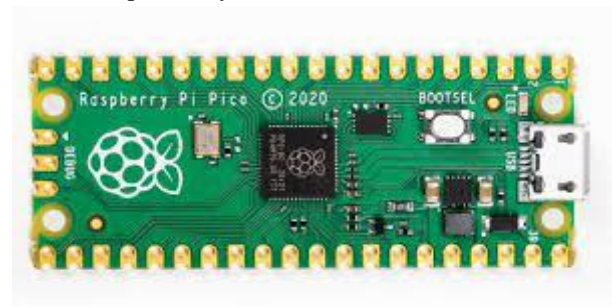
#### Flex sensor

Flex sensor is basically a system used to sense the motion of the thing or device. Whenever the bending was detected, its Resistance equivalently changes in flex sensor, output will be given based on that.



#### Raspberry Pi Pico Rp2040

The system works on the microcontroller. This microcontroller has built in ADC. The analog input from flex will be converted and digital output will be given to LCD and speaker by microcontroller.



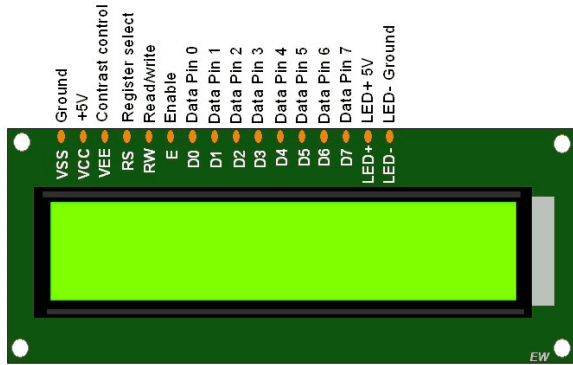
#### Voice Module APR33A3

This module can record high quality recording and also playback recorded voices. It is suitable simple interface and for single length message.



**16\*2 LCD display**

In this system we use 16\*2 LCD display . 16\*2 means it has 16 characters to display in 2 lines. The output will be display in it

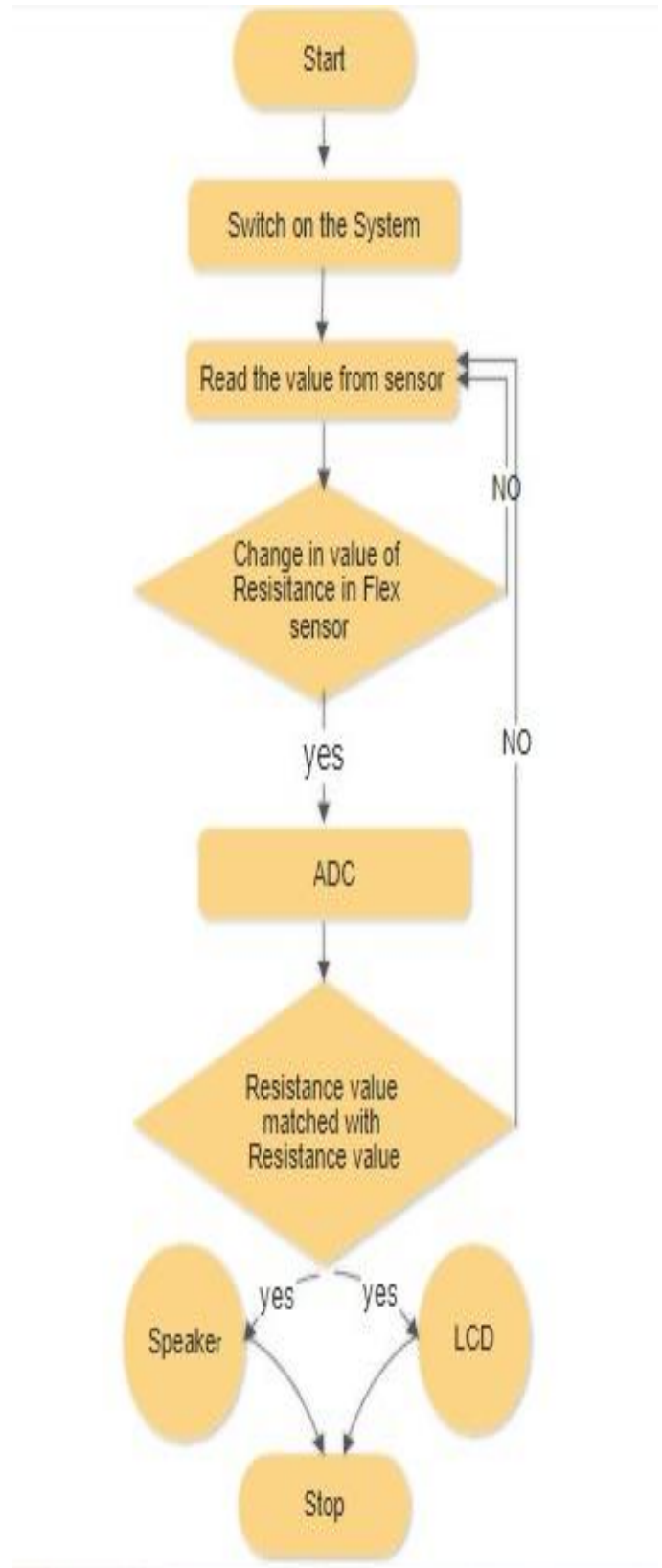


**Speaker**

Speaker is only device which gives output through voice. In this paper we use small speaker, which is connected to the microcontroller and It will give the sound which is preloaded using voice module.

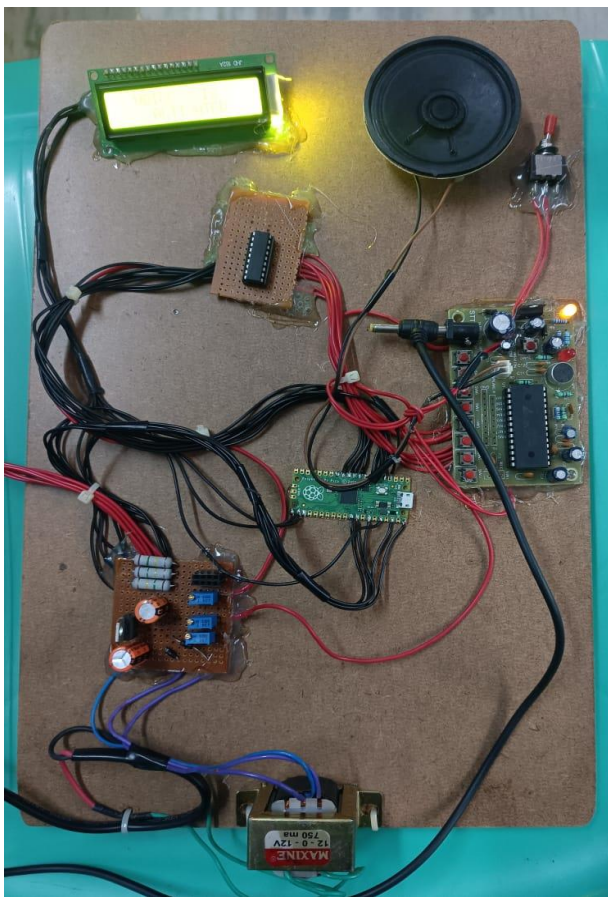


**V. FLOW CHART:**



## VI. RESULTS:

When the experiment has been performed in a real time with gesture along with zero contours then the result be “Normal” displayed on the screen and we can hear through speaker sound output also. Similarly, Two, Three, Four and Five commands displayed on screen and converted in audio voice messages accordingly. It was proposed to design to provide a cost effective, lightweight and mini device which can be carry to everywhere device which can be used to fill gap between the voiceless community with voice community. There are many difficulties can face on duration of these project with design issues which include the problem of size of system and handling. In Practical life flex sensors are tough to measure and also, we don't have any offer of an acceptable range of values to be decoded by the microcontroller. Our research has steered us to execute the design presented in this paper, but more effectual designs can also be made which may overthrow faced by our design of ‘**Smart hand gesture recognition system**’



## VII. CONCLUSION:

With the help of these simple flex sensors a voiceless person is able to interact with voice person in more comfortable and easier manner. This makes its possible to the user to not communicate with their community but also with normal communities so they can lead normal life. The system design and implementation of smart glove will help voice less candidate to express their feelings in voice. By the help of this project voice community also can understand voiceless candidate feelings.

## VIII. FUTURE SCOPE:

It can be extend to using interface with google assistant by using cloud services for home appliances can be controlled by raspberry pi .This project we are using a battery so it can be small and we are processing the data with Raspberry Pi Pico.

So we can decrease the size of the system. After implementation this device will be more efficient and user friendly. While coming to future scope of this device If we can introduce many programming languages to obtain the flexibility, so that can be developed more in order to get more precision of the device by using more flex sensors.

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