

## International Journal of Innovative Research in Science, Engineering and Technology

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# Gesture to Speech Converter for the Mute Community Using IOT

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**ABSTRACT:** The mute community around the globe has a hard time communicating with the rest of the world's population. This communication gap is there because a dumb person uses sign language which is not comprehensible by a normal person. This device act as a bridge between the normal and the mute people with the additional feature of emergency notification using IOT.The design of the device is based on embedded systems. Flex sensors and microcontroller are the key components.

### I.INTRODUCTION

Around one billion people, i.e., 15% of the population in our world are suffering with some kind of disabilities. Those disabilities include hearing impairment, speech impairment, and vision impairment and physical disabilities. Except the speech impaired people, all the other people have the ability to communicate with each other and convey what they need. So, to overcome this problem, some specific sign languages had been adopted from the ancient times. Sign language is a non-verbal form of communication that uses hand gestures to convey the thoughts. But this sign language has a disadvantage. Only Speech impaired people can understand the sign language whereas the normal people cannot.

There are three types of gestures. They are conversational gestures, controlling gestures and manipulative gestures. Conversational gestures helps to express ourselves more clearly in our daily life. They are very subtle and needs careful psychological studies. Controlling gestures can be designed to navigate in a virtual environment. Manipulative gestures serves as a natural way to interact with virtual objects. Sign language is an important case of conversational gesture. Technically, sign language can be interpreted in two ways. One way is to capture the image of the gesture and process it. The other way is to detect the motion and the bends of hand. In the image processing, the video of the moving hand will be captured. Background, lighting, scanning and color of the hand are to be considered. So, motion detection of the hand will be much easy compared to the image processing method. In this project, the second method has been implemented for detecting the movement of the hand and interpreting the sign language. No predefined sign languages are considered here since only two 2 fingers are used for gesture. Further many words can also be interpreted using all the five fingers.

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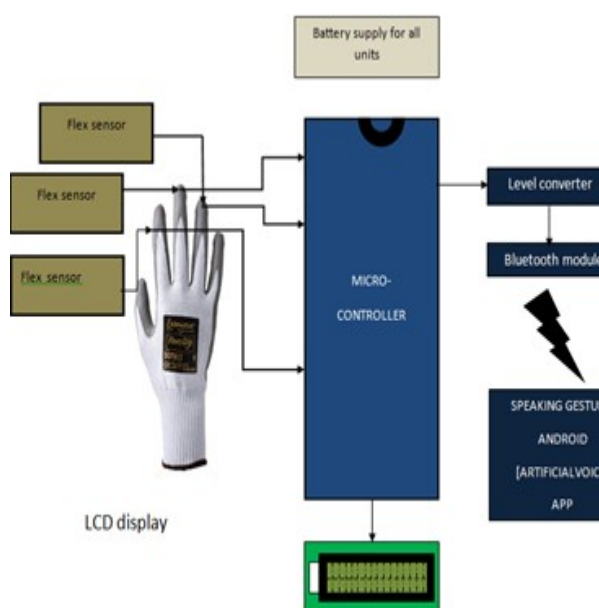
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## II. LITERATURE REVIEW

Orientation sensing is considered an important means to implement embedded technology enhanced artifacts (often referred to as ‘smart artifacts’), exhibiting embodied means of interaction based on their position, orientation, and the respective dynamics. We refer to orientation dynamics as ‘gestures’ in an abstract sense, and present a general framework for orientation sensor based gesture recognition. The framework specification is independent of sensor technology and classification methods, and elaborates an application-independent set of gestures. It enables multi sensor interoperability and it accommodates a variable number of sensors. A core component of the framework is a gesture library that contains gestures from three categories: hand gestures, gestures of artifact held permanently and gestures of artifact that are detached from the hand and are manipulated occasionally. An inertial orientation sensing based gesture detection and recognition system is developed and composed into a gesture-based interaction development framework.

An Automatic American Sign Language Recognition System is developed using Artificial Neural Network (ANN) and to translate the ASL alphabets into text and sound. A glove circuit is designed with flex sensors, 3-axis accelerometer and EMG sensors to capture the gestures. The finger bending data is obtained from the flex sensors on each finger whereas the accelerometer provides the trajectories of the hand motion. Some local features are extracted from the ASL alphabets which are then classified using neural network. Finger bending data is transmitted via zigbee and given to driver circuit to control the home appliances. Hidden Markov Model (HMM) is employed as an effective tool in most of the works. A system with two data gloves and three position trackers as input devices and a fuzzy Decision tree as a classifier is used to recognize the Chinese language gestures.

## III. HARDWARE CONFIGURATION



### Flex sensor:

A simple Flex Sensor is 2.2" in length. As the sensor is flexed, the resistance across the sensor increases. The

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resistance of the flex sensor changes when the metal pads are on the outside of the bend. Connector is 0.1" spaced and bread board friendly. The value of the output depends on the bending of the sensor. Hence, the output we get is an analog value and this output can be send to ADC IC or of Controller.

## Arduino UNO:

Arduino Uno is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins , 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. You can tinker with your UNO without worrying too much about doing something wrong, worst case scenario you can replace the chip for a few dollars and start over again. Programming language used in Arduino is just a simplified version of C++ that can easily replace thousands of wires with words.

## Bluetooth Module HC05:

Bluetooth is a wireless technology . HC-05 module is an easy to use Bluetooth Serial Port Protocol module. They use short-wavelength radio waves of frequency 2.4 GHz. This is used to send data from the arduino to the Android Phone.

## IV. PROPOSED SYSTEM

In our country around 2.78% of peoples are not able to speak (dumb). The advancement in embedded system, provides a space to design and develop a sign language translator system to assist the dumb people. This project mainly addresses to facilitate dumb person's lifestyle. Dumb people throughout the world use sign language to communicate with others, this is possible for those who has undergone special trainings. Common people also face difficult to understand the gesture language. To overcome these real time issues, this system is developed. Whenever the proposed system senses any sign language, it plays corresponding audio. This reduces the communication gap between dumb and ordinary people. This proposed model consist of four modules, they are sensing unit, processing unit, voice unit and wireless communication unit. It is achieved by integrating flux sensor and .microcontrollerThe flux sensors are placed in gloves, which respond to gesture. By using suitable circuit response of the sensor is given to the microcontroller based on the response microcontroller send the data to mobile using bluetooth.

In Software part-- an android application named Speaking gestures have been developed. It receives the data (alphabet/word) via Bluetooth, converts them into text and speaks it out. The entire process of speech synthesis has been tested and the test results displaying the alphabets and words have been shown in android app.

## V. CONCLUSION

The lifestyle of the mute can also be improved by providing them a means to have a voice for communication even without having a voice. Overall System is effective and efficient because of the use of Arduino microcontroller and android phone and android applications.

The future work is described as follows:

- The device will be portable by using a battery.
- By introducing different languages flexibility is obtained.
- A total of ten flex sensors can be used to increase the precision of this system.



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