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# Sign Language Gesture Vocalizer

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**Abstract:** *There are about 70 million silent people in the world. There are kids that have autism that is not verbal. It is extremely difficult for people with speech impairments and normal people to communicate. Thus, the system is developing a glove-based gadget that will translate sign language (ASL) to speech. Not everyone is able to comprehend sign language. These sensors record the user's movements in real time. These sensors provide data, which is gathered by an Arduino Nano microcontroller and transmitted over Bluetooth to a PC. With the help of this prototype, silent people can now speak and learn multiple languages*

**Keywords:** gesture recognition, flex sensor

## I. INTRODUCTION

There are some individuals who are deaf or hard of hearing. These individuals adjust their communication styles to include body language, facial expressions, and hand orientation and movement. Using sign language is the most common method for them to communicate. For the average person, gestures are confusing. As a result, people with this handicap are more likely to experience issues in society with their bodies, jobs, and education. They experience a great deal of isolation and deal with numerous social issues all their lives. They will benefit from a system that is made to translate sign language into voice output. This system, which recognizes gestures using sign language, converts them into speech so that people who are mute or hard of hearing can express their thoughts to others.

## II. METHODOLOGY

The system consists of both software and hardware. The hardware component consists of an Android phone, LCD display, Bluetooth module, Arduino, speaker, and Flex sensors. Software includes the Arduino sketch and the programming for an Android phone application. There are three components to the suggested system.

**1. Sensing the gestures:** An Arduino ATmega is coupled to flex sensors on each finger, which are sewn into the gloves. The analog output value rises with the bending. Arduino creates unique sensor readings for the bends by converting the analog signal into digital form.

**2. Input processing:** The analog outputs of Flex sensors are converted to digital signals by Arduino, which then produces sensor values. The accelerometer is in the same boat. Using the sensor, an Arduino program is created in the software.

**3. Communication:** The character that was assigned to the gesture in the database is displayed on the LCD LCD after the output from the Arduino is sent to the Bluetooth module. The Android phone receives the data through a Bluetooth module. MIT App Inventor is used to create the text-to-speech app. Thus, when the Bluetooth transmits the data, the audio output is obtained.

## III. RELATED WORK

A. ASL Interpreter : Each finger is bent correctly to define a letter by using the LCD display as a reference. It is anticipated that the user will not understand ASL; instead, they can refer to a table of sign language letters.

B. Static, Low-Cost Gesture Recognition System Prototype : This system is an open-hardware, low-cost gesture recognition system prototype. A data set with 36 unique gestures is used to assess the effectiveness of this gesture recognition system. Together, these gestures embody every gesture in the five widely used sign languages, totaling 120 gestures.

C. Smart Glove : Patients who are bedridden or physically incapable of operating light, fan, or TV switches usually have to rely on others to do so. Such people are facilitated by remote controls.

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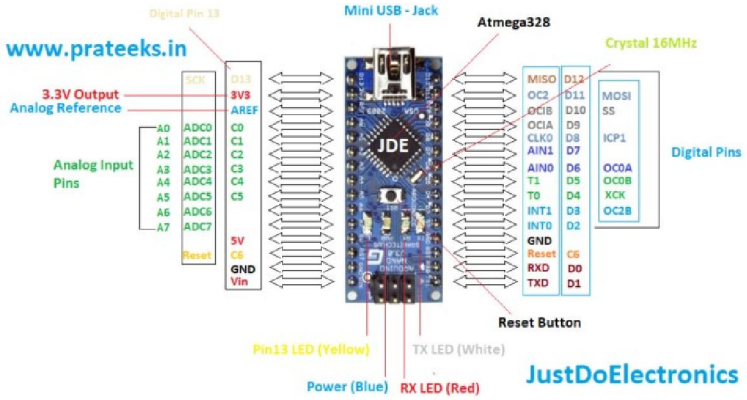
## IV. BLOCK DIAGRAM


## V. HARDWARE AND SOFTWARE IMPLEMENTATION

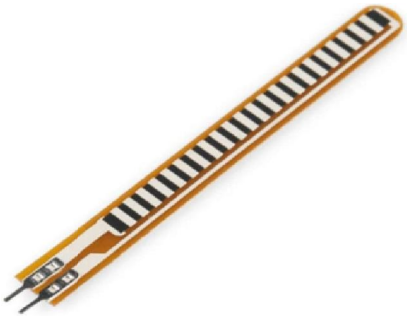
**HARDWARE IMPLEMENTATION :**

**1 ) ARDUINO UNO :** Because of its small size, I used the Arduino Uno microcontroller for this project. I selected the Arduino Uno microcontroller because it runs at 5 volts, which is also the voltage at which the flex sensor operates. This is the Arduino Uno microcontrollet's pin conviction. I used five flex sensors, and each sensor received an analog output from an Arduino Uno built-in eight analog pins (AD-AB)




(Fig : Arduino Uno)

**2) Flexible Sensor :** A flex sensor is a type of resistive device that responds to the degree of bending or flexing applied to it by altering its resistance. Typically, conductive material is embedded in a flexible material, like plastic or thin film. The conductive material's path varies as the sensor bends, changing the resistance of the sensor. Flex Sensor finds application in a number of domains, including speech conversion, control robots, and control home applications.



(Fig : Flexible Sensor)

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**3) Speaker :** In this Project, I used the 8 Ohm/0.25 watt Speaker and the sound of the speaker is relay clear and proper way sound.


**B) SOFTWARE IMPLEMENTATION :**

**1) ARDUINO IDE :**


## VI. PROPOSED SYSTEM

The suggested system uses an Arduino UNO microcontroller and flex sensor-based data glove LED indicators to show data transmission. Flex sensors are integrated into the glove. The flax detector measures the hand's orientation and generates a proportionate change in resistance for each unique gesture. Those hand gestures have an exit in controller process. The gestures are compared to a database, and an audio output is produced in the form of speech.

## VII. CONCLUSION

One helpful tool to facilitate communication is sign language. between the general public and the deaf and mute community This work is being done to see if it is feasible to use a flex sensor for sign language recognition and display the data—a system that has shown to be effective.

## VIII. ACKNOWLEDGMENT

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