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# Wearable Glove that Translate Sign Language into Text and Speech

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**ABSTRACT:** Dumb and deaf persons make up a large portion of India's population. As a result, the system is developing a glove-based device for converting ASL to speech. The basic system is divided into 2 parts recognition of sign language and conversion to text, followed by voice. The sign language glove is made up of a pair of basic hand gloves with flex sensors that detect how much the fingers bend. The sensors that increase resistance based on the degree of bend on the sensor are known as flex sensors. Data from the sensors is sent to the Arduino Nano control unit, where the analogue signals are digitally transformed and compared to the recorded value for sign detection, and then displayed as text on the mobile display. Also, the text output is wirelessly transferred to a mobile phone. Persons who are deaf or hard of hearing communicate with society using sign languages that are difficult to interpret by non-deaf or hard of hearing people. As a result, communication between deaf-mutes and non-mutes has always been a challenge. Everywhere in the world, there are difficult tasks.

**KEYWORDS:** Gesture Recognition, Sign Languages, Flex Sensors, Accelerometer.

## I. INTRODUCTION

Sign language is a natural way for normal and deaf individuals to communicate. The majority of sign language is based on hand gesture recognition. It might be difficult for ordinary people to notice signals and know what they are trying to express. As a result, the gloves' purpose is to make the lives of the deaf and dumb people easier. The gloves convert hand gestures to text and then speech, allowing ordinary people to read the recognised gesture, hear the voice, and know what the person is trying to say, resulting in more effective communication. Physical and non-physical communication are both part of the system. The sign language varies from nation to country and is not universal. The United States created American Sign Language (ASL), the United Kingdom created British Sign Language, and so on. The American Sign Language is used in the majority of countries, and our method is no different. Using Arduino as the system's brain, the gloves transform precise movements to text and ultimately to speech. The system, which is attached to the gloves, uses flex sensors to turn gestures into resistance, which is then converted to text using an Arduino Nano. The flex sensors are a type of flexible sensor. For accurate output, flex sensors are combined with accelerometers and touch sensors. The accelerometer is used to track hand motion, while contact sensors are developed to track finger touch. The sensors are chosen based on the following criteria. The sensors' output is processed on an Arduino Nano to produce text for display on a mobile device. Additionally, the data is translated to voice using text-to-speech systems. There is no commercial method for converting sign language to speech on the market. However, work is underway to translate sign language to speech that is portable, efficient, and extremely accurate.

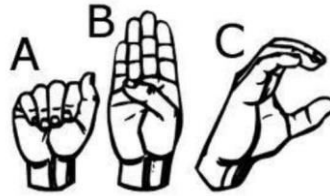


Fig1. Simple Gestures

## II.LITRETURE REVIEW

A variety of studies and research projects have been conducted on the issue of smart communication for visually and hearing-impaired persons. In addition to writing and drawing, sign language is the most efficient medium for fluent communication between regular people and these specially challenged people, according to this. Several patents have been filed in this subject with various ways to handle this challenge.

1. “Deaf-Mute Communication Interpreter” uses sensor based technique comprising of flex sensor, tactile sensors and accelerometer to translate American Sign Language gestures to both text and auditory voice. Although, they were only able to translate thirteen sign into their respective alphabets namely letters ‘A’ ‘B’ ‘C’ ‘D’ ‘F’ ‘I’ ‘L’ ‘O’ ‘M’ ‘N’ ‘T’ ‘S’ ‘W’ and tactile sensor were used to improve the accuracy of three letters M, N and T.

2. Aslant provided a system for employing gloves to understand sign language. The framework consists of five flex sensors, a microprocessor that analyses sensor data, an LCD that displays individual findings, and a speaker that listens to the output. It generated both a visual display on an LCD and auditory output through the speaker. This strategy has the disadvantage of restricting the user's freedom of choice.

## III.DESIGN METHODOLOGY

### Block Diagram

The three basic procedures of American Sign Language translation are recognizing sensor values, processing, and displaying/listening according to the sign. The most significant element of this project is the flex sensor, which is simply a variable resistor. Carbon on plastic is used to make these sensors. When the strip bends or deflects, the resistance of the flex sensor varies. Weutilized one flex sensor for the thumb and four sensors for the fingers. The hand's remaining fingers the flex sensor used in this project is 2.2 inches long, ensuring that the findings are accurate and correct. As a result, the flex sensor's resistance increases when the component's body bends. As shown in the block diagram below.

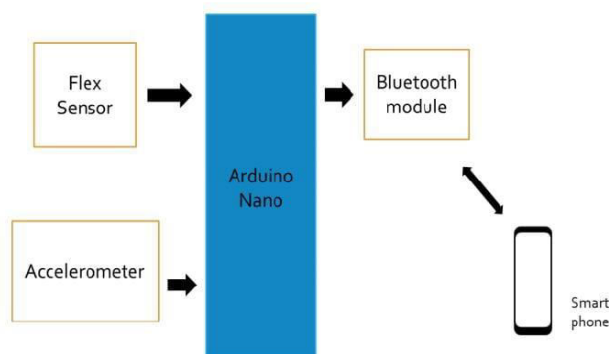


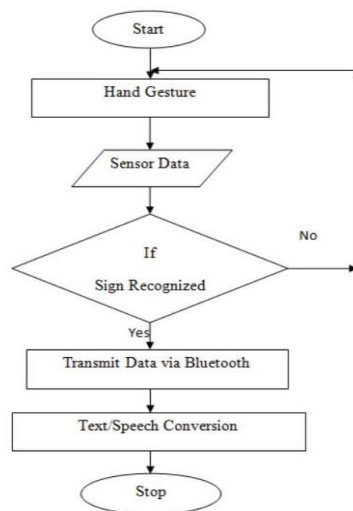
Fig2. Block Diagram



The values of the flex sensors and accelerometer are the main inputs to the Arduino Nano. When the hand is in a particular gesture according to sign language, the data from the flex sensors and accelerometer are obtained. The microprocessor transforms the resistance change into voltage, which it then processes. The specific value of a sign is inside the range. This symbol is indicated for help in the identification of alphabets and words. After a connection is made, the alphabet is wirelessly sent, and on the Android application, the alphabet/word is shown and voiced. Home automation and health monitoring will function on the same concept, in that when the sensors detect a problem, they will alert the user. When a user makes a gesture, it is processed and broadcast from the transmitter to the receiver, and the system responds, i.e. when a user makes a gesture, it is processed and transferred from the transmitter to the receiver, and the relay turns on or off the device connected to it. The pulse sensor, on the other hand, will measure the user's pulses and communicate them to the application through the HC-05 module.

**Flow Chart**

The algorithm flow utilized in the, small fingers on the hand, Arduino Nano, and also the measurement system to recognize the exact movement of the fingers. Each flex device is given an initial voltage, and when the fingers move, there will be a decrease because to a change in resistance caused by the bending of the flex device on the fingers. The input voltages collected are then transformed to a digital voltage pattern using an analogue to digital converter such as the Arduino Nano. The digital output is then compared with the device's preloaded values for Alphabets and numbers in the system; if the digital output matches the preset values, the Gestures are recognized, and the compared output is displayed as text on the mobile screen, making it easier for a typical person to browse and recognize.



**Fig3. Flow Chart**

A similar output is transmitted over a Bluetooth module, and the output is distributed via Bluetooth link to an Android Smartphone or a public laptop that is connected to the Bluetooth module and includes a Text to Speech (TTS) conversion package (application). The serial input is received via the Bluetooth link on the connected device, and a text output is received on the appliance with speech output from the speakers. This may make it easier for aged people to look at the output and recognize gestures rather than listening to the audio and communicating only with the deaf and dumb.

**Hardware and Software**

**A. Hardware Use**

1. Arduino Nano
2. Flex Sensor



- 3. Adxl 335 Accelerometer
- 4. Bluetooth Module

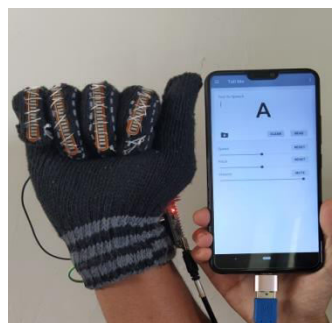
### B. Software Use

Arduino IDE:

The Arduino Integrated Development Environment - or Arduino Software (IDE) - contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Arduino hardware to upload programs and communicate with them.

### IV. EXPERIMENTAL RESULT

The movement in the fingers is measured using an accelerometer. Flex sensors allow the movement of each finger and the thumbs of the gloves. The flex sensors send out a flow of data that varies depending on at which you bend. A glove has five bend sensors, four for the fingers and one for the thumb. The flex sensors will be connected through resistors and the resistors will be of 1Kohms. This helps us know the resistance of the flex sensors according to movements of the user's fingers. The resistors will change values on flexing of the sensors and this way we receive the output of values. These sensors measure the bend in the fingers, thumb, and palm, and the Arduino Nano microcontroller determines which set of values represent which symbol based on the bend angle value, and sends the appropriate result value to the Android app via Bluetooth, which displays and speaks the generated symbol.



**Fig. a) A closed fist, all finger folded against the palm, thumb is straight, alongside the index finger.**

The output of the alphabet "A" is represented in figure "1," and the following movement identifies the letter "A." "The bend of the fingers is measured by sensors." When these requirements are fulfilled, the alphabet is the single selection. "A" will be displayed on mobile screen and then speech output is obtained.



**Fig. b) all fingers are straight. Thumb is folded across palm.**

The output of the alphabet "B" is represented in figure "1," and the following movement identifies the letter "B".The bend of the fingers is measured by sensors." When these requirements are fulfilled, the alphabet is the single selection. "B" will be displayed on mobile screen and then speech output is obtained.

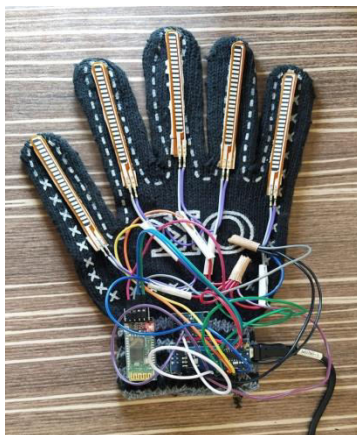


Fig. c) Final picture of the system.

The figure "C" shows the final picture of the system.Using these Gloves, the system will convert the sign language into text and speech.

## V.CONCLUSION

This technique allows deaf, dumb, and blind persons to communicate with one another. Dumb people speak in their own language, which is difficult for blind and conventional people to understand. The sign language is also translated into a written format to help deaf people. This text appears on a computer screen. Deaf people must be recovered. We'll using it to observe the hand motions for the deaf and blind.Hand movements are converted to text and then to voice by the system. If a person cannot hear the sound made due to those difficulties, a provision has been implemented into the text system so that the person still read and understand what the other person is trying to say.

## REFERENCES

- [1] A. Raja Mohan, R. Hemavathy andM. Dhanalakshmi,“Deaf-Mute Communication Interpreter”, International Journal of Scientific Engineering and Technology, Vol. 2, pp. 336-341, May2013.
- [2] Arif Arslan; Rizvi, Syed Tahir Hussain; Jawid, Iqra; Waleed, Muhammad Adam; Shakeel ,Muhammad Raheel (2016). Techno-talk: An American Sign Language (ASL) Translator. In: 2016InternationalConference on Control, Decision and Information Technologies (CoDIT), San Julian, April 6-8, 2016. pp. 665-670.
- [3] K.V.Fale, Akshay Phalke, Pratik Choudhari and Pradeep Jadhav, “SMART GLOVE: Gesture Vocalizer for Deaf and Dumb People”, International Journal of Innovative research in Computer and Communication Engineering, Vol. \$, Issue \$, pp. 6800-6806, April 2016.
- [4] Praveen Kumar, S Havalagi and Shruthi Urf Nivedita, The Amazing Gloves that give Voice to the Voiceless!, International Journal of Advances in Engineering&Technology, Vol.6,No.1,pp.471-480, March2013.
- [5] Das, A., Yadav, L., Singhal, M., Sachin, R. Goyal,H., Tap aria, K., Trivedi, G. (2016). Smart glove for Sign Language communications. 2016 International Conference on Accessibility to Digital World (ICADW).DOI:10.1109/icadw.2016.7942508.



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