# Design and Implementation of smart gloves fordeaf and tongue-tied disabled

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**Abstract:**

In communication medium, sharing a conversation dialogue between the normal person and deaf and dumb person is one of the challenging tasks still. The dumb person can practice hand gesture language in their community but not to others. This research article focuses to minimize the difficulty level between these two communities with smart glove devices. Besides, the author believes that result of the proposed model provides a good impact on the dump community. The smart glove contains input, control, and output moduleto get, process, and display the data respectively. Our proposed model is used to help these communities to interact with each other continuously without any error. The proposed model is constructed with good specification flex sensors. Little change of resistance in flex sensor is providing changes in their gesture language. So, this orientation direction is calculated well and gives better results over existing methods. Thewireless set can be made with Bluetooth technologies here. Here the gestures are assigned based on the alphabet letter. The sign language performs and gives audible output in the display section of the proposed model. It gives good results in our experimental setup. This research work focuses on good recognition rate, accuracy, and efficiency. The good recognition rate shows the continuous conversation between the two persons. Moreover, this research article compares the recognition rate, accuracy, and efficiency of the proposed model with an existing model.

## 1. Introduction

According to a survey, 2.42M people are deaf and dumb people in India that large amount in the society. Overall, the world is having around 15 – 20 % of the deaf and dumb population. This community is facing communication problems in society and the neighboring area. This communication gap is creating lots of problems and isolation of a particular community. The common person communication constituent is not sufficient for all other communities. The term "Augmentative and Alternative Communication" refers to speech components other than audible type communication. It consists of many symbols, figures, rising tones of synthesized speech, and drawing with sign language. Augmentative model communication comprises various datasets for limited abilities of their speech. Figure 1 shows smart glove pictures with flex sensors, Arduino, battery, conductivity thread, and a transmitter section. This mode of communication is supporting both people in the community. Generally, the alternative model is comprised of the database for their corresponding sign and symbols. No speech persons will interpret their idea, desire, needs to the normal person. The communication systems are customized for many specific situations such as a person visit doctor, a person attends an interview, and

so on. Also, the communication devices are controlled by many central processing units of the computer or laptop.

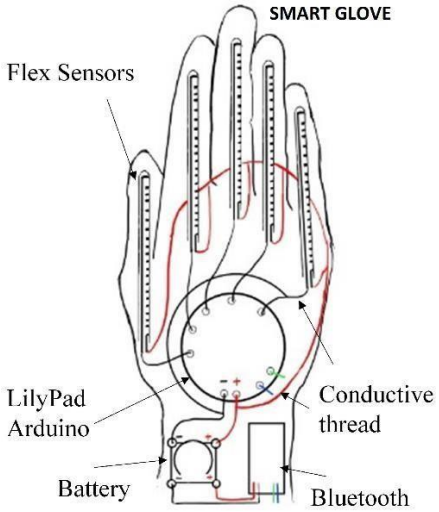


Figure 1: Overview structure of Smart Glove

The communication devices are not easy to carry and handle in all the places where they want. The electronic system should be easy to handle and portable, dedicated for the corresponding person. The dedicated device is used to do communication between the person that speaking by electronic devices. The undedicated devices are including speaking with many sign functions and feature extraction which will function with the central processing unit of the devices. It can provide internet facilities, e-mail services, etc. Our proposed system contains both of the operations lead by electronic devices.

**2. Literature survey**

According to the analysis done that, one out of every five people is deaf or dumb on this planet is an Indian. In India about more than 1.5 million deaf people utilize Sign Language as a method ofcorrespondence. Normal parents of deaf children or vice versa use gesture based conversation other than deaf population. However, due to this type of complications an automatic Sign-to- Speech/text language interpretation framework could assist to make more details accessible to the hearing impaired. In addition, the framework won't just promote data access; however it can likewise be utilized as an instructive apparatus to become familiar with any communication via gestures. One of the earliest employments of a gesture based communication is from the 5th century BC, in Plato's Cratylus. In 1620, Juan Pablo Bonet proclaimed, Reduction of letters and art for instructing mute individuals to talk which is said to be the 1st present day investigation of communication via gestures vocal, mounting out a strategy for voice training for hard of deaf individuals and a stadard letter set. Thomas Pryor and Navid Azodi are UG understudies who made the Gloves that make an interpretation of communication via gestures into text and speech known as signaloud. They had on Lemelson-MIT understudy cost for this venture. The first Hand oration mittens was constructed by Ryan Patterson in the year 2001. This model had constraints that a PC or a workstation was constantly required for

its working which made it less convenient and less portable.

In 2006, Nguyen Dang Binh et.al proposed "A New Approach Dedicated To Hand Gesture Recognition" utilized Thai communication via gestures acknowledgment with the strategy 14 ultra-data-glove which was fixed with 10 sensors for fingers and rest 4 sensors among the fingers which estimates variations and appropriation respectively. But, he got the 94% outcome set. He utilized another new Pseudo 2-

## 3. Proposed method

This paper aims to construct the smart glove to convert sign language to the audible speech signal. Our proposed system is implementing for capturing the images from the disabled person and identify the hand gesture him. The standard hand sign from the dumb person is showing in figure 4. The gloves are designing for identifying the motion of the hand gesture. The smart gloves consist of many bend sensors which are used to support convert some electrical signal to data signal as speech. The motion of a hand gesture is given to a smart glove which consists of a microcontroller unit within it for the further process of a model. The gesture signal is transmitting through Bluetooth for communication medium. The recognized gesture is matching with pre- defined data and it is providing to the display unit or speaker unit for voice recognition. Our proposed model has two sections as transmitter and receiver. The process flow of the transmitter section of the proposed method.

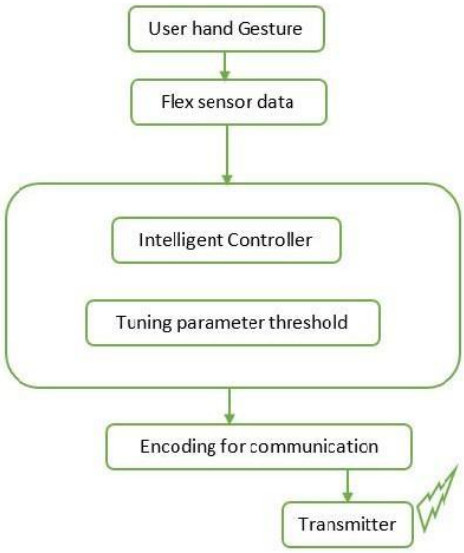


Figure 2. Proposed block diagram

Figure 2 shows the workflow of the receiver section of the proposed method. The additional gesture recognition system provides a better understanding between the people and improving the accuracy, recognition rate, and efficiency of the system compared with existing methods [27].

## 4. Results discussions

The different resistance values of flex sensor with various degree of sensors position. Based on these flex sensors in our proposed model gives a more appropriate answer for the hand

gesture compared to many bend sensors output. This appropriate answer is making the comfort zone between both the persons in confidently. The confidence level can make a very possible and comfortable life for every person with their community. Also, this is very cheap cost wise to buy, and simple in design to troubleshooting themselves. So, the proposed model is identifying and giving feedback very quickly with recognized words. Also, we obtained a real-time recognition rate of 95.6% with a lot of tests. The smart glove is constructed for sign language to text and speech in further development. Their model consists of a bend sensor, microcontroller, communication medium device. This Augmentative and Alternative Communication (AAC) comprises many limitations for this hand gesture language. The controlling unit is used to control the sensor output and it connects with a smart glove by a microcontroller. The conversion units are incorporated inside the controlling unit. The bend sensor output is converting from voltage to text output for the detection process. Also, there is developed android version devices for communication channel with Bluetooth technology. Here this software application is converting from text into an audible speech signal.

## 5. Conclusion

Thus, our proposed model has been constructed and tested successfully. Our smart glove is used to make a communication medium between deaf and normal people. Also, it is breaking their barrier between them with normal conversation confidently. This glove can spring confidence, comfort in their community. It makes their life's better and carrier can grow. The recognition percentage is also very high compared to another model with various iteration and locality. Our future works are carrying the following phenomena: Implementing artificial neural network in our proposed model. Training many data set leads to a good accuracy level with various parameters and circumstances. Improving speaker quality and deleting or updating the pre-defining dataset. Increasing the number of hand gesture images in the dataset with a machine learning algorithm.

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