Hand Movement Recognition for a Speech Impaired Person

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Abstract - *Hand gestures are the non-verbal method of communication used along with verbal communication. A more organized form of hand gesture communication is the sign language, which is the language of communication for deaf and dumb people. In our country around 2.78% of peoples are not able to speak. Their communications with others are only using the motion of their hands and expressions. We proposed a new technique called artificial speaking mouth for dumb people. It will be helpful to them for conveying their thoughts to others. In order to overcome the complexity the artificial mouth is introduced for the dumb peoples. This system is based on the flex sensor. According to dumb people, for every gesture they have a meaning. All templates are kept in the database. In the real time the template database is fed into a ardiuno and the flex sensor is fixed in their hand. For every action the flex sensors get accelerated and give the signal to the ardiuno. The ardiuno matches the gesture with the database and produces the speech signal. The output of the system generate using the speaker. By properly updating the database the dumb will speak like a normal person using the artificial mouth.*

Key Words: **Gesture, Flex sensor, Ardiuno, Speaker.**

1. INTRODUCTION:

To overcome the communication gap between dumb and normal people this system is introduced. All over world, deaf and dumb people struggle in expressing their feelings to other people. These gestures are widely used by the deaf and dumb people to express their thoughts [1]. Various challenges are experienced by speech and hearing impaired people at public places in expressing themselves to normal people. This system use a method to design an Electronic Hand Glove which would help for communication. As sign language is well structured code gesture, each gesture has a meaning assigned to it [9]. This system is being proposed with the use of flex sensors. Main goals of the system are to convert hand gestures to auditory speech for communication between mute and normal people. The system is based on Indian Sign language and covers all the words required in day to day life.

The blind people can speak freely by implies that of ancient language whereas the dumb have their own manual-visual language referred to as language. The languages haven't got a typical origin and the hence hard to interpret. A Dumb communication interpreter is also a tool that interprets the hand gestures to sensibility speech. A gesture in associate degree extremely language is also a certain movement of the hands with a particular kind created out of them. The primary aim of this paper is to introduce an issue that will efficiently translate language gestures to sensibility voice. The interpreter makes use of a glove based technique comprising of flex sensors. For each hand gesture created, a symptom is formed by the sensors appreciate the hand sign the controller matches the gesture with prestored inputs. The device will even be able to translate larger gestures that require single hand movement. Gesture recognition implies a method from that knowledge is collected from hand movement. Flex sensors and gloves are used to generate the gestures. Gesture data recognize by arduno. According to gesture data sound will be generated with the help of speaker.

2. LITERATURE SURVEY:

In the recent years, there has much research on the hand sign recognition. There are two technologies for recognition of hand gestures

> ➢ Vision-based methods :- The Vision Based methods require only a camera, thus realizing a natural interaction between humans and computers without the use of any extra devices. These systems tend to complement biological vision by describing artificial vision systems that are implemented in software and/or hardware. This poses a challenging problem as these systems need to be background invariant, lighting insensitive, person and camera independent to achieve real time performance. Moreover, such systems must be optimized to meet the requirements, including accuracy and robustness. [8]
> ➢ Glove-based methods :- In glove based method the concept Data-Glove based methods use sensor devices for digitizing hand and finger motions into multi-parametric data.

Similarly a data-capturing device is also required in order to recognize sign language; in this case measuring the position and movement of the signer's hands [4]. Two broad categories of input hardware have been used for recognition of hand gestures – glove-based devices such as those used by Kramer et al (1989) [7] and Fels et al (1993) [6], and camera-based systems as used by Holden (1993). The latter approach has some benefits, particularly as it does not require specialized hardware, but this is offset by the complexity of the computer vision problems faced in extracting the necessary data about the hands from a visual image. Therefore for this research glove-based input was used, as this allowed the research effort to be focused on the area of sign recognition rather than that of data capturing.

Comparison:

In case of vision- based gesture recognition systems, a lot of the digital signal processing has to be done. Also there require large programming. Because of this the response of the system is quite slow. Also the electric, magnetic fields, and any other disturbances may affect the performance of the system. In case of glove-based sign language recognition system that is available in the market lot of the hardware is required. Large numbers of cables have to be connected to the computers for monitoring the data. Hence the systems require lot of space. Also the system is not handy. In case of our project flex sensors that we are using are of low cost. Also the processor that we use in our process is very compact. Hence the space required for our system is very less compared to the other projects that are available in the market.

 Thus the system is portable. Performance of the system is not affected by the disturbances. Here we are converting hand signs in to the corresponding speech signal; hence the system is the proper means of effective communication. As the hardware required in designing are low cost, the overall cost of the system is less compared to the other systems available in the market, and it is the system is flexible enough for a user to add, modify or delete a hand sign.

3. FLOW CHART:
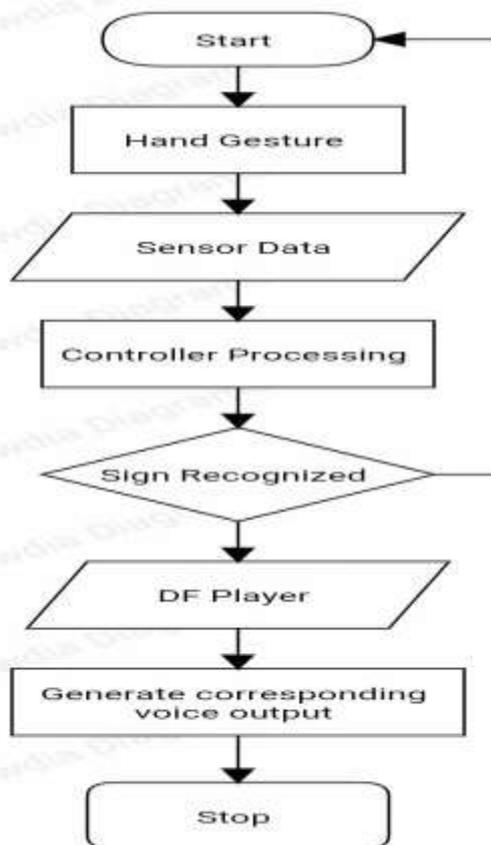
4. WORKING:

In this project we are using many components which include Node-MCU and a 4051 Multiplexer IC. While the Node-MCU is packed with excellent features such as WiFi and Arduino IDE compatibility, it has its drawbacks. It only has one analog pin, which is insufficient for this project. Since the glove has three flex sensors, it requires three analog inputs to work. A simple and inexpensive solution to this problem is to use a Multiplexer IC (74HC4051N). This IC is able to convert one analog input into eight

The IC works by turning on one analog input, reading it, and turning it off. It then turns on the next analog input. By doing this, it only reads one sensor at a time, sending it to the micro controller's analog pin. The IC is able to turn on, read, and turn off the analog inputs so quickly that it seems as though it is reading them all at the same time. This is similar to how computer and smartphone screens work; each pixel cannot have its own designated pin (that would be a disaster!), so it turns the pixels on and off so fast that our eyes perceive all of them as on at the same time. To function, the IC needs three digital pins. By changing the combinations of the on and off states of the pins, the IC is able to turn on and off all 8 analog inputs.

Data Glove:

Data glove consists of 3 flex sensors. The gesture of the hand movement detected by the Ardino.

Glove based technique :- It use a glove with different type of sensors like optical, electrical etc. this sensor based glove collects the data according to the hand movement and then this data is analyzed.

The output of the measuring device sensors is detected by the lean detection module, whereas the output of the flex sensors and therefore the overall gesture of the hand square measure detected by the gesture detection module [3].

Flex Sensors:

Flex sensors are resistive carbon parts. It is a variable whose resistance changes on bend smaller the radius of bend higher the resistance it offers. The variation in resistance is just about $10k\Omega$ to $30k\Omega$ [2]. The device incorporates within the device employing a potential divider network. The electrical device and flex forms a potential divider that divides the input voltage by a quantitative relation determined by the variable and glued resistors. Flex sensors are joined to the glove utilizing needle and string. Flex sensors are the sensors whose resistivity changes with the measure of curve. In this project, Arduino is used to take input from flex sensors.

Hand Gesture:

A   B   C
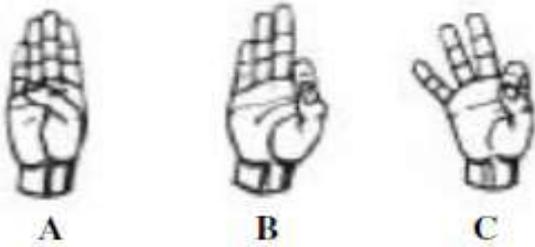
Advantages:

a) Useful for handling emergency conditioning.

b) Easy to implement.

c) It provide communication between dumb and blind.

d) Easy to operate: Anyone can operate it easily.

e) Easy to define gestures: we can add or define our own gestures.

3. CONCLUSION

 Sign language may be a helpful to ease the communication between the deaf or mute community and additionally the standard people. This project aims to overcome the communication gap between the dumb community and the standard world. The projected methodology interprets language into speech. The system overcomes the necessary time difficulties of dumb people and improves their communication. This system converts gesture data into speech. In world applications, this system is helpful for dumb of us those cannot communicate with standard person. The foremost characteristic of this project is that the gesture recognizer may be a standalone system, that's applied in common-place of living. It's in addition useful for speech impaired and paralysed patient means those do not speak properly.

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