

SIGN LANGUAGE WITH FLEX SENSOR USING TEXT AND VOICE OUTPUT

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ABSTRACT: Sign language translator is a project for social purpose, in which we are trying to implement a system which makes a communication gap between deaf/dumb and normal people as less as possible. Deaf and dumb people make use of sign language or hand gestures to make understand and to express their thoughts what he/she trying to say but it is impossible to understand by the normal people .Hence ,the system working on a glove based system that will be used for translation of sign language to speech and text. The basic system consists of a two parts; Sign language recognition and conversion to text and further speech. The device is just like a hand gloves fixed with flex sensors which is being used for the monitoring the amount of bend on the fingers. Data from the sensors is send to the controller which is the Arduino UNO the analog signals from the sensors are digitally converted and compared with the stored value for the recognition of sign and then displayed as a text on the 14x2 LCD and speech format on Android. Main goal of the system is to convert hand gestures to auditory speech for communication between mute/deaf and normal people. Hence,we make a simple prototype by taking some of those gesture and convert it into an audio and text form so that the normal people can understand the mute and deaf easily.

Keywords - Sign language, Arduino, Data Glove, Hand Gesture recognition Flex sensor , LCD.

I. INTRODUCTION

Sign language translation is one of the most growing line of exploratin now days and its miles the maximum natural manner of communication for the humans with hearing disablement. Sign language is a way of communication via human beings diminished by speech and listening to loss. Around 360 million human beings globally be afflicted via unable to hearing loss out of which 328000000 are adults and 32000000 children. Hearing disablement extra than 40 decibels in the better listening to ear is referred as disabling listening to loss. Thus, with growing range of people with deafness, there is moreover a rise in demand for translators. Minimizing the communication gap among listening to disabled and

regular humans turns into a want to make certain effective conversation among all.

In this paper, we propose a novel scheme of Sign language translator using text and voice output. We use a glove based method to translate the sign language. A hand gesture translation gadget can give an opportunity for deaf/dumb people to talk with normal humans without the need of an interpreter. The system is built for the automated conversion of sign into textual content and speech.

II. LITERATURE SURVEY

Paper [1] shows, a hand free translation of Taiwanese sign language which uses the wireless device to process the data. To differentiate hand, they have inner sensors put into gloves to show the boundaries as given by, posture, orientation, motion, defined of the hand in Taiwanese Sign Language could be recognize in no error. The hand gesture is considered by flex inner sensor and the hook size considered using the g sensor and the movement is considered using the spinner.

As the signal which was sampled can stay longer than the pre-set time, the legal gesture sent using phone via connectivity like Bluetooth for differentiating gestures and translates it. With the proposed architecture and algorithm, the accuracy for gesture recognition is quite satisfactory. As demonstrat the result get the accuracy of 94% with the concurrent architecture.

Authors of paper [3] applied a method of using a sham named animation making approach they have converted Malayalam language to Indian sign language. The intermediate representation in this method for sign language is being used by Ham No system. This method the application accepts some sets of words, say, either one or more and forms It in animated portion.

Authors [4] have proposed something great for the deaf community or hearing loss community by providing an app for the communication. But making an app for it is no simple

task at it requires lot of efforts like memory utilization and a perfectly fined design to implement a such

The authors [6] have built a system which works in a continuous manner in which the sign language gesture series is provided to make a automative training set and providing the some kind of sign from the set of training. They have proposed a system with instance learning as density matrix algorithm that monitors the sentence and find out the compound sign gesture similar to it with a monitors of noisy texts. In this project they studied about sign language translation in glove based approach which for long time formed dependencies. The result of this projects leads to a success rate of 98% accuracy which could able to identify the 26 gestures.

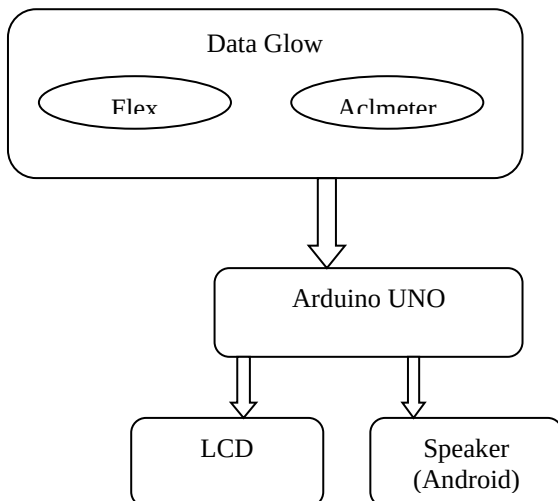
III. METHODOLOGY

Sign language translation using text and voice output, consists of ;

1. Reading man or woman hand movements and capture it by the help of flex sensor.
2. Trained the system learning model for image to textual content translation.
3. Forming simple words.
4. Forming some large sentences.
5. Forming the entire content which will they want to convert.
6. Obtaining audio output as well as the textual output.

Flow Diagram:

The flow chart explains the steps occurring to accomplish



1. Gestures Accession

The hand movements sensed by the help of flex sensor. The hand glove consists of 5 flex sensors which are fixed on the fingers of the gloves because the main part of the gestures are fingers so for each finger a separate sensor is required. The hand gesture is inputted to the system via flex sensors the bent of each finger describes as shown in Indian Sign Language. As the fingers bends the sensors also starts bending and as the

sensors bends the resistances also changes accordingly and that resistance value is inputted to the Arduino UNO.

2.Hand Posture Recognition

The preprocessed images are processed and store in data glove. The model that has already been trained generates the predicted label. All the gesture labels are assigned with a probability. The label with the highest probability is treated

3.Display as Text & Speech

The model accumulates the recognized gesture to words. The recognized words are converted into the corresponding speech using the pyttsx3 library. The text to speech result is a simple work around but is an invaluable feature as it gives a feel of an actual verbal conversation.

Algorithm

Sign language with flex sensor using text and voice output .

Start

S1: Set the hand postures to adjust with the skin complexion and the lighting conditions.

S2: Apply data increase to the dataset to expand it and therefore reduce the overlamping.

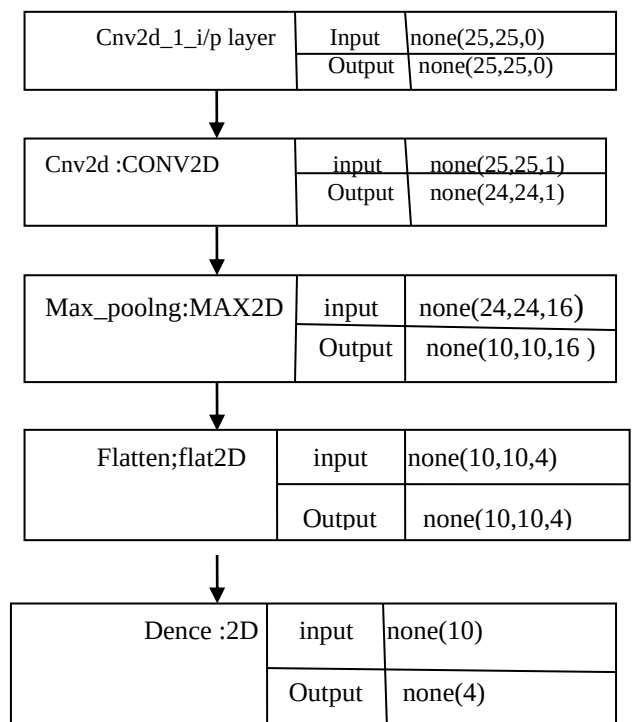
S3: Split the overall dataset into train part, test part and validation data sets.

S4: Train the CNN model to fit the dataset.

S5: Generate the model report which includes the accuracy, error and the confusion matrix.

S6: Execute the forecast file – this file forecast individual gestures, cumulates them into words, displays the words as text, also ralated voice output.

Stop



IV. COMPONENTS USED

A) Flex Sensor

Flex sensor means flexible sensors, flexible sensor are sensors which change their resistance depending upon the bend on the sensor. The more the bend the resistance is also more. Flex sensor also work as variable analog voltage divider. Flex sensor consists of carbon resistive element within a thin flexible substrate. When the substrate is bent the resistive element produces a resistive output relative to the bend radius. The system consists of 5 flex sensors which are stitched on the fingers of the gloves because the main part of the gestures are fingers so for each finger a separate sensor is required

B) Arduino UNO

"Uno" means one in Italian and was chosen to mark the release of Arduino Software (IDE) 1.0. The Uno board and version 1.0 of Arduino Software (IDE) were the reference versions of Arduino, now evolved to newer releases. The Uno board is the first in a series of USB Arduino boards, and the reference model for the Arduino platform; for an extensive list of current, past or outdated boards see the Arduino index of boards.

C) Data Glove

The data-glove approach utilize a unique assembled electronic glove, which has infabricated sensors that utilized to distinguish the hand stance. Most commercial sign language translation systems use the data-glove method, as it is simple to acquire data on the bending of finger and 3D orientation of the hand using gloves. The framework require less computational force, and continuous interpretation is much simpler to accomplish. The data glove is outlined with flex sensors. The flex sensors work as variable resistance sensor that change resistance as indicated by the sensor's flexing.

D) Liquid Crystal Display (LCD)

A 16x2 LCD (Liquid Crystal Display) is used in the system to display 16 characters. Each line displays 8 characters. Each character is further divided into 5x7 pixels matrix format. LCD contains tow registers namely command register and data register to send command to the LCD command register is used whereas to send data on the LCD screen to be displayed is saved on data register. The intensity of the screen can also be controlled by using 10k pot connected to V0 pin of LCD. The LCD works on 4 bit mode as well as on 8 bit mode according to system requirement.

E) Speaker

For audio amplification and audio output. It will basically give audio-based output of the circuit

V. RESULTS

We have Successfully Tested the Arduino interfacing with the flex sensor and LCD.

VI. CONCLUSION AND FUTURE WORK

The project is a simple demonstration of how sign language glove can be used to solve communicate gap problems between an normal people and deaf/dumb people. A finger spelling sign language translator is obtained which has an accuracy of 95%. The project can be extended to other sign languages by building the corresponding dataset and training the dataset. Sign languages are spoken more in context rather than as finger spelling languages, thus, the project is able to solve a subset of the Sign Language translation problem. The main goal of our project has been achieved, that is, to eliminate the need of interpreter. There are a few finer points that need to be considered when we are running the project. The gloves are independent and it is portable with minimum weight and low power. The system converts the hand gestures to the text and further to speech. If in some conditions the person can't hear the sound produced there is a provision provided into the system of text due to which the person can read and understand what the another person wants to convey. This project can be enhanced in a few ways in the future, it could be built as a web or a mobile application for the users to conveniently access the project, also, the existing project only works for ASL, it can be extended to work for other native sign languages with enough dataset and training. There can be a lot of future enhancements related to this research work, which includes: 1. In homes offices and more, gesture remembrance can be greatly used to increase usability and reduce the resources necessary to create primary or secondary input systems like remote controls or car entertainment systems with buttons.

2. Designing of a whole jacket which will be capable enough to read and vocalize the movements of animals and displaying the same on LCD for deaf people.

3. Virtual reality application e.g., replacing the conventional input devices like joy sticks in videogames with the data glove.

4. Gesture remembrance along with facial remembrance, lip movement remembrance, and eye tracking can be combined to create something called perpetual user interface to interact with computer systems which will improve creativity by leaps and bounds.

VII. REFERENCES

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