Decipher Glove As A Communication Aid for the Disabled

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Abstract—Hand gesture is one amongst the everyday methods employed in language for non-verbal communication. On other hand, sign gestures, different from the speech communication, but serving the identical function. It's often very difficult to spot impaired communities to speak their ideas and creativity to the conventional humans or society. This paper presents a system which will not only automatically recognize the hand gestures but also convert it into corresponding speech or written output in order that a speaking impaired person can easily communicate with normal people. The most aim is to form effective communication between impaired communities and normal people. The system consists of sensors attached to gloves which will take movement of hand as input. The micro controller is employed to acknowledge hand gestures. After the gestures are recognized, it is sent to the Android Phone via the Bluetooth Module. in step with recognized hand gestures, corresponding previouslyrecordedsoundtracksaregoingtobeplayed.

Index Terms—ASL-American Sign Language, BP- Backprop- agation.

I. INTRODUCTION

When people talk with each other, they convey not just through their speech but also through their gestures. However, such differently-abled persons often have trouble communicating with others. Their interaction with the society and digital world is also very limited due to the lack of affordable support technologies that aid in their communication.Researchers are now trying to bridge the gap between the advancements in interpersonal communication technology and its adoption by the audio-vocally impaired. Due to the above, there has been an increase in the innovation of systems consisting of sensor based gloves that act as a recognition engine to interpret various sign languages and translate them to voice output. However the major demerit of these systems is that they are complex and are not cost effective. Henceforth we make an intelligent framework containing a wired glove interfaced with a PC which may be altered to the signals that somebody is comfortable with and makes an interpretation of them into printed messages or speech.

II. LITERATUREREVIEW

Various techniques are employed within the recent pastto attain the objectives outlined in Section I. These include visual recognition techniques using image processing which, however, include their own limitations [1]. Coloringdetection, though a preferred strategy employed in computer visionbased algorithms, is sensitive to lighting conditions [2]. Moreover, a versatile and progressively adapting model for coloring recognition might be a challenging task [1]. Besides, motion cues limit the user to a stationary background [3]. The concept of wired gloves has also been utilized by researchers and developers within the recent past. Linear sensors and Bend sensors besides back propagation (BP) algorithm were proposed in [4]. However, a retardant faced by the gesturer wearing such a glove is that the restriction he feels while wearing it. Bend sensors and accelerometers were employedin a knowledge glove that was used as an alternate to keyboards andmiceforairwritingand3Dsketching[5].

III. SIGNLANGUAGE

Sign language is that the language employed by deaf and mute people. it's a mix of shapes and movements of various parts of the body. These parts include face and hands. the realm of performance of the movements is additionally from well above the top to the belt level. Signs are employed in linguistic communication to speak words and sentences to the audience. A gesture during a signing, could be also a specific movement of the hands with a sepecific shape made out of them. Facial expressions also count toward the gesture, at the identical time. A posture on the other hand, could also be a static shape of the hand to point a sign. A sign language usually provides signs for whole words. It also provides signs of letters to perform words that don't have a corresponding register that

language. So, although sentences will be made using the signs for letters, performing with signs of words is quicker. The linguistic communication chosen for this project isthattheAmericanSigningandRegionalLanguage;language spoken reception or during a neighborhood that's a region of a much bigger nationstate.

A. American SignLanguage

It is the foremost well documented and most generally used language within the world. American Sign Language(ASL) could be a complex visual-spatial language that's employed by the Deaf community within the USA and English-speaking parts of Canada. It is a linguistically complete, naturalcommunication.It'sthelinguisticcommunicationofthemanyDeaf people. ASL shares no grammatical similarities to English and will not be considered in any way to be a broken, mimed, or gestural kind of English.

also been utilized in making games. Actions of the experts wearing the sensors are captured and translated into the game to offer a sensible look to the sport. Sensor gloves have also been utilized in giving commands to robots. Streams of shapes of the hand are defined then recognized to regulate a robotic hand or vehicle.
Here, the sensor glove may be a system that translates thehand gesture or symbols to speech and text using an ArduinoR3. Also the glove translates the signing to regional language for simpler communication. The sooner prototype faileddrastically to represent an equivalent but the matter was solved usinga metallic strip between the fingers, which want to tell if they were in touch or not. The accuracy was increased by continuously updating the info set for every symbol from time totime.

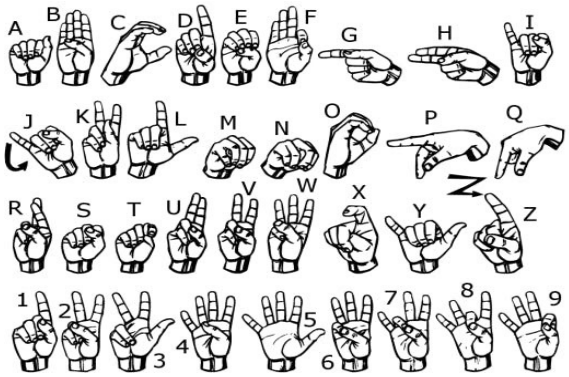

Fig. 1. American Sign Language.

IV. SENSORGLOVES

Sensor gloves are normally gloves made out of cloth with sensors fitted thereon. Using the info glove could be a far better idea over camera because the user has flexibility of on the road freely within a radius limited by the length of wire connecting the glove to the PC, unlike the camera where the user should stay in position before the camera. We've a sensor glove with 5 flex sensors and an accelerometer. 5 sensors are for each finger and thumb. Accelerometer is employed to measure the tilt within the palm. These sensors measure the bend in the fingers, thumb and palm and consistent with the bend angle value the Arduino Nano microcontroller understands which set of values represent which symbol and transfers the acceptance outcome value generated.

V. VI. SIGN LANGUAGE RECOGNITION

Our system is aimed at maximum recognition of the signs and symbols that are used by the disable people without any failure. This will make the system usable at public places. There are few components used for the development of gloves. Arduino Nano R3 HC-05 Bluetooth Module Flex Sensors Adafruit Analog Accelerometer Resistors of 10k ohm Android Studio App The glove has 5 flex sensors and an accelerometer.

Fig. 2. Sensor Gloves.

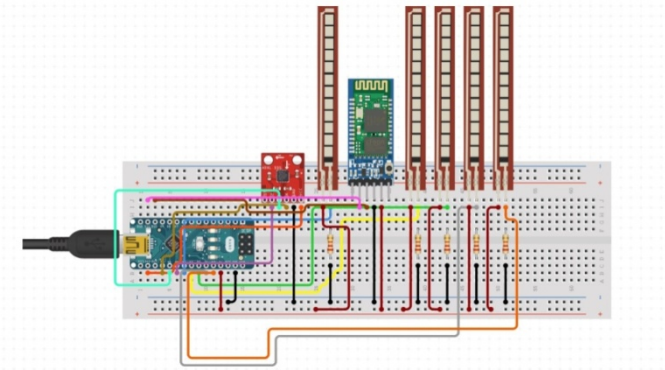

Fig. 3. Circuit Diagram.

VI. PREVIOUS WORKS

Previously, sensor gloves are utilized in games for creating virtual 3D environments. Players can give input to the game using the gloves. Gloves, alongside other sensor devices, have Accelerometer is employed to live the lean of the palm. The accelerometer (ADXL335) is additionally included to detect the orientation of hands and provides information regarding the triplets of x, y and z axes (voltage) as per the orientation of hands in several positions. The sensors measure the bend in the figures and thumb and palm consistent with the bend angle value the Arduino Nano microcontroller understands which set of values represent which symbols and transfers the appropriate outcome value to the Android app via Bluetooth which displays and speaks the symbol generated. The bend angle value generated is compared with the angle value of the corresponding alphabet or word then retrieves as output. The sensors generate an analog signal that's converted to digital signalbythemicrocontrolleri.e.,AnalogtoDigitalConversion (ADC). After the conversion, the signals are sent to Bluetooth anddisplaytheresultantoutputfromthedataset.Thebend

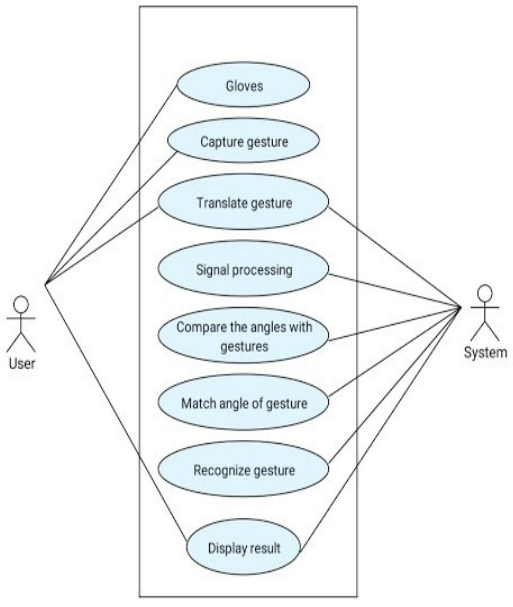

Fig. 4. Use-Case Diagram.

angle value generated is compared with the angle value of the corresponding alphabet or word and then retrieves as output. The sensors generate an analog signal that is converted to digital signal by the microcontroller i.e., Analog to Digital Conversion (ADC). After the conversion, the signals are sent to Bluetooth and display the resultant output from the dataset.training was done on the samples of individuals who didn't know signing and got a handout to perform the signs by reading from it. So, there was an excellent deal of variation within the samples. Some samples even gave completely wrong readings of the sensors. Testing was also done on an equivalent quite people

B. Problems

The main problem faced within the project was the massive dataset made system slow due to less RAM of Arduinothan Raspberry Pi. A number of the alphabets involved dynamic gestures. These gestures provide equal or similar inputs or values, might not be recognized by the gloves. Few symbols that were hard to differentiate like "U" and "V" which are very slightly different from one another and gave anequivalent values.

C. ProposedSolutions

Raspberry Pi is often used rather than Arduino Nano R3 to deal with large datasets. The matter of dynamic gestures can be resolved employing a metallic strip between the fingers, whichusedtotelliftheywereintouchornot.

VII. FUTURESCOPE

This tool can be:

- Further integrated with various services and help to generateemploymentforthedeafanddumbpeople.
- Ready with the controller to supply home automation on fingertips.
- Paired up with the fitness sensor to watch the health of theindividual.

A. Result

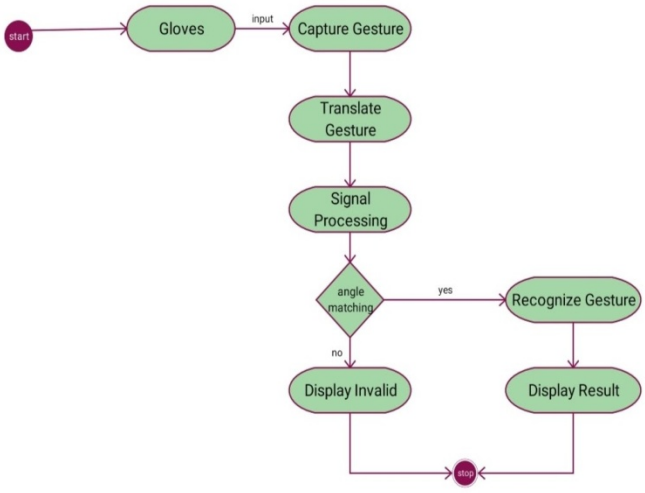

Fig. 5. Flow Diagram.

VIII. APPLICATIONS

The product generated as a result are often used at public places like airports, railway stations and counters of banks, hotels etc. where there's communication between different people. Additionally to the present a mute person can deliver a lecture usingit.

Assuming the very fact that we are ready to convert the entire of Sign Language into spoken English or Regional Language, we can manufacture a handy and portable hardware device having this translating system inbuilt

as a chip. With the help of this hardware device, which has inbuilt speakers as well, and a gaggle of body sensors alongside the pair of knowledge gloves a mute person can communicate to any normal person anywhere. A special dress also can be designed having the required number of sensors at appropriate places forthispurpose.thismayalmostbridgethecommunication

The accuracy rate of the software was found to be 88 Percent. This figure is lower thanks to the very fact that gap present between the deaf community and therefore the normal world.

IX. CONCLUSION

An Android Studio is employed to make the app. The app shows the symbol generated with voice output alongsidetext. This project was meant to be a prototype to see the feasibility of recognizing sign languages using sensor gloves. The completion of this prototype suggests that sensor gloves can be used for partial signing recognition. More sensors can be employed to acknowledge full signing. Also, some gestures requireuseofbothhands.Thisneedstwosensorgloves.

REFERENCES

[1] P. Garg, N. Aggarwal and S. Sofat, "Vision based hand gesture recog- nition," World Academy of Science, Engineering and Technology, vol. 3,2009

[2] V. Pavlovic, R. Sharma and T. S. Huang, "Visual interpretation of hand gestures for human-computer interaction: a review," IEEE Transactions on Pattern Analysis and Machine Intelligence, vol. 19, no. 7, pp.677- 692, July1997

[3] P. Halarankar, S. Shah, H. Shah, H. Shah and J. Shah "Gesture recognition technology: a review," International Journal of Engineering ScienceandTechnology(IJEST),vol.4,no11,2012

[4] C. S. Fahn and H Sun, "Development of a sensory data glove using neural-network-based calibration, "Corrections of IC-AT 2000 Proceed-ing,pp239–245,2000

[5] C. S. Ingulkar and A. N. Gaikwad, "Hand data glove: a wearable real time device for human computer interaction," International Journal of ScienceandEngineering,vol.1,pp-99-104,2013

[6] "Suitability of Clustering Algorithms for CrimeHotspot Analysis", Divya G et al, International Journal of Computer Science Engineering and Technology(IJCSET), July 2014,Vol 4, Issue 7,231-234.

[7] "Dynamic Security Architecture among E-Commerce Websites", Ramesh, R and Divya G,International Journal of Advanced Computer Research, Bhopal Vol. 5, Iss. 19, (Jun 2015): 184-191.