OPEN ACCESS

International
Journal
Of Modern Engineering Research (IJMER)

A Comparative study On Gesture control voice command Over Android Device

Omkar khandeshe[1], Vishal Salvi[2], Vinayak Gawade[3], Shreekunj Varia[4], Rupali Molawade[5]

Diploma, Student, Dept. of Computer Engineering, Government Polytechnic Mumbai (Bandra), India[1,2,3,4]
Lecturer, Dept. of Computer Engineering, Government Polytechnic Mumbai (Bandra), India[5]
Corresponding Author: Omkar khandeshe

ABSTRACT: *"Speech" and "gestures" are the expressions, which are mostly used in communication between human beings. In human communication, the use of speech and gestures is completely coordinated. Gesture Vocalize is a large-scale multi-microcontroller-based system being designed to facilitate the communication among the dumb, deaf and blind communities and their communication with the normal people. This system can dynamically reconfigure to work as a "smart device". This system composed of monitoring the gesture by hand glove via flex sensor and Bluetooth application connected with microcontroller. This system is beneficial for dumb people and their hands will speak having worn the gesture vocalize data glove.*

KEY WARDS: *Monitoring hand glove, Bluetooth text to speech application, Gesture Reorganization.*

Date of Submission: 17-02-2019 Date of acceptance: 03-03-2019

I. INTRODUCTION

Communication involves the exchange of information, and this can only occur effectively if all participants use a common language. Sign language is the language used by deaf and mute people and it is a communication skill that uses gestures instead of sound to convey meaning simultaneously combining hand shapes, orientations and movement of the hands, arms or body and facial expressions to express fluidly a speaker's thoughts. Signs are used to communicate words and sentences to audience. A gesture in a sign language is a particular movement of the hands with a specific shape made out of them. A sign language usually provides sign for whole words. It can also provide sign for letters to perform words that don't have corresponding sign in that sign language. In this device Flex Sensor plays the major role, Flex sensors are sensors that change in resistance depending on the amount of bend on the sensor. This digital glove aims to lower this barrier in communication. It is electronic device that can translate Sign language into speech in order to make the communication take place between the mute communities with the general public possible. It can also provide sign for letters to perform words that don't have corresponding Sign in that sign language. Sensor gloves technology has been used in a variety of application areas, which demands accurate tracking and interpretation of sign language.

Loss of hearing and speech can cause people to become isolated and lonely, having worse affected on both their social and working life. Looking up the meaning of a sign is not a straightforward task. Sign Language is a well structured code gesture where every gesture has a meaning assigned to it. Sign Language is the only means of communication for deaf people. With advancement of science and technology many techniques have been developed not only to minimize the problem of deaf and dumb people but also to implement it in different fields. Sign language is a language which instead of voice or sound patterns uses manual communication and body language to convey the meaning. This involves mostly the combination of shapes, orientation and movement of the hands. Sign language is not only used by deaf but also who can hear, but cannot physically speak. All India Federation of the Deaf estimates around 4 million deaf people and more than 10 million people have hearing problem in India.[3]

II. LITERATURE REVIEW

There are many different combinations possible to communicate with deaf and dumb people. Different methods of communication are shown in Table 1 that is implemented by different researchers.

Different methodologies are used to improve the communication between normal and deaf & dumb people. But using the single methodology has its own drawback. Combining these methodologies gives more accuracy in communication. We now discuss how different researchers used different methodologies to establish effective communication between them.

Waseem Afzal et al.[1] System includes the human hand glove consists of a triple axis accelerometer and five flex sensor attached to it to control the hand movement. The whole part then made wireless to enable it to be operate from a far off place by using a ZigBee transmitter- receiver module. When the user moves the arm or the fingers, the sensors fixed to the hand glove outputs an analog voltage. This analog voltage is given to the inbuilt ADC of the microcontroller. The processed digital signal is sent to the control circuitry of the robotic arm using the ZigBee transmitter module. The ZigBee receiver module then receives the digital values and they are use as the control signal to the servo motor. The servos then move the robotic arm to mimic the movement made by the user.

Table 1: Different methodologies used in Glove for Gesture Recognition.

Author	Title	Mathematical Formula to Determine Output Voltage of Flex Sensor	Methodology
Waseem Afzal et al. [1]	Gesture Control Robotic Arm Using Flex Sensor	-	The human hand glove consists of a triple axis Accelerometer and five flex sensor attached to it to control the hand movement. The whole part then made wireless to enable it to be operate from a far off place by using a ZigBee transmitter- receiver module.
Nisha Kawale et al. [2]	Implementation Paper on Sign Language Using Flex Sensor	-	Flex sensor associated with the five fingers of hand for getting the gesture based communication information and pass it to the microcontroller. Microcontroller change over this information to advanced shape and send it to the android application utilizing Bluetooth module.
K.Harshith Sreevastcha et al. [3]	Sign Language to Speech Conversion	-	The Apr33a3 voice module is used to record the voice of the user. The flex detector on glove produces a proportional modification in resistance and measures the orientation of hand. The gestures made are compared within database and output is generated in the form of voice audio.
Kunal Purohit et al.[4]	A Wearable Hand Gloves Gesture Detection based on Flex Sensors for disabled People	-	The flex sensors output a stream of data that varies with degree of bend. The analog outputs from the sensors are then fed to microcontroller. It processes the signals and perform analog to digital signal conversion. The gesture is recognized and the corresponding text information is identified.
Mandar Tawde et al.[5]	Glove for Gesture Recognition using Flex Sensor	-	1) First module is a wearable device consisting of a glove with five flexes sensors and Arduino Nano. Speaker will be attached with the glove to give output as an audible speech. 2) Second module is an Android App, with Google API. It converts a Speech into text and displays on Mobile Screen. This modules functionality is limited to English language.
Shahrukh Javed et al.[7]	Wireless Glove for Hand Gesture Acknowledgment: Sign Language to Discourse Change Framework in Territorial Dialect	$\boldsymbol{Vout = Vin\left(\frac{R1}{R1+R2}\right)}$ Where; R_1 - flex sensor resistance. R_2 - Input resistance.	a) The gesture is served as an input to the system which is measured by the sensors. b) These qualities from both the sensors are fed to Arduino nano which contrasts it and the values stored in the predefined database, and further transmit this digital data wirelessly to the main processor by means of Bluetooth. c) Central processor the raspberry pi3 is coded in python dialect for processing the received digital signals to generate the text output.
J. Thilagavathy et al. [8]	Embedded Based Hand Talk Assisting System for Deaf and Dumb	-	The first mode of operation is voice mode. In this mode the input is obtained from flex sensor which senses the sign language performed by the deaf and dumb people or normal person. The second mode of operation is Text mode. In this mode of operation, the controller accepts the input of the deaf, dumb, normal person using keypad.

Nisha Kawale et al.[2] System's software part will include programming for android phone application. Hardware part will be consisting of flex sensors to take input from different gestures through gloves, microcontroller to convert input analogue data to digital data and for further processing, power supply to

provide voltages to specific units, and finally Bluetooth module to send the data from controller to android mobile.

K. Harshith Sreevastcha et al.[3] Suggested that the approach is used with microcontroller (Arduino) and sensor based data glove. The Apr33a3 voice module is used to record the voice of the user. LED indicates while the voice is generated. The glove is internally equipped with flex sensors. For every specific gesture, the flex detector produces a proportional modification in resistance and measures the orientation of hand. The process of those hand gestures is finished in controller. The gestures made are compared within database and output is generated in the form of voice audio.

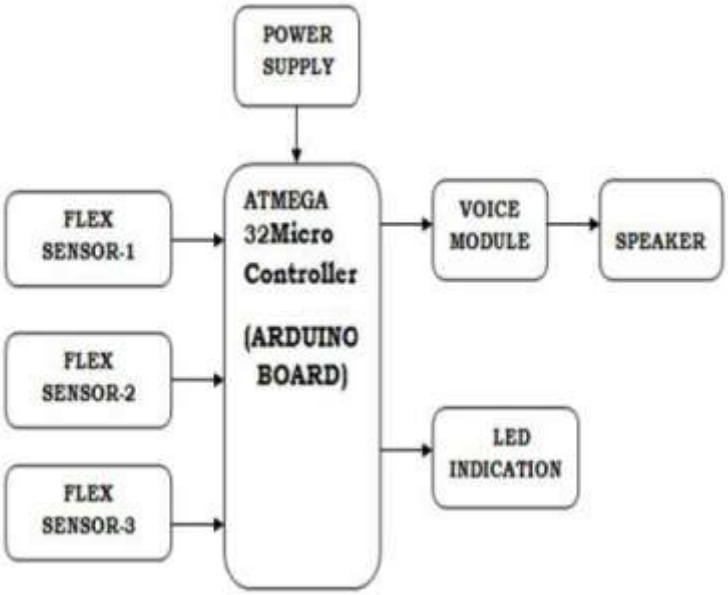

Figure 1: Block diagram of sign language to speech conversion.[3]

Kunal Purohit et al.[4] System works on the simple principle that when the device is powered on, the sensors are calibrated. Then the microcontroller acquires the readings from the sensors. The values are matched with a database stored. If the values matches the given letter that is found the character is forwarded to the display unit and the result is displayed and the program stops the process for once else if the character is not matched then the process still goes on and is in the loop till a character is matched from the database.

Mandar Tawde et al.[5] System is consists of two modules Gloves with flex sensor and Arduino: This module is a wearable device consisting of a glove with five flex sensors and Arduino Nano. Speaker will be attached with the glove to give output as an audible speech. Android App to convert Speech to Text: This module is an Android App, with Google API. It converts a Speech into text and displays on Mobile Screen. This modules functionality is limited to English language.

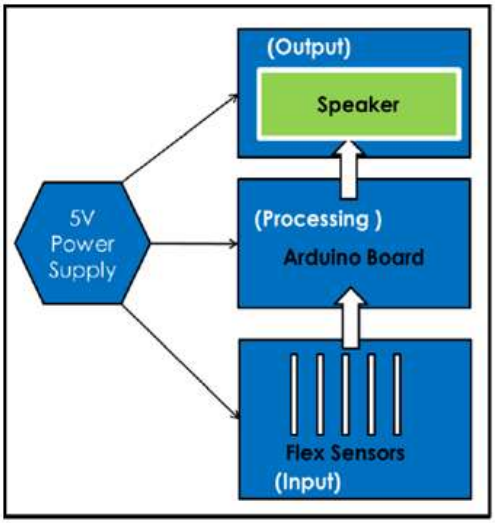

Figure 2: Gloves with flex sensor and Arduino.[5]

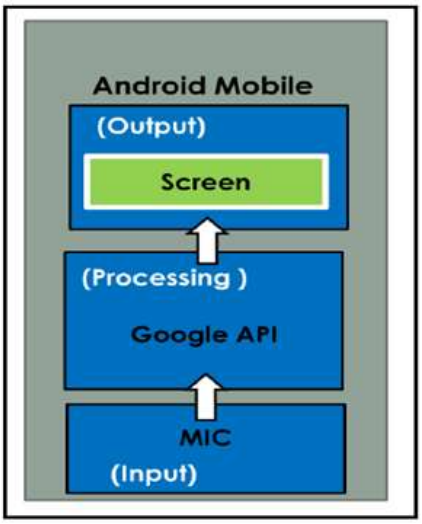

Figure 3: Android App to convert Speech to Text.[5]

Shahrukh Javed et al.[7] System suggested, the gesture is served as an input to the system which is measured by both the sensors particularly from the flex sensor in terms of impedance and the IMU gives the digital values. These values from the flex sensor are analog in nature and are given to the Arduino nano which uses the analog to digital convertor consolidated in it to convert the resistive values to digital values. IMU utilizes the accelerometer/gyroscope sensors to measure the displacement and position of the hand. These qualities from both the sensors are fed to Arduino nano which contrasts it and the values stored in the predefined database, and further transmit this digital data wirelessly to the main processor by means of Bluetooth. Central processor the raspberry pi3 is coded in python dialect for processing the received digital signals to generate the text output, for example, characters, numbers and pictures. Further, the text output is shown on Graphic-LCD display and next text to speech engine, here particularly espeak converter is utilized to give the sound related voice output. Finally, system effectively delivers the output as text and auditory voice in regional dialect.

In the J. Thilagavathy et al. [8] system the flex sensor senses the sign language performed by the deaf people and produces the output. The output of the flex sensor is given to the Microcontroller through ADC. In the Microcontroller we already programmed the particular word for each output of the sensor. This word is recorded in the voice chip and heard from the speaker. If the Controller accepts the input from the Keypad then, the output will be displayed in the LCD.

III. ANALYSIS

This paper concentrates on how different researchers used different methodologies to create their systems which help deaf and dumb people to communicate to outer world. The methodologies described above by different researchers are convenient in their own ways. All the methodologies provide a better way to establish effective communication between deaf/dumb and normal people. Most of the methodologies are almost similar in way and working with only difference that some of them are used for securing digital motion image while others are used for securing data, string or file. All the methodologies are time convenient and are very easy to implement. Here some old systems used PCBs while most were used Aurdino boards for data manipulation. Most of the systems used on board microcontroller's memory to store their data while some access their data from stored databases. And also some systems used voice modules to convert their text data to speech and send it to the speakers to speak while some directly sends it to the android device for text-to-speech conversion using Bluetooth module. Combining the features of all these systems we can make a single stand-alone system which will be more convenient to use. The main advantage of this system is it overcomes the drawback of single working systems as well as it provides support for different languages.

IV. CONCLUSION

This paper is mostly concerned about how different researchers used for the communication between deaf, dump and normal people. Dump people use their standard sign language which is not easily understandable by common people and blind people cannot see their gestures. The paper compares the different combination of sign language as well as gesture movement done by deaf, dump, and normal people as well how they work with different scenario. Sign language is a useful tool to ease the communication between the deaf or mute community and the normal people. Yet there is a communication barrier between these communities with normal people. This paper aims to lower the communication gap between the deaf or mute community and the normal world.

REFERENCES

[1]. Waseem Afzal, Shamas Iqbal, Zanib Tahira and Mehtab Ejaz Qureshi. (2017). "Gesture Control Robotic Arm Using Flex Sensor", in Applied and Computational Mathematics. ISSN: 2328-5605 (Print); ISSN: 2328-5613 (Online) Vol. 6, No. 4, pp. 171-176. doi: 10.11648/j.acm.20170604.12

[2]. Nisha Kawale, Pradnya Kaspate, Hruchika Vanjari, Prof. Prachi Sarode "Implementation Paper on Sign Language Using Flex Sensor" in International Journal of Innovative Research in Computer and Communication Engineering, Vol. 6, Issue 3, March 2018

[3]. K.Harshith Sreevastcha, N.Manohar, G.Soumya Reddy, "Sign Language to Speech Conversion", in International Journal of Innovations & Advancement in Computer Science IJIACS ISSN 2347 – 8616 Volume 7, Issue 4 April 2018

[4]. Kunal Purohit, Prof. Kailash Patidar, Mr. Rishi Singh Kushwah, "A Wearable Hand Gloves Gesture Detection based on Flex Sensors for disabled People" in International Journal for Research in Applied Science & Engineering Technology (IJRASET) ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor:6.887 Volume 5 Issue VIII, August 2017

[5]. Mandar Tawde, Hariom Singh, Shoeb Shaikh, "Glove for Gesture Recognition using Flex Sensor" in International Journal of Recent Trends in Engineering & Research (IJRTER) Volume 03, Issue 03; March - 2017 [ISSN: 2455-1457]

[6]. Shubham Mishra, Saurabh Takkar, Tripti Garg,Amanpreet Kaur, Pankaj Rakheja, Charu Rana, "Arduino based Gestures to Speech Conversion System" in International Journal of Advance Research and Innovation, Volume 6 Issue 1 (2018) 19-20

[7]. Shahrukh Javed, Ghousia Banu S, J Aarthy Suganthi Kani and Ateequeur Rahman Wireless Glove for Hand Gesture Acknowledgment: Sign Language to Discourse Change Framework in Territorial Dialect Volume 3 Issue 2 - June 2018 DOI: 10.19080/RAEJ.2018.03.555609 Robotics & Automation Engineering Journal (RAEJ) ISSN: 2577-2899

[8]. J. Thilagavathy, A. Jeyapaul Murugan, S. Darwin Embedded based hand talk assisting system for Deaf and Dumb in International Journal of Engineering & Research & Technology(IJERT),ISSN:2278-0181,Vol.3,March-2014

[9]. InFlect™ Flex Sensor.pdf, 2016. [Online]. Available: https://www.brewerscience.com/wp-content/uploads/2015/06/Flex-Data-Sheet-1.pdf. [Accessed: 04-Jan- 2019]
[10]. Flex Sensor.pdf. [Online]. Available: https://www.sparkfun.com/datasheets/Sensors/Flex/FlexSensor.pdf. [Accessed: 04-Jan- 2019]
[11]. HC-05 -Bluetooth to Serial Port Module, 2010. [Online]. Available: http://www.electronicaestudio.com/docs/istd016A.pdf. [Accessed: 04-Jan- 2019]

Omkar khandeshe, "A Comparative study On Gesture control voice command Over Android Device " International Journal of Modern Engineering Research (IJMER), vol. 09, no. 1, 2019, pp 33-37