Smart Finger Gesture Recognition System for Silent Speakers

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ABSTRACT

Silent speakers face a lot of problems when it comes to communicate their thoughts and views. Furthermore, only few people know the sign language of these silent speakers. They tend to feel awkward to take part any exercises with the typical individuals. They require gesture based communication mediators for their interchanges. The solution to this problem is to provide them a better way to take their message across, "Smart Finger Gesture Recognition System for Silent Speakers" which has been proposed. Instead of using sign language, gesture recognition is done with the help of finger movements. The system consists of data glove, flex sensors, raspberry pi. The flex sensors are fitted on the data gloves and it is used to recognize the finger gestures. Then the ADC module is used to convert the analog values into digital form. After signal conversion, the value is given to Raspberry Pi 3, and it converts the signals into audio output as well as text format using software tool. The proposed framework limits correspondence boundary between moronic individuals and ordinary individuals. Therefore, the recognized finger gestures are conveyed into speech and text so that the normal people can easily communicate with dumb people.

Keywords : Flex Sensor, Raspbian, Espeak, Gesture Recoginition.

I. INTRODUCTION

Correspondence is the establishment of all human relationship. It is a method for communicating their sentiments, needs, thoughts and furthermore it causes us to comprehend others feelings and considerations. Typical individuals can ingest the new data and information through day by day commotions, discussions and dialect that are talked around them. In any case, the impaired individuals don't have that extravagance. Normal individuals are totally uninformed of the gesture based communication. Unless they took legitimate preparing to take in this gesture based communication, it is extremely hard to speak with them.

Motions in gesture based communication are the specific hand developments with a particular shape completed out for them. Motions are the significant instrument to convey their requirements for noiseless speakers. Unfortunately, it is not easy for the common people to understand these gestures and therefore it becomes hard for them to understand what the dumb people are trying to convey. However, it isn't evident that what number of gesture based communications exists overall in light of the fact that every nation has its own particular local gesture based communication and furthermore it requires greater investment to pass on their message. They face numerous difficulties in work and in addition to broad daylight services. Some incapacitated individuals require the assistance of interpreter. In any case, it influences awkward

correspondence between cripple individuals and ordinary to individuals. This framework maintains a strategic distance from the issues because of poor correspondence. Communication through signing is the most basic type of correspondence, which pass the messages with signals of words and images.

Discussion interfaces individuals around them and it takes in numerous things from their encounters. A critical piece of socialization is the advancement of discussion aptitudes. Communicating and trading of an individual enthusiasm by utilizing a typical dialect turns out to be extremely proficient one. One of the principle wellspring of correspondence is hand, as we talk ordinarily our hands naturally moves as per discourse. In the public area and additionally in working life, the impaired individuals are separated. To stay away from this issue gesture based communication is executed which is utilized rather than voice, the non-verbal communication and manual correspondence to pass on the importance. Significant difficulties that are looked by the idiotic individuals while speaking with ordinary individuals are security concerns, divergence, behavioral issues and so on. This outcomes the imbecilic individuals are debilitated to stand up openly puts and furthermore in crisis cases.

Gestures are non-vocal communication with bodily actions communicate particular messages. Motion fills in as apparatus for correspondence for listeners. It allows individual thoughts together with body language in addition to words when they speak. It is implemented using gestures recognition, which is used to identify human gestures with the help of mathematical algorithms. A few signals are comparative for particular activities and when an individual makes utilization of it, it is effectively comprehend by others. A Dumb correspondence translator is likewise an instrument that deciphers the hand signals to sensibility speech. A signal in relate degree greatly dialect is likewise a certain

development of the hands with a specific kind made out of them.

Signal acknowledgment is utilized to pass on their messages to ordinary individuals. Physically tested individual can utilize basic motions to cooperate with typical individuals without physically touching them. Human conduct is one of the motion acknowledgment procedures. The most characteristic expressive path for correspondence is motion. This project goes for taking care of the issue of constrained correspondence capacities of the impaired individuals who know gesture based communication by changing it into a type of verbal and vocal correspondence. Physical activity conveyed by the finger, eye, or any piece of the body can be considered as motion. Finger motions are the most reasonable and effective interpreter for people. Here, single Finger motion acknowledgment framework is proposed, it utilizes right fingered motions, and are characterized and perceived for the particular character.

Stupid individuals can express their felling with various hand shapes and outward appearance. Each signal has significance allot to it. This undertaking centers to help these physically tested individuals having discourse handicap to have typical correspondence and learning knowledge with the general population on them. This system makes the silent speakers away from the interpreter. The proposed framework is utilized to lessen the correspondence obstruction between the incapacitated individuals and ordinary individuals. Rather than creating communication via gestures, finger developments based signal acknowledgment strategy is utilized. The Glove propels their social joining as they are empowered to convey what needs be to non-gesture based communication speakers and opens up potential outcomes like shopping, individual managing an account, participating in training and past. It might likewise assume a huge part in boosting the work conceivable outcomes of the discourse

disabled individuals. The proposed system helps to overcome their disability.

II. RELATED WORKS

Abhijith Bhaskaran K, Anoop G Nair, Deepak Ram K, Krishnan Ananthanarayanan and H R Nandi Vardhan [1] proposed the hand signal acknowledgment framework was created with the assistance of gloves which is comprises of flex sensors and inertial estimation unit (IMU) to perceive the motions. The flex sensors are utilized to perceive the development of fingers. Inertial estimation unit is utilized to perceive the arm developments. State Estimation technique was utilized to track the hand development in three dimensional spaces. The simple information from the flex sensors and IMU is changed over into advanced esteems by simple to computerized converter ADC (MCP008). Advanced esteems are given to the Raspberry pi for preparing. Signal esteems are coordinated with the database which is customized in raspberry pi. On the off chance that the motion is coordinated with the database, the yield will turned out from the sound coat in raspberry pi. Voice yield is conveyed from this framework.

Anagha J. Jadhav, Mandar P. Joshi [2] proposed an implanted framework for discourse impeded individuals. This framework comprises of flex sensors, accelerometer sensors, intensifier, AVR Micro-controller, playback voice module. Flex sensors delivers the distinctive arrangement of qualities in light of finger developments and accelerometer sensors faculties in view of the wrist developments. These two sensor esteems given to speaker (operation amp) to enhance these signs. Increased signs are given to AVR Micro-controller to process the signs. It contrasts the qualities and the qualities that are put away in. If it matches with the qualities, it gives the yield. Yield of the Micro-controller is given to voice play back module to stand up through speaker. Perceives just four words and it isn't so effective.

Ashish S Nikam and Aarti G Ambekar [3] proposed the Sign Language Recognition Using Image Based Hand Gesture Recognition Techniques based on capturing the images using web cam pre-processing of the signs will be done by using Microsoft Visual Studio as an IDE and Open CV library. As the image captured is RGB and for different conditions it converts into YCbCr. After the image captures it contains collection of frames. They convert RGB frames into HSV (Hue, Saturation, Value) and this mainly used for color space differentiation and for image segmentation, thresholding method is used. Here each pixel in image replaces into black pixel and it can share its intensity. Blob detection used to detect the points/regions in the image which differs in features like brightness and color. They said that they can adjust the HSV value within range 0 to 255 to extract and get accurate boundary of an object. With the help of convexity hull algorithm, it is used to extract contour of hand position. Boundary of hand by joining points is called convex hulls. This results the finger point detection and number recognition using convexity algorithm.

A.Batool, S.Rauf, T.Zia, T.Siddiqui, J.A.Shamsi, T.Q.Syed and A.U.Khan [4] proposed a smart home concept uses complex mechanical interfaces. This is done through gesture recognition technology that control the electrical appliances by a smart phone. The user uses hand gestures to control electrical appliances remotely. A camera is attached to the smart phone to recognize the gesture. The cloud system is used for an interface between the user's location and his/her home. Raspberry Pi serves as a receiver to receive the messages from cloud and control appliances. The remote accessing technology is used to operate these appliances for flexible and control. The machine learning concept implements Haar cascade training using openCV – a computer vision library in android. The user details and the gesture made are sending to the cloud and then transfer the user information and gestures to the amazon RDS storage. The Raspberry Pi

device receives these details. The implementation is based on the software includes Python and Linux.

Dhananjai Bajpai, Uddaish Porov, Gaurav Srivastav and Nitin Sachan [5] proposed the hand signal is perceived by hand gloves. It comprise of flex sensors, accelerometer and contact sensors which detects the hand and finger development. AVR 2560 Micro-controller utilized as a part of this framework. The information esteems from the sensors in the glove are given to the AVR 2560 Micro-controller which changes over the simple into computerized esteems. The computerized esteems are given to the AVR 2560 Microcontroller. The computerized esteems are checked with the information in the program. The trans-collector module is utilized to transmit and get the information in remote with the assistance of Bluetooth and GSM-CDMA module. The Graphic User Interface which used to show the all information and data sent and got between the clients. Yield is delivered regarding voice and content.

Emad E.Abdallah, Ebaa Fayyoumi [6] proposed an application for the ultimate communication with the disable users using sign language. In this the Arabic language is used as a medium of communication to learn the sign language terms. This assistive technology helps hearing impaired people to communicate through a communication assistant with people using telephone. A game is proposed using camera and sensor to detect and collect signal data for the ASL. The signs made by the user are captured by the camera. Then the signer demonstrating ASL phrase video is shown. Scripting notation is used for signing signals and a web browser plug-in to interpret these notations into gestures. This technique is composed of 3D motions of Arabic sign language through mobile application to serve the deaf and dump people.

Fernando Ramirez-Garibay, Ceasar Millan Olivarria, Alejando Federico Eufracio Aguilera and Joel C. Huegel [7] displayed the outline and advancement of

a specialized gadget model My Vox. It is utilized for the correspondence amongst typical and hard of hearing visually impaired individuals. The gadget incorporates printed show to be seen by the ordinary individuals, Braille show for visually impaired and discourse yield. It comprises of Raspberry Pi an ARM based PC that fit in the palm of a hand. The information gadget utilized is USB console since it is compatible with the ARM based PC. Any new client can utilize, regardless of the dialect they talk and console with embellished Braille characters likewise can be utilized. The yield gadget incorporates LCD show to peruse the message. Braille show for the visually impaired individuals. This message is imitated as discourse through speaker.

Geethu G Nath and Arun C S [8] proposed the Real Time Sign Language Interpreter where the sign language is developed for the recognition of numbers. Using convex hull detection method, the numbers are recognized. They used to match the templates for recognition of alphabets. To calculate matches, the match template function is used in Open CV. For pre-processing actions, a webcam is used for acquiring the input images. Canny edge detection is used to detect edges and is forwarded for classification and matching procedures. The hardware part is done using a Beagle Bone Black with ARM CORTEX A8 processor architecture. Then the camera system is used to acquire images if sign language symbols and the display device show the corresponding text for each sign.

Harini Sekar, Rajashekar R, Gosakan Srinivasan, Priyanka Suresh and Vineeth Vijayaraghavan [9] proposed the signal acknowledgment is finished by utilizing glove and sensor unit (GSU). The GSU is the glove which is appended with flex sensors and contact sensors. The qualities from the sensors are passed to the Primary Supporting Hardware (PSH) which is the association between current restricting resistor circuit and contact sensors and the association between the voltage divider and flex sensors. The motions are

perceived precisely by Secondary Supporting Hardware (SSH) which comprises of the ATmega328P Micro-controller is associated with a glove. There are two Microcontrollers were utilized. Two Micro-controllers are imparting through the X Bee module. Ace slave setup was utilized. One Micro-controller was indicated as Master and another was considered as Slave. Ace Micro-controller got from the glove's information and it asks for the Slave Micro-controller. The Slave Micro-controller recognizes its demand. Ace Micro-controller prepared the qualities and distinguished the motions. Yield is shown on the LCD.

Julien Marot and Salah Bourennane [10] proposed a new manner to teach on microcomputer and digital signal processing. First the students are given task to install the operating system on the micro-SD card by a PC computer through software. The installation starts from scratch in relevant so that they can understand the operating system. The micro-SD card which consists of the operating system is plugged into the Raspberry Pi. By interfacing the students can understand the difference between the windows type GUI and Linux. The students are allowed to develop their own programs based on free software and free libraries of programming functions. Students find easier for processing while looking at result images than hearing sounds. They have been appreciated to do the process, such as photographs acquired with a camera connected to the Raspberry Pi. It is controlled remotely and low-cost classroom is created for the students.

Kumad Tripati, Neha Baranwal and G. C. Nandi [11] proposed ceaseless ISL signal based correspondence framework. They utilized the two hands for performing ISL motions. Grouping of casings frames video. These casings could be any motion outline or non-motion outline for division and compute angle for each casing. This technique is utilized for making database for dividing ceaseless motions into segregated motions. A key casing breaks each sentence into arrangement of words. Here they separates closer view

picture from finish picture implies that it expels foundation of a picture. They connected Orientation histogram as a component extraction procedure for extricating highlights of each motion. Another favorable position on histogram is interpretation invariant property. The measurements of these highlights are lessened utilizing Principal Component Analysis (PCA). Motion acknowledgment is finished utilizing diverse separation measurements like Euclidean Distance, Correlation Distance and Cosine Distance.

B. G. Lee, S. M. Lee [12] proposed a framework for motion acknowledgment of American Sign Language. This framework comprises of five flex sensors, two weight sensors and three-hub inertial movement sensors to perceive the ASL letters in order. Flex sensor perceive the finger motion in light of the finger developments and inertial movement sensor perceives hand motions in light of the introduction of hand. These two sensor esteems given to Arduino genius small 328 to decide the letters in order utilizing SVM classifier and the decided letters in order is converted into content and transmitted to a cell phone through Bluetooth 4.0 module. An android application scans for adjacent gadgets and afterward transmitted the flag to cell phones. Voice yield is heard in speaker of the cell phone and the content yield is shown in portable screen. Exactness of this framework is additionally expanded by including weight sensors.

Li Lei and Que Dashun [13] proposed the signal acknowledgment framework was finished with the assistance of ARM9 processor. The hand glove comprises of flex sensors and IMU module consolidated together. The sensor module in the gloves which sense the bowing level of the fingers and the development of the arm. The information from the sensors is simple esteems. The simple info esteems are changed over to computerized values by A/D converter. The computerized esteems are given to the ARM9 processor. The ARM9 processor is estimated the information esteems for additionally handling.

The information esteems are checked with the datum in the program. ARM9 processor has a content show module to show the word relies upon the signals and also it additionally have a voice-communicate module to gives a word as voice for the correspondence amongst hard of hearing and dump individuals and typical individuals. On the off chance that the information esteems are coordinated with the information in the program, it will create a yield as far as voice and content.

Monique Bernice H. Flores, Charles Mholen B, Siloy, Carlos Oppus and Luisito Agustin [14] proposed the motion acknowledgment framework is created utilizing the glove controller which is comprise of flex sensors and computerized accelerometer. The gloves was associated with gizDuino small scale controller and furthermore associated with a Bluetooth for remote execution. The flex sensors are utilized for finger development and the accelerometer is utilized for hand tilting. The finger signal was distinguished by finger twofold framework. Two states are settled for finger development. That is flexed and loose. Every state having a bit esteems. Bit 0 for flexed and Bit 1 for loose. The information from the flex sensor and computerized accelerometer were perused and deciphered by the Arduino controller. The open source three measurement outline programming blender has coordinated Python API. It permits the change of the turn, scale, and position. The three measurement virtual condition for the hand development by utilizing glove controller. The yield voltage was shown on serial screen.

NeelaHarish and S.Poonguzhali [15] proposed a hand motion acknowledgment framework which is actualized with the assistance of flex sensors and accelerometer sensors. The signals are represented by the Indian Sign Language. The flex sensors and accelerometer sensors are put on the fingers and wrist to acquire developments. In the flex sensors protections esteem changes as per diverse signals and these qualities given to Pic- Microcontroller. Micro-

controller handled the signs which are from sensors. The yield of the Micro-controller is given to voice module which comprises of eight channels. Eight words can be recorded utilizing these modules. The most ordinarily utilized eight arrangements of words for Indian Sign Language was gotten as yield in voice. Just recorded eight arrangements of words is as voice.

Rishikanth C, Harini Sekar, Gautham Rajagopal, Ramesh Rajesh and Vineeth Vijayaraghavan [16] proposed a framework for motion acknowledgment of American Sign Language. The framework comprises of glove which includes flex sensors and contact sensors interfaced with an Arduino ATMega328 Micro-controller. For different motions the flex sensors delivered the scope of qualities which is associated with voltage divider circuit and these sensors are multiplexed utilizing MUX4051. The contact sensors are specifically associated with Micro-controller. It delivers the yield when they are in contact with a protest. The qualities got from the MUX are encouraged to Micro-controller which deciphers the diverse motion. Micro-controller perceives the characters with the database that are put away in and these characters are shown in LCD show. Subsequently a portion of the characters are not perceived by the framework is one of the downside.

Shreyashi Narayan Sawant and M.S.Kumbhar [17] proposed the Real Time Sign Language Recognition Using PCA where the sign language is implemented by vision-based approach to recognize single handed gestures using web-cam which is MATLAB interface. In this proposed strategy, 26 mixes of Indian signs are created by utilizing right hand put away in preparing information base. Pre-handling is done on these caught input motions. These highlights are utilized for motion acknowledgment utilizing the PCA calculation which gives improved comes about. The sign acknowledgment techniques are Data Acquisition, Pre-handling and division, Feature extraction, Sign acknowledgment and Sign to content, voice change. Pre-processing comprise picture acquisition, division

and morphological separating strategies. Otsu calculation is utilized for division purpose. Feature extraction is a strategy for decreasing information dimensionality by encoding related data in a packed portrayal and expelling less discriminative data.

Subhankar Chattoraj and Karan Vishwakarma [18] proposed the Assistive System for Physically Disabled People utilizing Gesture Recognition where the communication through signing is finished utilizing picture pre-handling, highlights extraction utilizing scale-invariant component change (SFIT) calculation, which is utilized for include vector execution. Normally MATLAB utilizes default capacity to re-size it as indicated by singular need. Rather than this, Bicubic technique is utilized to re-size it. Division has two factors to be specific static and dynamic. The yield of picture division is in paired picture and this incorporates mutilation or clamor. To lessen this, low pass channel is utilized as a part of picture pre-preparing stage. Every conceivable size of the picture are looked utilizing scale space and distinguishing proof of PIP (Potential intrigue focuses). They execute SIFT calculation to compute source picture include vector.

Suraksha Devi, Suman Deb [19] proposed a framework which perceives the hand signal and change over them into discourse and content in Hindi dialect. In this framework, they utilized flex sensors to detect the finger developments in view of the measure of curve happening in fingers and thumb. They utilized Data Acquisition technique to gather the information from the sensors and this information put away in Micro-controller (Arduino) to check the legitimacy of the motion. On the off chance that it matches with the information put away in Micro-controller, it gives the yield as discourse and content in Hindi. An android application is produced in advanced mobile phone utilizing java to change over the motions into content and discourse. This framework perceives the fourteen preparing sets and they didn't private what they are. A portion of the applications are virtual reality

association, gaming and training innovation and apply autonomy.

Vikas Kumawat, Shubham Jain, Vikram Vashisth, Neha Mittal and Bhupendra Kumar Jangir [20] proposed home mechanization procedure to control the home machines remotely utilizing Raspberry Pi, The remote access can screen and control the framework as per the need of the client. A 220v supply is given to the framework. It utilizes temperature sensor to screen the room temperature by web interface on Wi-Fi skilled cell phone. A little 5v DC supply is utilized to connect an engine. Web interface is created utilizing Raspberry Pi as a web server to work the electronic and electrical machines. This paper incorporates planning a website page to speak with the Raspberry Pi through the web for the home security peripherals.

The summary of the related work shows on perception of previously mentioned papers they have utilized the advances to decipher the diverse gesture based communications utilized by the discourse hindered individuals. In many papers they have utilized the flex sensors and accelerometer sensors are utilized to perceive the hand motions. Various sensors like weight sensors, contact sensors, inertial movement unit (IMU) sensors are utilized to perceive the finger signals and the introduction of the hand developments. Regularly they utilized micro-controller to distinguish the signals made by the client and the perceived characters or words taken as yield as content and discourse. To acquire voice yield, voice module is utilized. An android application is created to change over the motions into content and discourse. These previously mentioned advancements are in existing technique. But they have a disadvantage that a portion of the characters are not distinguished by the framework, so they can't decipher the gesture based communications viably. It requires greater investment to para stage their demeanor's into words. Every nation has their own local communication through signing so it fluctuates as indicated by their

requirements. The proposed framework is to defeat the issues that are looked by the idiotic individuals.

III. PROPOSED WORK

In this segment the proposed framework is introduced, which bolsters the two path correspondence among the crippled and typical individual. Framework comprises of two modules i.e. gloves with flex sensor to change over signals to discourse and web based informing administration to change over discourse to content.

3.1 Block Diagram Explanation

The square outline for the framework execution is shown.
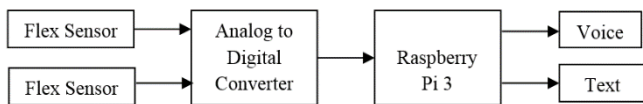
Fig. 3.1 Block diagram

Fig. 3.1 shows the underlying plan period of the glove which sensors ought to be utilized and they should be situated on the glove is chosen. In glove based systems, data gloves are used which can archive the accurate positions of hand gestures as its positions are directly measured. The Data-Glove based methods use sensor devices for digitizing hand and finger motions into parametric data.

Flex sensors esteems contrasts as indicated by the variety of finger developments, the yield of the flex sensor is a simple esteem and it changes for each unique signals. Subsequent to getting the flex sensor esteems, the ADC module is utilized to change over the simple flag esteems into advanced esteems.

Limit esteems are as of now characterized for each relating motions. The qualities from ADC module are given as contribution to the Raspberry Pi where it contrasts the qualities and the limit esteem that are as of now put away in the database. At the point when the qualities are coordinated, the relating motion is perceived and the yield will be the voice flag of the particular movement. Through the online message

benefit, the voice yield is changed over into content arrangement.

3.2 Hardware Description

In the proposed system the raspberry pi 3 acts as control unit and the interfacing components are ADC module and flex sensors and headphones or speaker for the output of voice signal.

3.2.1 Flex Sensor

Flex sensors are additionally called as twisting sensor. The flex sensor is comprised of resistive carbon component. It is a moment sensor which is finished with two hubs that is sure hub and negative hub. The protection esteem is changed when the substrate is twisted. Two flex sensors were utilized to quantify the curves of the fingers which were ascertained by estimating the protection esteem in flex sensors. It changes the protection esteem in extent to the degree it is bowed. The sensor when lying level has an ordinary protection of 10,000 ohms (10k) and when it is twisted, the protection increments to 30-40k ohms at 90 degree. Joining the flex sensors to the fingers of the gloves in a way which takes into account full flex of the sensors by broadening and getting the fingers.

3.2.2 ADC Module

The MCP3008 is a minimal effort 8 channel 10 bit simple to computerized converter. A framework was set up for the securing of the information, with the goal that the information from the flex sensors is gathered. The MCP3008 ADC (Analog to Digital Converter) is a coordinated circuit which measures the simple flag and changes over into computerized numeric esteem that gives an advanced portrayal of the simple flag.

The MCP3008 partners with the Raspberry Pi over the SPI (Serial Peripheral Interface). The GPIO sticks in Raspberry pi are associated with the SPI sticks in the ADC. The SPI has contains equipment and programming. The proposed framework utilized programming SPI in light of the fact that it is minimal

more adaptable since it can work with any pins on pi. The hardware SPI requires certain pins on the Raspberry Pi to be related with particular sticks on the MCP3008.

3.2.3 Raspberry PI 3

Raspberry pi is a little charge card measured single board PC with remote LAN and Bluetooth availability. There are two composes specifically display show A and show B. It is subdivided into Raspberry pi zero, Raspberry pi zero w (remote), Raspberry pi 2, Raspberry pi 3. Raspberry pi 3 demonstrates B is utilized as a part of finger motion acknowledgment framework. It is third era of the raspberry pi which is perceived on Feb 2016. Raspberry pi is a Broadcom BCM2387 chipset processor. Raspberry pi 3 displays B have chip receiving wire which is utilized by Wi-Fi and Bluetooth 4.1 Soc BCM2837 that is given by Broadcom BCM43438 chip. It underpins Linux, Qtonpi, ARM and MAC.

Raspberry Pi 3 demonstrates B incorporates a 1.4GHZ quad-focus 64 bit ARM Cortex A53 planned at 1.2GHz. It has 40 GPIO pins, video core IV GPU, smaller scale SD card opening, 1GB SDRAM @1250MHz, 4xUSB ports, Ethernet port, Quad center @1250MHz preparing speed, CSI camera port, 3.5mm 4-shaft composite video and Audio yield jack, HDMI video yield port, miniaturized scale USB control input (it can deal with up to 2.5 Amps), DSI port, 10/100 LAN port, 4xUSB 2 ports.

3.3 Software Tools

In this project, the products utilized are PYTHON IDE, WAY 2 SMS and ESPEAK. The PYTHON IDE is utilized to stack the program into the Raspberry Pi 3 to speak with the fringe parts. WAY 2 SMS is utilized as a web based informing administration to stack the yield from the unit. ESPEAK utilized as discourse synthesizer for the voice yield.

3.3.1 Python IDE

Python IDE is a created programming for python programming. Python was initially created in the late 1980's at the National Research Institute for Mathematics and Computer Science by Guido Van Rossum and discharged in 1991. Python is a deciphered question arranged and abnormal state dialect. Python is an IDLE is Integrated Development and Learning Environment. Sit out of gear has a two window composes. They are shell window and manager window.

3.3.2 Raspbian

Raspbian is a Debian-based PC working framework for Raspberry Pi. There are a few renditions of Raspbian including Raspbian Stretch and Raspbian Jessie. Since 2015 it has been authoritatively given by the Raspberry Pi Foundation as the essential working framework for the group of Raspberry Pi single-board PCs. The working framework is still under dynamic improvement. Raspbian is exceptionally upgraded for the Raspberry Pi line's low-execution ARM CPUs. Raspbian utilizes PIXEL, Pi Improved X windows Environment, Lightweight as its principle work area condition as of the most recent refresh. It is made out of an altered LXDE work area condition and the Open box stacking window administrator with another topic and couple of different changes.

3.3.3 WAY 2 SMS

Way 2 SMS is an online gateway and free SMS benefit offering free and boundless SMS crosswise over India. Utilizing this boundless SMS can be sent to any versatile. It would SMS be able to numerous distinctive individuals on the double is permitted. To send a free SMS to any portable, getting enrolled with way 2 SMS is compulsory.

3.3.4 ESPEAK

Espeak is a minimal open source programming discourse integrate for all dialect. It can be utilized for Linux and in windows. It utilizes a "formant union".

This enables numerous dialects to be given in little size. It can be utilized as order line program to talk content from a record. It incorporates diverse voices, whose attributes can be adjusted. As a matter of course the yield is set to naturally choose the default sound interface for the relating motion developments. It underpins discourse amalgamation mask up dialect. Content to discourse interpreter relies upon which content to discourse interpretation step client need to utilize.

3.4 Flow Diagram Explanation

The flowchart for the working module is indicated in Fig: 3.2.

```
            Start
              │
              ▼
   Read the analog value ◄──────────┐
              │                      │
              ▼                      │
   Convert the analog                │
   value into digital value          │
              │                      │
              ▼                      │
   If the resistance value of        │
   finger movements ─────────────────┘
   matches with stored
              │
              ▼
   Output
   (Voice and text)
              │
              ▼
            Stop
```
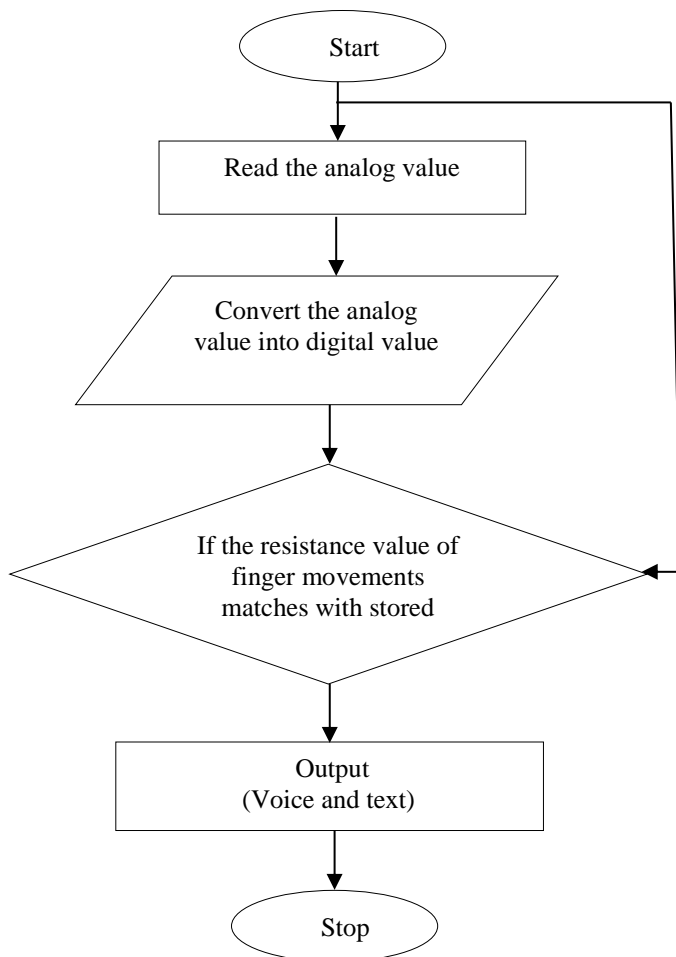
Fig. 3.2 Flow diagram of the proposed system

The above Figure 3.2 asks to the stream outline; right off the bat the flex sensor will detect the signal development of the fingers. Utilizing ADC module,

the flex sensor esteems are simple esteems that are changed over into advanced esteems. Limit esteems are put away for each flex sensors. On the off chance that the qualities are coordinated then the comparing motion is distinguished and the required voice flag will be the yield. Instant message likewise will show in advanced mobile phone. On the off chance that the qualities are not coordinated, it will again do a similar procedure.

IV. RESULTS AND DISCUSSION

This project provides a simple approach to access, amid crisis circumstance. By executing the framework progressively premise may help the crippled individuals to speak with the ordinary individuals with no issues.

Table 1. Comparison of flex sensor outputs for different finger movements

Values of flex sensor 1	Values of flex sensor 2	Message delivered
30	50	I need water
60	40	Take me to the hospital
50	40	I am scared to do this, kindly help me.

The above Table 1 indicates the flex sensor values for different finger movements and their corresponding messages were discovered to a normal person.

Fig. 4.1 Overall module of the proposed system

The above Figure 4.1 indicates the overall module of the proposed system which will help the bed ridden patients to communicate freely to others.

Fig. 4.2 Flex sensor values for first, second and third movement

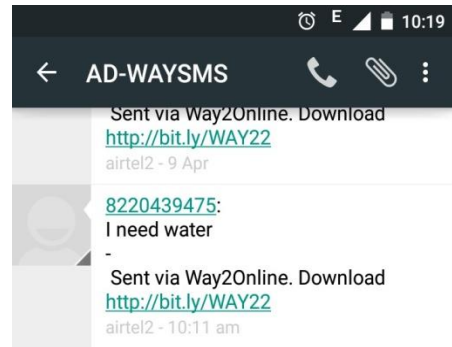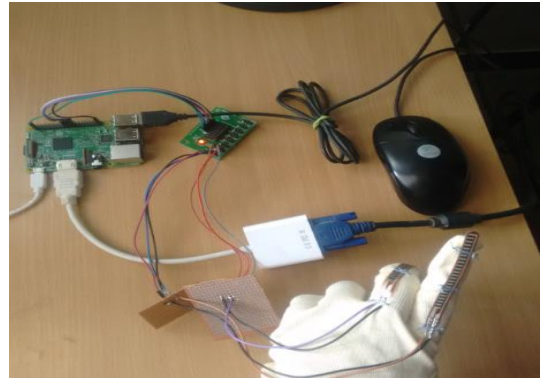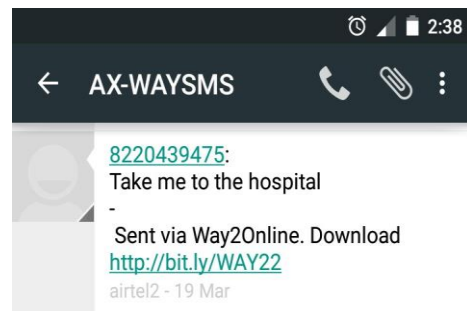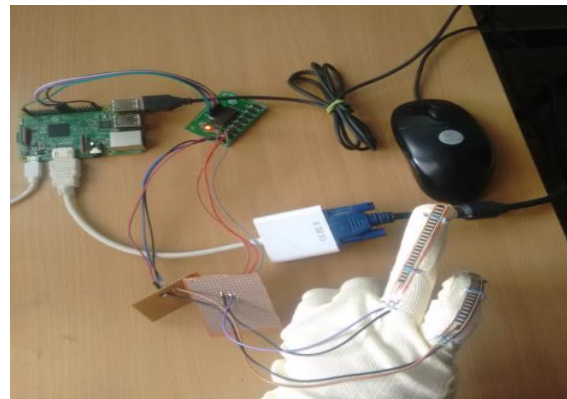The above Figure 4.2 indicates the flex sensor value for first finger movement, second finger movement and third finger movement.

Fig. 4.3 First movement

The above Figure 4.3 indicates the first hand gesture movement and their corresponding message is delivered i.e., "I need water" through online message service.

Fig. 4.4 Second movement

The above Figure 4.4 indicates the second hand gesture movement and their corresponding message is delivered i.e., "Take me to the hospital" through online message service.
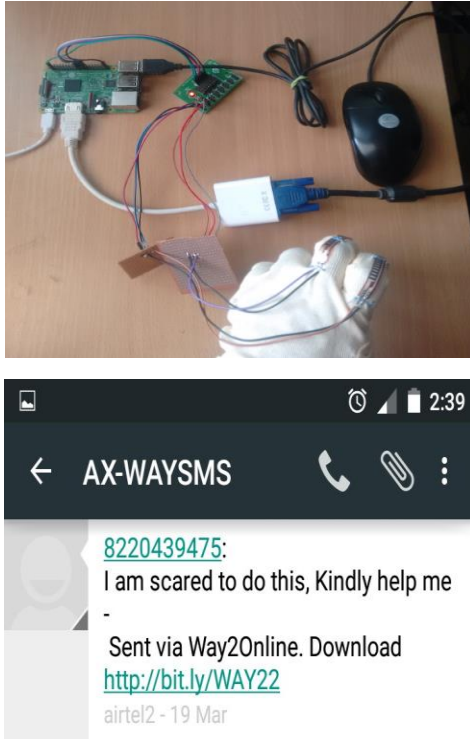

Fig. 4.5 Third Movement

The above Figure 4.5 indicates the third hand gesture movement and their corresponding message is delivered i.e., "I am scared to do this, kindly help me" through online message service.

The above Figure 4.3, 4.4, 4.5 shows the different gestures i.e., different finger movements to communicate with the normal people in emergency.

V. CONCLUSION AND FUTURE ENHANCEMENT

Dissimilar to alternate designs of hand glove which can perform just the communication via gestures for letter sets and numbers, this project derives the entire sentence, which is passed on through signal acknowledgment. Just flex sensor is utilized as opposed to utilizing numerous sensors, this improves the equipment plan. It can be reasoned that improved and keen finger signal framework will help its clients to speak with others around them. This venture, have utilized the flex sensor technique for perceiving the finger signals. For the single signal movement, a single sentence is passed on. This undertaking causes the noiseless speakers to speak with ordinary individuals. In future, the developments can be added to various finger movements So that, the bed ridden individuals can discuss effectively with the typical individuals without knowing the communication via gestures.

VI. REFERENCES

[1]. Abhijith Bhaskaran K, Anoop G Nair, Deepak Ram K, Krishnan Ananthanarayanan, H R Nandi Vardhan, (2016) "Smart Gloves for Hand Gesture Recognition", International Conference on Robotics and automation for Humanitarian Applications (RAHA), pp.1-6.

[2]. Anagha J.Jadhav and Mandar P.Joshi, (2016)"AVR Based Embedded System for Speech Impaired People", International Conference on Automatic Control and Dynamic optimization techniques (ICACDOT), pp. 844-848.

[3]. Ashish S.Nikam and Aarti G.Ambekar, (2016)"Sign Language Recognition using Image Based Hand Gesture Recognition Techniques", Online International Conference on Green Engineering and Technologies (IC-GET), pp. 1-5.

[4]. A.Batool, S.Rauf, T.Zia,T.Siddiqui, J.A.Shamsi, T.Q.Syed and A.U.Khan, (2014) "Facilitating Gesture-Based Actions for a Smart Home Concept", International Conference on Open Source Systems and Technologies, pp. 6-12.

[5]. Dhananjai Bajpai, Uddaish Porov, Gaurav Srivastav and Nitin Sachan, (2015) "Two Way Wireless Data Communication and American Sign Language Translator Glove for Images Text and Speech Display on Mobile Phone", 5th International Conference on Communication Systems and Network Technologies, pp. 578-585.

[6]. Emad E.Abdallah and Ebaa Fayyoumi, (2016) "Assistive Technology for Deaf People Based on

Android Platform", Procedia Computer Science, vol. 94, pp. 295-301.

[7]. Fernando Ramirez-Garibay, Ceasar Millan Olivarria, Alejandro Ferderico Eufracio Aguilera and Joel C.Huegel, (2014) "My Vox-Device for the Communication between People: Blind, Deaf, Deaf-Blind and Unimpaired", IEEE Global Humanitarian Technology Conference (GHTC), pp. 506-509.

[8]. Geethu G Nath and Arun C S, (2017)"Real Time Sign Language Interpreter", IEEE International Conference on Electrical, Instrumentation and Communication Engineering (ICEICE), pp. 1-5.

[9]. Harini Sekar, R.Rajashekar, Gosakan Srinivasan, Priyanka Suresh and Vineeth Vijayaraghavan, (2015)"Low-cost Intelligent Static Gesture Recognition System", Annual IEEE System Conference (SysCon), pp. 1-6.

[10]. Julien Marot and Salah Bourennane, (2017) "Raspberry Pi for Image Processing Education", 25th European Signal Processing Conference (EUSIPCO), pp. 2364-2366.

[11]. Kumud Tripathi, Neha Baranwal and G.C.Nandi, (2015) "Continuos Indian Sign Language Gesture Recognition and Sentence Formation", Procedia Computer Science, vol. 54, pp. 523-531.

[12]. B.G.Lee and S.M.Lee, (2017) "Smart Wearable Hand Device for Sign Language Interpretation System with Sensors Fusion", IEEE Sensors Journal, vol. 18, Issue 3, pp. 1224-1232.

[13]. Li Lei and Que Dashun, (2015) "Design of Data Glove and Chinese Sign Language Recognition System Based on ARM9", 12th IEEE International Conference on Electronic Measurement and Instrument (ICEMI), vol. 03, pp. 1130-1134.

[14]. Monique Bernice H.Flores, Charles Mholen B.Siloy, Carlos Oppus and Luisito Agustin, (2014) "User-Oriented Finger-Gesture Glove Controller with Hand Movement Virtualization Using Flex Sensors and a Digital Accelerometer", International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment and Management (HNICEM), PP. 1-4.

[15]. Neela Harish, S.Poonguzhali, (2015)"Design and Development of Hand Gesture Recognition System for Speech Impaired People", International Conference on Industrial Instrumentation and Control (ICIC), pp. 1129-1133.

[16]. Rishikanth C, Harini Sekar, Gautham Rajagopal, Ramesh Rajesh and Vineeth Vijayaraghavan, (2014)"Low Cost Intelligent Gesture Recognition Engine for Audio-Vocally Impaired Individuals", IEEE Global Humanitarian Technology Conference (GHTC), pp. 628-634.

[17]. Shreyashi Narayan Sawant and M.S.Kumbhar, (2014) "Real Time Sign Language Recognition using PCA", IEEE International Conference on Advanced Communications, Control and Computing Technologies, pp. 1412-1415.

[18]. Subhankar Chattoraj and Karan Vishwakarma, (2017) "Assistive System for Physically Disabled People using Gesture Recognition", IEEE 2nd International Conference on Signal and Image Processing (ICSIP), pp. 60-65.

[19]. Suraksha Devi and Suman Deb, (2017) "Low Cost Tangible Glove for Translating Sign Gestures to Speech and Text in Hindi Language", 3rd International Conference on Computational Intelligence and Communication Technology (CICT), pp. 1-5.

[20]. Vikas Kumawat, Shubham Jain, Vikram Vashisth, Neha Mittal and Bhupendra Kumar Jangir, (2017)"Design of Controlling Home Appliances Remotely Using Raspberry Pi", 2nd International Conference for Convergence in Technology (I2CT), pp. 841-845.

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