CONVERSATION SYSTEM FOR NON VOCAL PEOPLE USING HAND GESTURES

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Abstract: Many people in the world suffer from some or the other physical, sensory or mental disabilities. Often their lives are handicapped by these disabilities which prevent them from being a part of the society to the fullest and they hesitate to enjoy equal rights and opportunities. Communication is the basic need for every human being for exchanging ideas, thoughts, feelings and information in the form of verbal or non-verbal message. But for a person who can't speak, it is very difficult to convey their message. Many speech impaired people use sign language for their communication. Sign language uses gestures instead of voice to convey message. But the difficulty with this sign language is that it needs to be learnt. The purpose of this paper is to make conversation much easier between mute and normal people there by bridging the society barriers. The input to the system is gestures made by hand and these gestures are recognized properly and displayed at the output in the form of the text and speech. This paper also provides a facility for a mute person to contact people around him/her through email application in case of emergency.

***Key words*– Flex sensor, Raspberry pi, E-speak, Exim-4, sign language.**

I. INTRODUCTION

Gesturing is an action performed to convey specific meaning, feeling or intention. Lot of research has been carried out in the sign language interpretation using gestures continuously in the past few years to be used as an effective tool for deaf and mute people to communicate and be an integral part of the society.

Sign Language is the only way of communication for mute people who are unable to speak and normal people can't understand the sign language used by those impaired people. Hence it becomes very difficult for mute people to communicate with them.

In this paper conversation system is developed to ease the communication process of mute people. The main component of this system is a glove on which four flex sensors are attached provided if we use only one hand for communication and these flex sensors are connected to Raspberry Pi kit which is the main control unit of this system.

This system has a feature of user input. So mute people can easily use his/her own chosen commands for specific gestures. Flex sensors have characteristics of change in the resistance when bent. The value of resistance in the flex sensor is maximum when flex sensor is kept straight and the value of resistance in the flex sensor is varying when flex sensor is bent in different angles.

Figure 1.1: Communication using Sign Language

II. EXISTING SYSTEM

In one of the paper, Flex sensors, tactile sensor, accelerometer is used to detect the hand gestures which are mounted on the hand glove of the user. The main control unit of this system is microcontroller. Various resistance values of each sensor are detected and sent to microcontroller. Then gestures are matched to the data base based on the gesture shown. The gestures are detected using colors which will be mapped and compared with the image stored in the data base, if the image is matched then particular gesture is displayed.

Limitation with this system is connection between the flex sensor and microcontroller is not effective. Moreover, in Microcontroller and Arduino, once a program is dumped then the program cannot be changed i.e. it is a static system. We are making an attempt here to make the system dynamic. We are using Raspberry Pi, which is abundant as compare to microcontroller. With supplementary features of microcontroller with additional features like Ethernet, USB, and HDMI interface.

III. LITERATURE SURVEY

Safayet Ahmed; Rafiqul Islam [1]: Motivation of this project is to help the speech impaired communities by developing an electronic speaking system. Arduino is main control unit for this system. Arduino was programmed in such way that configuration settings can readily change without changing the entire program code. This electronic speaking system has two way

of communication. First one is audio through the speaker and another one is text command that is displayed on the LCD. Gesture is being made with glove consisting of flex sensors. Initially recorded voice commands are saved in the SD card. For specific gesture, there is a particular audio and text command. To increase the audio sound an amplifier was also connected.

B. G. Lee and S. M. Lee [2]: Gesturing is an instinctive way of communication to present a specific meaning or intent. In this paper, sign language interpretation system using a wearable hand glove is proposed. This wearable system uses five flex-sensors, two pressure sensors, and a three-axis inertial motion sensor to differentiate the characters in the American Sign Language alphabet. The whole system consists of three units: a wearable device with a sensor module, a processing module and a display unit mobile application module. Mobiles that are based on android application were developed with a text-to-voice function that converts the received text into audible output.

IV. METHODOLOGY

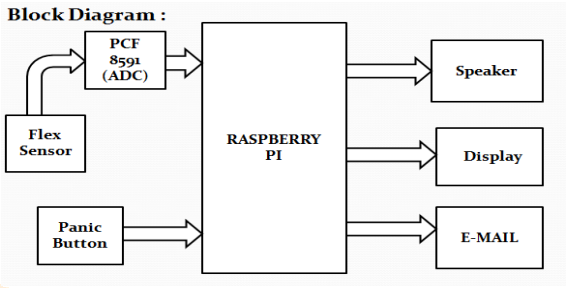

Figure 4.1: Block Diagram

Flex sensors are yielding devices that can be used to detect bending. The Flex Sensor exclusive technology is based on resistive carbon elements. When flex sensors are bent, the sensor produces a resistance value of minimum, if the resistance value of flex sensor is higher, then it will be up to 10kohm. Four flex sensors are attached to the glove, which will be weared by mute people.

Raspberry Pi do not have any AD or DA converters, so if we want to use analog sensor on Raspberry pi, an external AD expansion board is required. An AD/DA converter chip, PCF8591 is interfaced with raspberry pi, which may be helpful for AD sampling on Raspberry pi.

Glove is connected to the voltage divider circuit which is in turn connected to the analog input pin of PCF8591 (ADC) mounted on Raspberry pi. When gestures are made, gesture analyzation take place in raspberry pi by comparing the value of gesture with the pre-stored threshold values in raspberry pi of that specific gesture, for this user should first press the submit button after that message is synthesized played through the speaker and displayed on LCD screen as well.

As an added application, the project includes transferring a mail to different recipients in panic situations by the mute person. For this, we are creating one E-mail server in Raspberry Pi through which it will transfer the mail to different recipient using EXIM-4.For describing the panic situation; we are providing a panic button which is connected to the raspberry pi kit. If a person presses the panic button for long time in panic situation, then mail will be sent to different recipients.

4.1. RASPBERRY PI 3 MODEL B

Raspberry pi is a credit card size minicomputer. There are two types of raspberry pi model A and B. It has 64 bit quad core processor, and has on –board Wi-Fi, Bluetooth and USB boot capabilities. It appeared with a faster 1.2Giga Hertz processor and a 3 time faster network based on giga bit Ethernet. Other options are Power over Ethernet, USB boot. It consisting of 40pins GPIO (general purpose input output), 4x USB two ports, CSI camera port, DSI display port, micro SD card slot, HDMI(high definition multimedia interface), four pole stereo and composite video port. Fig 4.1.1 shows the Raspberry Pi 3Model B.

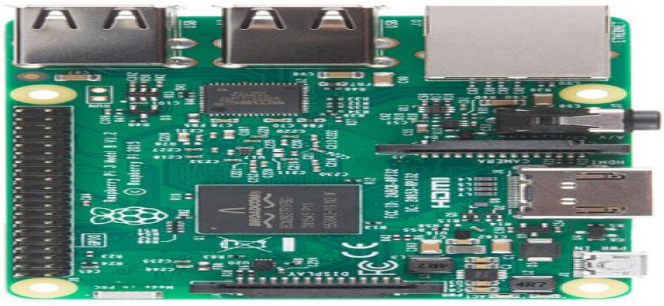

Figure 4.1.1: Raspberry Pi 3 Model B

4.2. FLEX SENSOR

4.2.1 How to make a flex sensor

- Take aluminium sheet cut it as you need with equal in size.
- Paste two strips of aluminium sheet on one another.
- Take a sponge to place in between two aluminium strips.
- Place a wire and aluminium strips on tape.

Figure 4.2.1: Flex Sensor

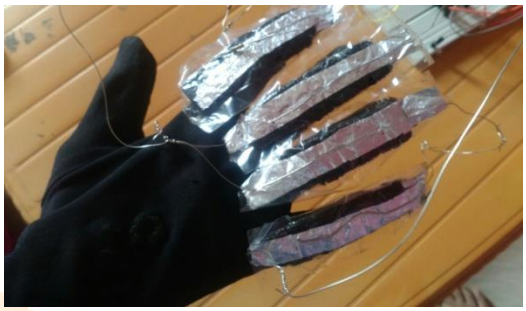

Figure 4.2.2: Flex sensor attached to glove

4.3. E-SPEAK

In this paper we are using E speak speech synthesizer to convert text to speech which uses English and other languages. E speak is having ranges for male and female voice.

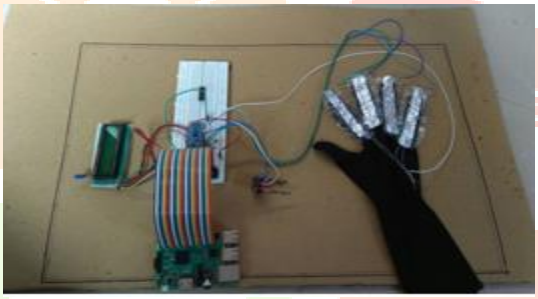

Figure 4.3.1: Proposed System

V. ADVANTAGES

- The communication between a normal person and a speech impaired person becomes easier.
- As we are using the display to show the user command so one speech impaired person can also communicate with a deaf person.
- There is an option for user input.
- This device is portable and compact; user can bring it anywhere he/she wants

VI. LIMITATIONS

- Limited number of gestures.

VII. APPLICATIONS

- **Health:** It gives deaf and dumb people the provision to communicate in a better way with the world.
- **Disaster Management:** We can avoid many disastrous and serious issues if mute people can communicate on time, there by avoid many accidents.
- **Societal:** Even mute people can be a part of society by this way of communication.
- **Military:** It can be used in secret missions.

VIII. CONCLUSION

This conversation system using hand gesture for mute people will be an effective tool and helpful in communication in working areas and public sector areas. Their gestures will be converted to speech by the system and as well as displayed on LCD, which will be easy for mute people to communicate with deaf person. This system will be able to convert the hand gestures effectively there by making them easy to communicate with the world.

IX. FUTURE SCOPE

The system can be enhanced by using touch pad (mobile screen) instead of flex sensor which is mounted on glove. By using touch pad (mobile screen) ‘n’ number of gestures can be made, which is easy for mute person to convey their ‘n’ number of message. They need not have to make the gestures, directly by using touch pad the message can be conveyed.

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