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Speaking Gloves for Speechless Persons: A Review

Mr. M. R. Bhoyar[1], Ms. M. J. Dahake[2], Mr. A. P. Shingade[3], Mr. A.N. Shire[4]

Student, Department of Electronics & Telecommunication Engg., JDIET, Yavatmal, India[1,2]

Assistant Professor, Department of Electronics & Telecommunication Engg., JDIET, Yavatmal, India[3,4]

Abstract: In our day to day life, we observe that the communication of speechless or mute patients with normal peoples find many difficulties. Usually speechless patients communicate in sign languages that are not understood by normal people. As we know that visual communication is more effective than verbal communication, so by considering this phenomenon we inspired to have some technological system for communication of speechless patients. We have studied the seminar that focuses on ease of communication between the speech impaired patients or people with the others. The topic consists of the glove that translates the bending movement of the fingers into voice or speech signal using Flex sensors. AVR Microcontroller processes the binary data from flex sensor and further the voice module processes on the microcontroller output to produce speech signal. The message spoken through the speaker is also displayed on the LCD display.

Keywords: AVR microcontroller, Bend movement, Speech Impaired, Voice module.

I. INTRODUCTION

The development of the most popular devices for hand movement acquisition, glove-based systems, started about 30 years ago and continues to engage a number of researchers. Communication involves the exchange of information, and this can only occur effectively if all participants use a common language. In the recent years, there is a rapid increase in the number of speech - disabled victims due to several reasons like by birth, oral diseases, accidents, etc… and need for the Electronic Assistive Technology (EAT) also increases particularly among physically impaired. Speech impairment is a communication problem in which the normal ‘8speech is disrupted this the articulation problems, because they are rendered helpless and unable to communicate with the outside world.

This seminar is useful for the deaf and dumb, it can also be used for the (speechless) patients with half of their bodies paralyzed and they are not able to speak but are able to move their fingers. The aims and objectives of this research

1.1. BLOCK DIAGRAM:-

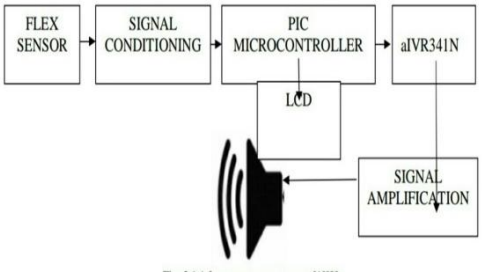

Fig:- 1 system block diagram

1.2.HARDWARE DESCRIPTION:-

1.1.1FLEX SENSORS

Table:-1.Electrical characteristics of flex sensors

Size	approx 0.28" wide and 1"/3"/5" long
Resistance Range	1.5-40K ohms depending on sensor. Flex point claims a 0- 250K resistance range.
Lifetime	Lifetime Greater than I million life cycles
Temperature	Range -35 to +80 degrees Celsius
Hysteresis	7%
Voltage	5 to 12 V

Flex sensors change in resistance depending upon the amount of bend on the sensor as shown in Fig. I. The convert the change in bend to electrical resistance the more bend, will be the resistance value. They are usually in the form of a thin strip from 1"-5" long that vary in resistance from approximately 10KΩ to 50KΩ. Thisare frequently used in gloves to sense finger movement. The flex sensors are used as input and are placed inside the glove that is bending of movement.

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1.2 SIGNALCONDITIONING:

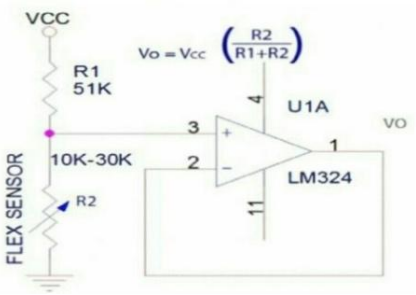

Fig:-Flex Sensor Signal Conditioning Circuit

It has been done by the circuit shown in Fig. Supply voltage is applied on the divider circuit having 51KΩ resistance in series with flex sensor as load resistance. When it's bend, its resistance value increases that causes increase in voltage on it which is an analogy voltage change it's fed to voltage follower, an operational amplifier (LM324, which is recommended by the flex sensor) has been used to boost-up the circuit current, which makes it comprehensible for the PIC microcontroller to proceed further.

The corresponding value of graph which is output of fig calculation are as following formula for voltage divider circuit

V0=Vcc(R1/R1+R2)

For V0 minimum when sensor deflection is 0◦ R1=51KΩ , R2=10KΩ Vcc=3.7V

V0(min)=3.7(10K/51K+10K)=0.60656V

For V0 minimum when sensor deflection is 0◦ R1=51KΩ , R2=20KΩ Vcc=3.7V

V0(midle)=3.7(20K/50K+20K)=1.0422V

For V0 minimum when sensor deflection is 0◦ R1=51KΩ , R2=30KΩ Vcc=3.7V

V0(max)=3.7(30K/51K+30K)=13707V

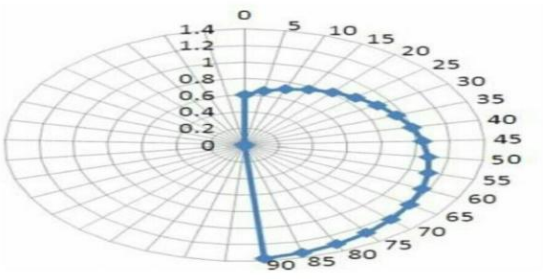

Fig:-Signal Conditioning Graph (Deflection vs. Voltage)

1.3 SIGNAL AMPLIFICATION

The recorded voice output from a IVR341N is not audible to human ears therefore, it is fed to an amplifier (LM386 Y,1/4 W) that enhances its volume to human ears. It is configured at the gain of 200 that make it quite natural to human ears; an 8Ω speaker is used to get the final output.

II. LITERATURE REVIEW

The need for the inventing a system such as electronic hand glove has made the impaired people to live their life comfortably with us. This system helps to minimize distance. Electronic Hand Glove is a portable device which can be easily handle anywhere. That will help the care taker to know what the patient.

Author Kuldeep Singh V Rajput, et al[1] presented design of Talking hand glove for the hearing impaired . Advantages of this seminar is hearing impaired people generally use hand sign language to communicate. The main idea of seminar is talk able to translate this sign language into speech. In this system RVM 01 is a parallel Mode based voice recording & playback chip is used. It supports 32 Voice groups with total 1800 minutes recording. Sampling is done at 10K sample rate and the voice is record in the internal memory. No external MEMORY is required for storing the voice data. Its voice storage capacity is more therefore this system is more efficient .

Author Ahmad.S.F, et al [2] presented implementation of electronic speaking glove for speechless patient tongue to a dumb. This system is designed to facilitate an easy communication through synthesized speech for the benefit of speechless patients. In this author used Smart Phone various gestures can be made on touch screen. These can be convert to sound by various inbuilt software. this is not convenient as user must be educated which is not possible all the time. Therefore this system is less efficient than other one.

Author Abjhijt Auti, et al[3] described design of speaking gloves for speechless persons. The main aim of the seminar topics is to develop electronic speaking glove which is designed to easy communication through synthesized speech for the benefit of speechless patients. A speechless person communicate through sign language which is not understood by the any people. The proposed system is designed to solve the problem. In this system used aIVR341N is a 8-bit MCU based Voice chip .It can store 341sec voice message with 4-bit ADPCM compression at 6KHz sampling rate and it required external memory for voice storing

Jan Fizza Bukhari, et al [4] named their prototype as Sign Speak which translated Indian Sign Language into text and speech. The various part of module were glove design, data acquisition, wireless link and android application.

In glove design module selection of appropriate sensors and their location was finalized. contact when two finger are in contact of hand. To detect a contact, connected to the input voltage through pull-up resistors was used. Whenever any conductive plate connected to ground was touched to positive plate, a contacts was detected. Therefore, whenever one finger was in contact with the other, value of contact sensors for that particular fingers became 0. To detected and measure the acceleration of hand ADXL 345 was used in I2C mode. By placing all

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these sensors on a glove at appropriate location, the data glove as an input device to our main controller.
In data acquisition module to acquire multiple sample of gesture for the purpose of extracting important feature and training algorithm, a Data Acquisition (DAQ) system was setup, which was a able to capture data from the flex and contact sensor.

The application was written in Java using Eclipse, by modified the Bluetooth Chat sample code from Androids. Two API Bluetooth (for scanning of other Bluetooth devices and paired Bluetooth connections) and Text to Speech API (for conversion of text massage into speech featuring more than 30+ languages and implementation of different feature such as voice, speed and pitch) were u

III. COMPARISION TABLE

References	Parameter	Operating Frequency	Data Memory	Timer	RAM Byte	Temp range	Operating voltage
1.B Ali 2.B Nadeem	AT mega 328	20 mhz	1 Kbyte	3	32 Kbyte	Up to 85◦c	1.8V to 5.5V
1.Kuldeep singh 2.Ahmad S F	PIC 16F877A	20 mhz	256 byte	3	368 byte	_40 ◦c to 85◦c	2V to 3.6V
1 Jan Fizza Bukhari.	ADXL345	2 mhz	13bit	3	48kB	_55 ◦c to +105◦c	2v to3.6V

IV. ADVANTAGES

- Cost is less
- Easy to implements
- Useful for handle emergency conditioning
- Immediate alert

V. APPLICATIONS

- Easy communication for handicapped patients with the normal people.
- The care taker will be always in contact with handicapped patients.
- Useful for speech Inspire

VI. CONCLUSION

This system is the useful tool for speech impaired and partially paralyzed patient. Which fill the communication gap between patients, doctor and relatives.
It will be give dumb a voice to speak for their needs and to express their gestures movement.
As it is portable, it requires low power operating on a single rechargeable battery and having less weight.

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