Microcontroller Based Sign Language Glove

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Abstract-- The people who are speech impaired and paralyzed patients those have difficulty in communication. So that patients cannot speak and hear properly and they have problem in communication to other people who don't understand sign languages. So at that time electronic hand glove is used for communication and for that one hand is used for making position of different fingers using flex sensors. The objective of my project is to develop a electronic device for the people who suffer from speech impairment and paralyzed patients. In this, Flex sensor glove is used and Indian sign language's alphabets make using different position of fingers and thumb and their output are shown in the LCD.

Key Words: Flex Sensor, Indian Sign Language's Alphabets, Microcontroller, ADC, and LCD.

I. INTRODUCTION

In this world there are many people those do not speak and hear properly. So that people have difficulty in communication with normal person those do not understand sign language. For that electronic hand glove is useful for that person. The objective is to develop a portable electronic hand glove device that converts the Indian sign language's alphabets shown in LCD. In this disabled person worn hand glove and makes the sign of alphabets. In this only one hand is used. A system is developed for different signs and their outputs are shown in LCD. The results will show that the people who are deaf and dumb easily understand what they want to say by using alphabets on LCD. The Flex Sensor glove is a normal glove in which flex sensor are fitted with the length of each finger and thumb. The sensors output a stream of data that varies with degree of bend. Flex sensor plays the major role. There are different Indian sign language's alphabets will make using different position of fingers. The flex sensor's outputs are in analog form so to convert in digital form ADC is used. Then these digital signals are connected to the microcontroller where the programming is done and then the outputs are shown in the LCD.

II. PROTOTYPE OF MY PROJECT

Block diagram of the system is shown in Fig 1. The system is consisted of:

1) Glove
2) Flex Sensor
3) ADC
4) Microcontroller
5) LCD

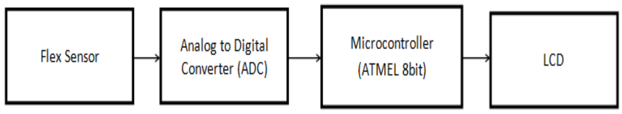


Fig (1): Show block diagram of my Prototype

Each flex sensor is fitted with each finger and thumb in the glove and the voltage required for each flex sensor is +5v. The outputs of this flex sensor are in analog form. So to convert this value into digital form there is Analog-to-Digital converter is used. Then this ADC's output goes in microcontroller. In this the programming done by microcontroller and control button is pressed and if the output is in correct sign then the result display in LCD screen otherwise it will display an invalid signal on LCD. Here, I made the alphabet Y and its output shown in the LCD as given in Fig 2.

III. FLEX SENSOR

The Flex Sensor patented technology is based on resistive carbon elements. As a variable printed resistor, the Flex Sensor achieves great form-factor on a thin flexible substrate. When the substrate is bent, the sensor produces a resistance output correlated to the bend radius—the smaller the radius, the higher the resistance value. Flex sensors are sensors that change in resistance depending on the amount of bend on the sensor. They convert the change in bend to electrical resistance - the more the bend, the more the resistance value. They are in the form of a thin strip from 1"-5" long that vary in resistance from approximately 10 to 50 kilo-ohms. The resistance of the flex sensor changes when the metal pads are on the outside of the bend (text on inside of bend).

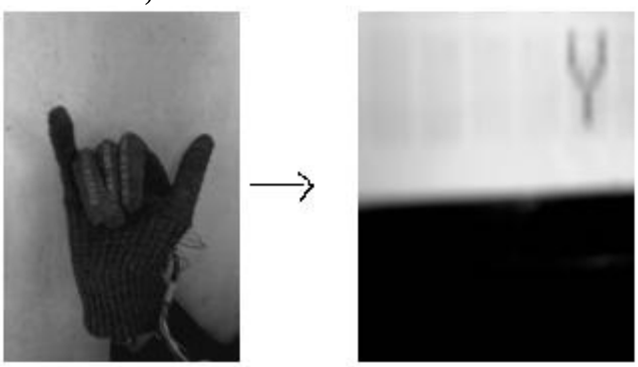


Fig (2): Photos of hand position and its equivalent alphabet

Fig (3): Image of flex sensor

The membrane construction is both resilient and somewhat durable, and can be used within a temperature range of -35ºC to +80ºC for an operational life rating of over 1 million movements if the sensor is secured properly.

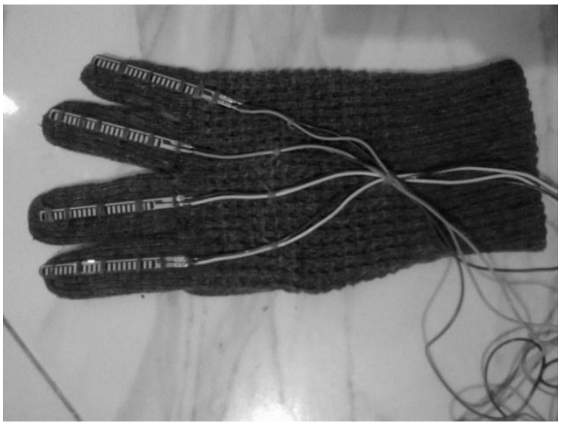
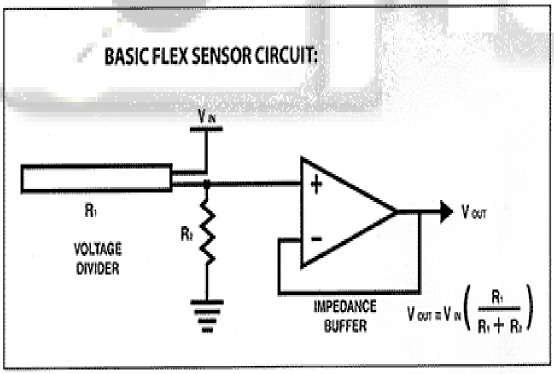


Fig (4): Show photos of flex sensor glove

Flex sensors are analog resistors. They work as variable analog voltage dividers. Inside the flex sensor are carbon resistive elements within a thin flexible substrate. More carbon means less resistance. When the substrate is bent the sensor produces a resistance output relative to the bend radius. With a typical flex sensor, a flex of 0 degrees will give 10K resistance will a flex of 90 will give 30-40 K ohms.

A. *Basic Circuit:*

Flex Sensor as Voltage Divider - Output voltage increases with the bend.



The impedance buffer in the circuit above is a single sided operational amplifier, used with these sensors because the low bias current of the op amp reduces error due to source impedance of the flex sensor as voltage divider. Suggested op amps are the LM358 or LM324.

IV. INDIAN SIGN LANGUAGE

ISL is most widely used in India. Deaf and dumb people use sign language for communication. The alphabets of Indian sign Language can be display using one hand and two hands. Here, I used only one hand.

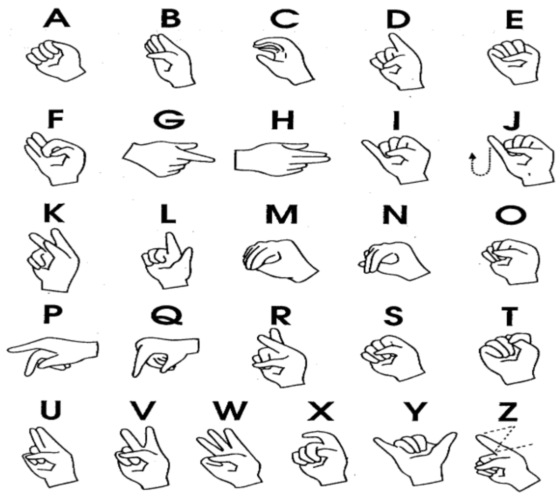


Fig (5) Images of Indian sign language

V. MICROCONTROLLER 89S52

The AT89S52 is a low-power, high-performance CMOS 8-bit microcontroller with 8K bytes of in-system programmable Flash memory. The device is manufactured using Atmel's high-density nonvolatile memory technology and is compatible with the Indus-try-standard 80C51 instruction set and pinout. The on-chip Flash allows the program memory to be reprogrammed in-system or by a conventional nonvolatile memory pro-grammer. By combining a versatile 8-bit CPU with in-system programmable Flash on a monolithic chip, the Atmel AT89S52 is a powerful microcontroller which provides a highly-flexible and cost-effective solution to many embedded control applications. The AT89S52 provides the following standard features: 8K bytes of Flash, 256 bytes of RAM, 32 I/O lines, Watchdog timer, two data pointers, three 16-bit timer/counters, a six-vector two-level interrupt architecture, a full duplex serial port, on-chip oscillator, and clock circuitry.

VI. ADC 0808

The ADC0808 data acquisition component is a monolithic CMOS device with an 8-bit analog-to-digital converter, 8-channel multiplexer and microprocessor compatible control logic. The 8-bit A/D converter uses successive approximation as the conversion technique. The converter features a high impedance chopper stabilized comparator, a 256R voltage divider with analog switch tree and a successive approximation register. The 8-channel multiplexer can directly access any of 8-single-ended analog signals. The design of the ADC0808 has been optimized by incorporating the most desirable aspects of several A/D conversion techniques. The ADC0808 offers high speed, high accuracy, minimal temperature dependence, excellent long-term accuracy and repeatability, and consumes minimal power. These features make this device ideally suited to applications from process and machine control to consumer and automotive applications.

VII. LCD 2X16 A MODULE

Innovati's LCD 2x16 A Module provides versatile display functions. Through its simple connections, it can be controlled by Innovati's BASIC Commander for a wide range of LCD applications. In this module, two display lines, each with 16 characters on each line can be displayed. By using the cursor control command, the position of the character to be displayed on the screen can be arbitrarily changed. In this module, the backlight function can be used to change the backlight to allow the message to be read easily.

VIII. CONCLUSION

My project is used for speech impaired and paralyzed patients. It is also useful for deaf and dumb people to communicate with one another and with the normal people.

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