Indian Sign Languages using Flex Sensor Glove

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Abstract— Now days, it is serious problem for deaf and dumb people for communication. Deaf and dumb people face problem in communication to normal person. So For communicating to each other, both have knowledge about sign language. Here, I made Indian Sign Language's alphabets using one hand. For making this, Flex sensor glove is used. Using this alphabet, I made word forming for example, "BOY", "HELLO". For making this, each sign of alphabets, the output shown in LCD. And then for combining alphabets word display on LCD.

Keywords— Glove, Flex Sensor, Indian Sign Language's Alphabets, Microcontroller, ADC, and LCD.

I. INTRODUCTION

In real word, there are many people who are deaf and dumb cannot communicate easily. For communication of deaf and dumb people, I made electronic hand glove for that people. It is portable and easy to handle. There is five flex sensor is used and each are fitted with length of each finger and thumb. Indian Sign Language's alphabets made using different position of fingers and thumb. Here, only one hand is used. There output shown in the LCD. Using this alphabet, I made word forming and their output shown in the LCD. The sensor output are in analog form so to convert in digital form there is ADC is used. Then ADC's output goes in microcontroller module where programming is done. And then the output has shown on the LCD.

II. SYSTEM FUNCTIONALITY

There is five flex sensor is used and voltage required for each flex sensor is +5v.When power is ON, Each flex sensor get +5v supply. When user made letter or word and press a button, then five signals coming from each five flex sensor are amplified using amplification circuit, and then its goes in microcontroller which are then converted analog signals to digital values. And then display the output in the LCD. If there is no letter matches current state of the hand, there is no output shown in the LCD. The flowchart of this system is shown below.
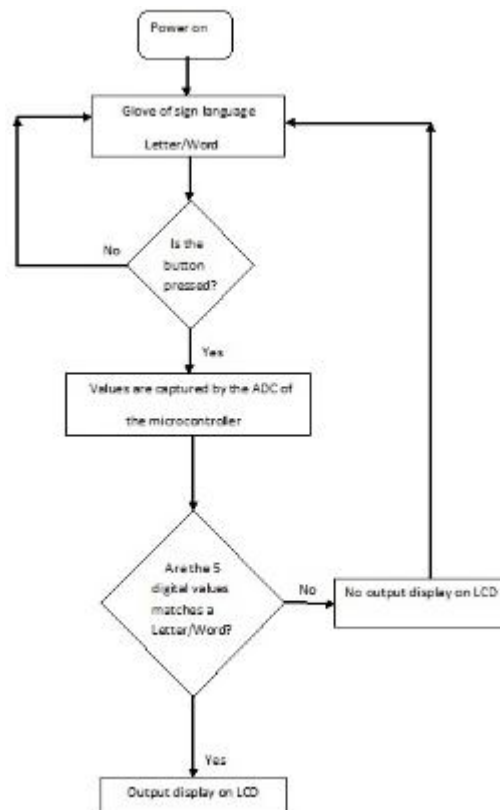

Fig 1 Flow chart of the system functionality.

For making word, each of alphabet's sign can be done by user. For making "BOY", Take the position of 'B' and there output shown in LCD and then it's saved and then make position of 'O' and also it's saved and then make 'Y' and also it's saved on LCD. If incorrect letter can be display on LCD will be removed by erase button.
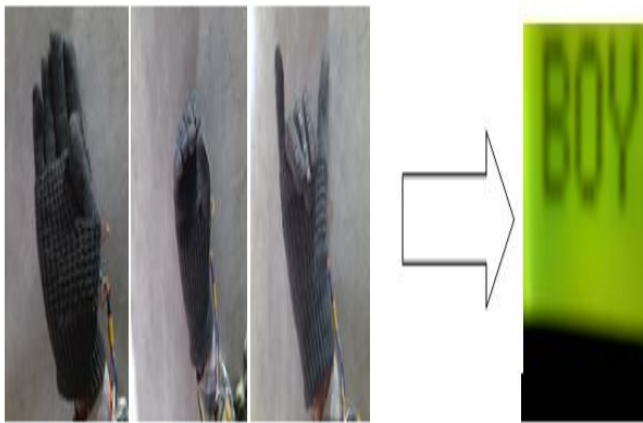
Fig. 2 Image of word "BOY" display on LCD.

III. PROJECT'S PROTOTYPE

There is five flex sensor are fitted with each finger and thumb and voltage required is +5v. Then its output is in analog form so to convert in digital form there is analog to digital converter is used. Then this digital value goes in microcontroller where programming is done. And this data goes in LCD where output is shown.

Fig 3 photos of my project's prototype.

There is five press button is used. First for displaying the output. Second is character print button, third is word print button and fourth is reset button and last is for erase button.

IV. 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.

Fig 4 Image of Flex sensor

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. The Bend Sensor lists resistance of 30-250 K ohms.
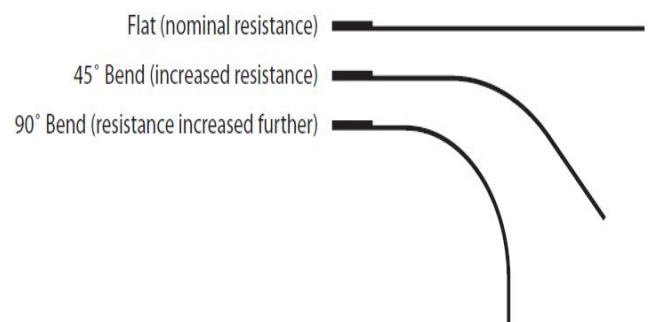
V. MICROCONTROLLER

Features of microcontroller are:
• 8K Bytes of In-System Programmable (ISP) Flash Memory
– Endurance: 10,000 Write/Erase Cycles
• 4.0V to 5.5V Operating Range
• Fully Static Operation: 0 Hz to 33 MHz
• Three-level Program Memory Lock
• 256 x 8-bit Internal RAM
• 32 Programmable I/O Lines
• Three 16-bit Timer/Counters
• Eight Interrupt Sources

• Full Duplex UART Serial Channel
• Low-power Idle and Power-down Modes
• Interrupt Recovery from Power-down Mode
• Watchdog Timer
• Dual Data Pointer
• Power-off Flag
• Fast Programming Time
• Flexible ISP Programming (Byte and Page Mode)
• Green (Pb/Halide-free) Packaging Option

VI. ADC

Features of analog to digital converter are:
• Easy interface to all microprocessors
• Operates ratio metrically or with 5 VDC or analog span adjusted voltage reference
• No zero or full-scale adjust required
• 8-channel multiplexer with address logic
• 0V to 5V input range with single 5V power supply
• Outputs meet TTL voltage level specifications
• Standard hermetic or molded 28-pin DIP package
• 28-pin molded chip carrier package
• ADC0808 equivalent to MM74C949

VII. LCD

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. CONCLUSIONS

This project is useful for deaf and dumb people those cannot communicate with normal person. It is also useful for speech impaired and paralysed patient means those do not speak properly.

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