

Speaking Aid for Deaf and Dumb using Flex Sensors

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Abstract

Communications between deaf-mute and a standard person have invariably been a difficult task. About nine thousand million people in the world are deaf and dumb. They are introverted closed society. They do not have normal opportunities for learning and Face serious problem in communication with normal people. Existing application focus only on recognition of sign language. The project's aim is to actually help them to communicate with normal people. The project aims to facilitate individuals by means of a glove based mostly deaf-mute communication interpreter system. The glove is internally equipped with four flex sensors. For every specific gesture, the flex detector produces a proportional amendment in resistance and measures the orientation of hand. Four flex sensors are used to produce 16 combinations which produces 16 Speech outputs. The 16 combinations are binary combinations using four flex sensors. The analog output is converted into digital binary output and depending on the binary output speech output is generated.

Keyword- Flex Sensor, PIC Controller, LUMISENSE Technologies

I. INTRODUCTION

We all live in a technology driven world in which technology in one or other way is assisting to make our life style better. But there are people who suffer from the hearing and speech impairment and they use sign language to communicate with each other. So sign language is a special language in which a body part is moved mostly hand in a particular way to convey a particular message and a normal person is mostly unaware of the sign language which creates a communication gap between the two groups of the persons. Thus this paper presents a way in which technology can be used as an intermediate interface and a better communication is possible providing a better way of life to all.

The project aims to facilitate individuals by means of a glove based mostly deaf-mute communication interpreter system. The glove is internally equipped with four flex sensors. For every specific gesture, the flex detector produces a proportional amendment in resistance and measures the orientation of hand. Four flex sensors are used to produce 16 combinations which produces 16 Speech outputs. The 16 combinations are binary combinations using four flex sensors. The analog output is converted into digital binary output and depending on the binary output speech output is generated.

II. METHODOLOGY

This project is helpful for deaf and dumb individuals who cannot communicate among themselves or with normal persons. Gestures are captured using flex sensors since it does not require accurate coordinates like accelerometers.

The flex sensors are 2-terminal variable resistance sensors. A fixed resistor is added to create a voltage divider. Due to bending, there'll be some changes in resistance value of flex sensors. Output voltage changes correspondingly. Speech output is formulated to various voltage changes.

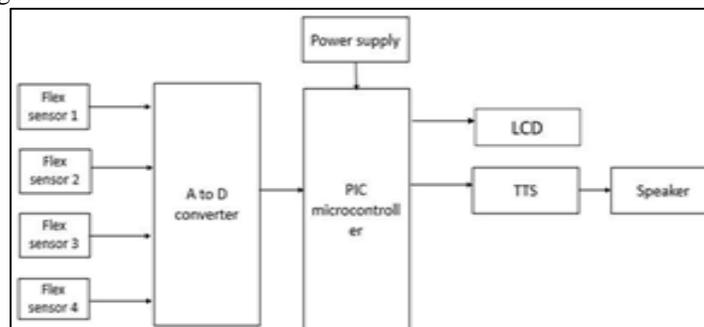


Fig. 1: Block diagram of proposed system

A. Flex Sensors

A flex sensor or bend sensor is a sensor that measures the amount of deflection or bending. Usually, the sensor is stuck to the surface, and resistance of sensor element is varied by bending the surface. Since the resistance is directly proportional to the amount of bend it is used as goniometer, and often called flexible potentiometer.

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.

1) Attributes

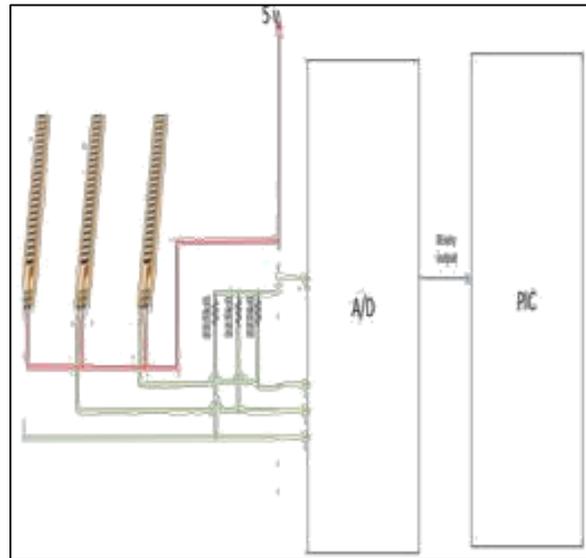


Fig. 2: Flex connection

- Custom designed to match customer specs.
- High level of reliability, consistency, repeatability harsh temperature resistance
- Variety of flexible or stationary surfaces for mounting
- Infinite number of resistance possibilities and bend ratios

2) Diagrammatic Representation

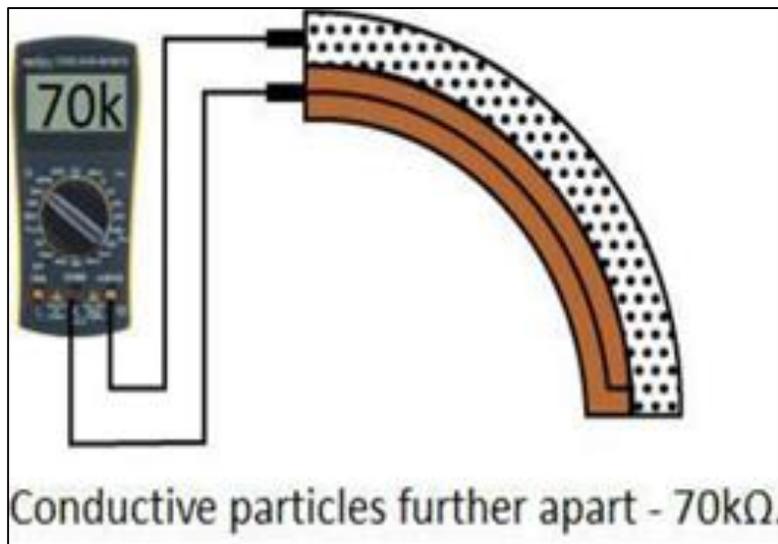


Fig. 3: Diagrammatic Representation

B. PIC Cont Roller

PIC is a Peripheral Interface Microcontroller which was developed in the year 1993 by the General Instruments Microcontrollers. It is controlled by software and programmed in such a way that it performs different tasks and controls a generation line. PIC microcontrollers are used in different new applications such as smart phones, audio accessories and advanced medical devices.



Fig. 4: PIC controller

1) A/D Converter

The PIC Microcontroller consists of 8-channels, 10-bit Analog to Digital Converter. The operation of the A/D converter is controlled by these special function registers: ADCON0 and ADCON1. The lower bits of the converter are stored in ADRESL (8 bits), and the upper bits are stored in the ADRESH register. It requires an analog reference voltage of 5V for its operation.

2) Working

PIC16 series consists of five ports, such as Port A, Port B, Port C, Port D and Port E. It is a 16-bit port, which can be used as input or output port based on the status of the TRISA register. Port A and Port E together has 8 pins or channels.

In this project we have used PORT A channels as an input for flex sensors. First four channels are used for this purpose. Depending upon the voltage range that falls on each pin of PORT A, the corresponding speech is displayed on LCD and speech output is given out by the speech module attached to PORT C of PIC.

III. SPEECH MODULE

WTV-SR is one of the members of recording serial products. WTV-SR module can record as well as fixed voice playback, recording content uploaded and a variety of control modes can be chosen. With the master chip and plug -in SPI-FLASH, it has a great advantage in the duration time of recording and cost performance.

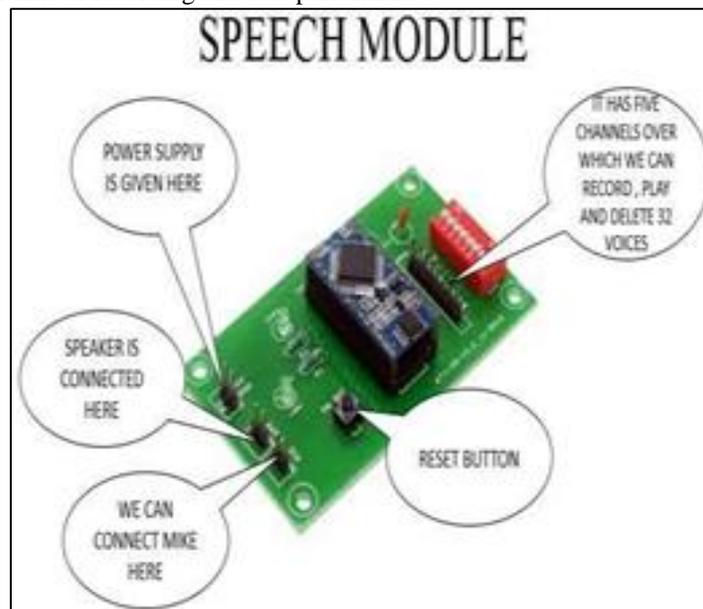


Fig. 5: Speech module by LUMISENSE technologies

A. Features

- Operating voltage: 3.3v DC
- Recording Time: 12 minutes
- 8-level adjustable volume
- Support MIC & LINE-IN recording Support USB with programmer
- With power down memory to retain Applications

B. Working

This speech module is made by lumisense technologies. It has 5 channels over which 32 voices can be recorded, played and deleted depending upon the users' wish. It has eight pins REC, PLAY, DEL, A0, A1, A2, A3 and A4 from which A0-A4 are the channels over which voices are recorded. To record a voice, set the REC pin to LOW and set the channel you have chosen to LOW. The voice is recorded through microphone connected to this speech module.

The same procedure is followed for every action. For example, if u want to delete mes sage, set the DEL pin and the selected channel to LOW. The message will be erased. By this facility, the user can change his own needy messages without the help of others. This helps them to change the speech outputs that are required at the very moment.

IV. ADVANTAGES OF PROPOSED SYSTEM

- Efficient way for Mute Communication: can communicate among other deaf and dumb people as well as to normal people.
- Quick Response Time: No component introduces considerable time delay.
- Low Power Requirement: All the components used requires low power to be operated.
- Low cost: Only few components are used.
- Easy to operate: any one can operate easily.
- Easy implementation: Easy to define gestures. to LOW. The voice is recorded through microphone connected to this speech module.

V. RESULT

The programming tool we used is MPLAB IDE and PICKIT 3 is used to dump the code to the PIC microcontroller. The flex sensors would give the output of a varying voltage values depending on the variation in the resistance values due to the bending of fingers. This analog output is converted to digital output by the A to D converter inside PIC and the results are stored in 2 different registers as a 16 bit output. Depending upon this decimal value, the programmed voice and LCD outputs appear.

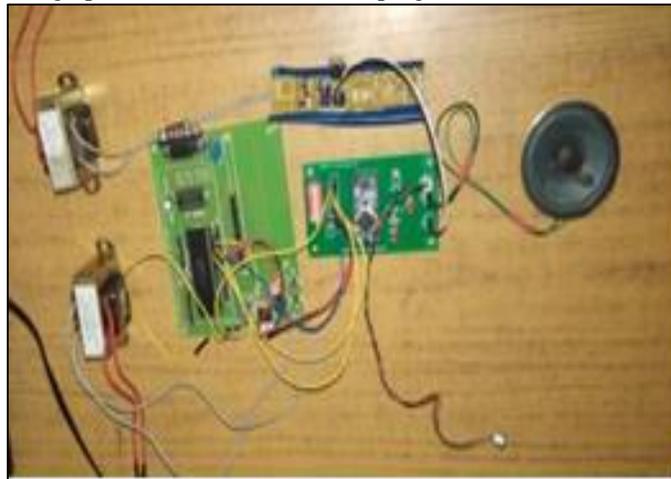


Fig. 6: Project module



Fig. 7: Project output

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