Hand Gesture Recognition to Speech Conversion in Regional Language

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Abstract:Mute people use sign language for communication, but they find difficulty in communicating with others who don't understand sign language. Due to which communications between mute and a normal person have always been a challenging task. We propose to develop a device which can convert the hand gestures of a deaf-mute person into speech. This methodology provides a map for developing a Digital wireless glove which is fitted with Flex sensors and accelerometer.

These sensors sense the gestures of a person in the form of bend of fingers and tilt of the hand fist. This system includes a voice playback IC to give the real time speech output in regional language as well as a LCD module to display the text. The text display being in English, the voice output of this device will be in regional language. So this device acts as a communicator as well as a translator providing more flexibility in communication.

Keywords: Arduino, LCD, Flex Sensor, Accelerometer.

I. INTRODUCTION

Communication involves the exchange of information. This can only occur effectively if all participants use a common language. Sign language is the language used by deaf and mute people that uses gestures instead of sound to express speaker's thoughts. \

A gesture in a sign language is a particular movement of the hands with a specific shape made out of them.But they find difficulty in communicating with others who don't understand sign language.Due to which communications between deaf-mute and a normal person have always been a challenging task.We propose to develop a device which can convert the hand gestures of a deaf-mute person into speech.

II. SYSTEM MODEL

The system architecture comprises of two primary sections: Transmitter and Receiver sectionThe transmitter section is responsible for recognizing the hand gestures of a person. This is done by wearing the gloves which are fitted with flex sensors.The output of flex sensors is in the form of variation in resistance in accordance to the bend of fingers.An accelerometer is mounted on the palm side of the glove to sense the tilts of the hand.

The outputs of the flex sensors and the accelerometer are directly given to the microcontroller.A specified value is assigned to each gestureeach specified value of the gesture, a digital value is fed to the encoder which converts the parallel data to serial and transmits it through the RF transmitter.Once the serial data is received at the RF receiver this data is converted to parallel form by the decoder and given to the microcontroller. In accordance with the digital value received the microcontroller gives designated commands to the voice playback IC.This voice playback IC produces the pre-recorded voice outputs through the speaker.In this way the hand gestures of a person are converted to the speech form where the speech output is in the form of regional language.

Fig 2.1 Block diagram implementation for transmitter section

Fig 2.2 Block diagram implementation for receiver section

III. CALCULATION:

A simple flex sensor 2.2" in length. As you bend the sensor (flexing), the resistance across the sensor increases. The resistance of the flex sensor changes when the metal pads are on the outside of the bend (text on inside of bend).

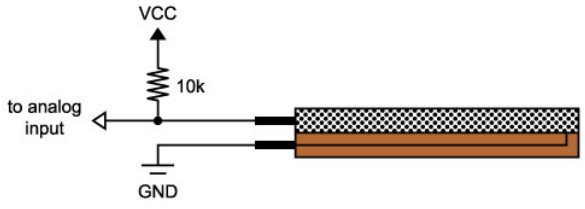


Fig. 3.1. Flex sensor

Connect one side of the flex sensor to ground. Connect the other side to your analog input, and use a 10K pull-up resistor to VCC.The resistor and the flex sensor form a voltage divider, which divides VCC by a ratio determined by the two resistances. When the sensor is straight, the 10K resistor and the 4.7K flex sensor will cause the output voltage to be

Vout = Rflex/(10+Rflex)*VCC

Vout = 4.7/(10+4.7)* 5V

Vout= 1.5V

When the sensor is bent to 90^0, the voltage will increase to about 66 percent of VCC.

Vout = Rflex/(10+Rflex)*VCC

Vout = 20/(10+20)* 5V

Vout= 3.33V

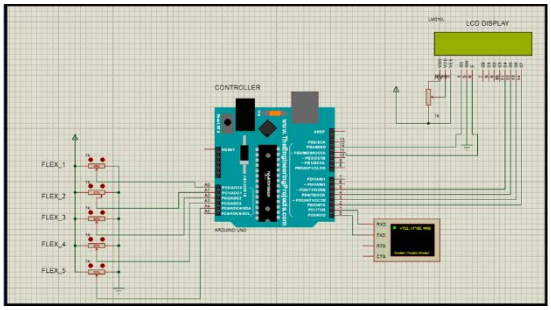
These numbers will vary for individual sensors; for the most accurate results, test your specific sensor and use those numbers in your code.The sensor works only in one direction: when it is bent away from the side with the conductive ink (towards the side with the text). You may see a small response when bending in the other direction, but not nearly as much as in the "correct" direction.

IV. METHODOLOGY

- Start
- Implement the flex sensors on hand glove
- Implement the Accelerometer on hand glove
- Check the status of flex sensors
- Measure resistance across flex sensors
- Input from flex sensor given to controller
- Check status of Accelerometer
- Input from Accelerometer given to controller
- Decide the gesture for the message
- Sent data to receiver by using Bluetooth
- Message will record in voice O/P according thegesture
- Message will display on LCD
- Message will play in regional language on speaker which recorded in voice module
- Stop

V. RESULTS

The hand signs taken in the prototype can be easilymodified according to the user convenience. At the same time the voice output can be changed easily to gives a flexibility in selection of language according to different regions. System accuracy, user configurability, portability, its immunity to noise and environmental disturbances make it to be a better choice over the other products available in the market.



4.1 Circuit Diagram in PROTEUS

VI. CONCLUSION

This system aims to lower the communication gap between the deaf and the normal world.The project proposes a translational device for deaf-mute people using glove technology. The proposed technique has enabled the placement of five flex sensor and an accelerometer on to a glove to detect the gestures of a person.As this system is having its voice output in regional language, it can be used as a translator to communicate with people of different regions with ease.