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GESTURE VOCALIZER FOR DEAF AND DUMB

Kshirasagar Snehal P.*, Shaikh Mohammad Hussain, Malge Swati S., Gholap Shraddha S., Mr. Swapnil Tambatkar, Asst. Prof.
Department of Electronics And Telecommunication, Shivaji University, Kolhapur, India

DOI:

ABSTRACT
This paper provides information about the way in which the deaf and dumb people will communicate with each other through a device that will overcome most of the difficulties being found by deaf and dumb people. Deaf and dumb people use sign language for communication. That sign language cannot understand by normal people; so it creates barrier in communication between normal peoples and deaf and dumb peoples. Hence there must a midway that would convert this gestures into text and speech format, so normal people would understand it. In this paper, we used sensor based method. We use two sensors such as flex sensor and accelerometer which is mounted on gloves. Flex sensor is used to measure bending of fingers. Accelerometer is use to measure static and dynamic acceleration. In this paper we use AVR microcontroller and speech synthesizer. Data glove is gives most promising result with high accuracy and sensitivity.

KEYWORDS: Gesture, AVR16, Flex sensor, Accelerometer, Speech synthesizer.

INTRODUCTION
Communication is nothing but exchange of information, ideas etc. For effective communication it is important that communication in such a way that sender as well as receiver can understand it. If any one of them unable to understand then it creates barrier in communication.Similerly deaf and dumb people used gestures to communicate. Gestures are various hand movement of specific shape. Actual meaning of those gestures cannot understand by normal people.

The aim of this paper is to present a system that can efficiently translate American Sign Language [1] is converted in to text and speech. Gesture recognisation is classified into two main categories i.e. vision based and sensor based [2][3].Some disadvantages of vision based techniques such as it includes complex algorithms. Another challenge in image and video processing includes variant lighting conditions, backgrounds and field view constraints and occlusion [4].As compare to vision based technique sensor based technique have some advantages such as greater mobility.Mute people can use the gloves to Perform hand gesture and it will be converted into speech so that normal people can understand their expression. This paper provides the map for developing such a digital glove [7].

One is to build a three-dimensional model of the human hand. The model is matched to Images of the hand by one or more cameras, and parameters corresponding to palm orientation and Joint angles are estimated. These parameters are then used to perform gesture classification. A hand gesture analysis system based on a three-dimensional hand skeleton model with 27 degrees of freedom was developed by *Lee and Kunii* [5], [6]. They incorporated five major constraints based on the human hand Kinematics to reduce the model parameter space search. To simplify the model matching, specially marked gloves were used.

In this paper we used sensor based method. Here we used AVR microcontroller (ATmega16), flex sensor, accelerometer, speech synthesizer, speaker and LCD. Flex sensors and accelerometer are fitted on glove .According to gesture flex sensor is bend. According to degree of bending of flex sensor its resistance is a change. Accelerometer is used to measure static as well as dynamic accelerations .Output of flex sensor and accelerometer is analog values that converted in to digital by using inbuilt ADC in AVR microcontroller. AVR microcontroller

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compares these values with stored value and select the closest or nearest value. i.e. meaning of that gesture which display in text format on LCD and in speech format via speaker.

MATERIALS AND METHODS

Block Diagram

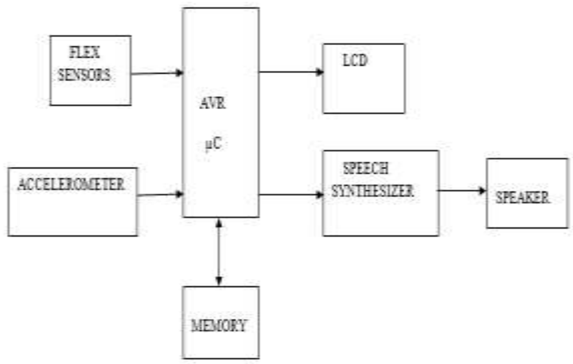

fig.2.1 Block Diagram

- AVR Atmega16
- Flex sensor
- Accelerometer
- Speech synthesizer
- LCD
- Speaker

Block Diagram Description

Introduction to AVR Atmega16

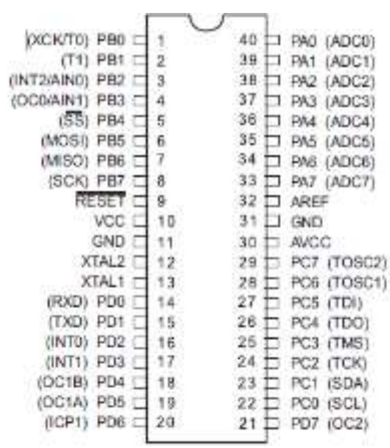

Fig 2.2.1 Pin description of AVR Atmega 16

The ATmega16 is a low-power CMOS 8-bit microcontroller based on the AVR enhanced RISC

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Architecture. By executing powerful instructions in a single clock cycle, the ATmega16 achieves throughputs approaching 1 MIPS per MHz allowing the system designer to optimize power consumption versus processing speed.

- The ATmega16 provides the following features:

16 Kbytes of in-System Programmable Flash
program memory with Read-While-Write capabilities, 512 bytes EEPROM,1 Kbyte SRAM, 32general purpose I/O lines, 32 general purpose working registers, a JTAG interface for Boundary scan, On-chip Debugging support and programming, three flexible Timer/Counters with compare modes, Internal and External Interrupts, a serial programmable USART, a byte oriented Two-wire Serial Interface, an 8-channel, 10-bit ADC with optional differential input stage withProgrammable gain (TQFP package only), a programmable Watchdog Timer with Internal Oscillator, an SPI serial port, and six software selectable power saving modes. The Idle mode stops the CPU while allowing the USART, Two-wire interface,A/D Converter, SRAM; Timer/Counters, SPI port, and interrupt system to continue functioning. The Power-down mode saves the register Contents but freezes the Oscillator, disabling all other chip functions until the next External Interrupt Or Hardware Reset. In Power-save mode, the Asynchronous Timer continues to run, Allowing the user to maintain a timer base while the rest of the device is sleeping. The ADC noise Reduction mode stops the CPU and all I/O modules except Asynchronous Timer and ADC,to minimize switching noise during ADC conversions. In Standby mode, the crystal/resonator Oscillator is running while the rest of the device is sleeping. This allows very fast start-up Combined with low-power consumption. In Extended Standby mode, both the main Oscillator and the Asynchronous Timer continue to run.

Flex sensor

Flex sensors are attached to the hand gloves. These flex sensors are attached & fixed on the hand glove to monitor & sense the static movements of the fingers. The output of the flex sensor is a square wave. The frequency of this sensor varies when the amount of bend of the flex sensors. When the fingers bend, there is change in the resistance of the flex sensors & this change is output of the flex sensors. This output is given to the AVR microcontroller used in the system where this data is processed & converted into digital form. Flexors are thin strips with length 1"-5" & a width of 0.25" & thickness of about flex sensors are made up of carbon resistive elements. Flex sensors operated at 5v.

Accelerometer

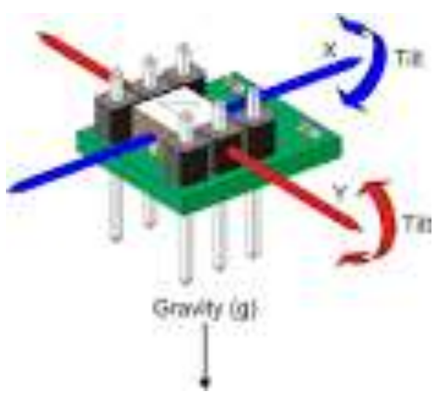


Fig.2.2.3 Accelerometer

The accelerometer is nothing but ADXL335. It is a small,thin, low power; three is axis accelerometer with outputs that are signal conditioned. The static acceleration of gravity in sensing the tilt & the dynamic acceleration due to motion, shock, and

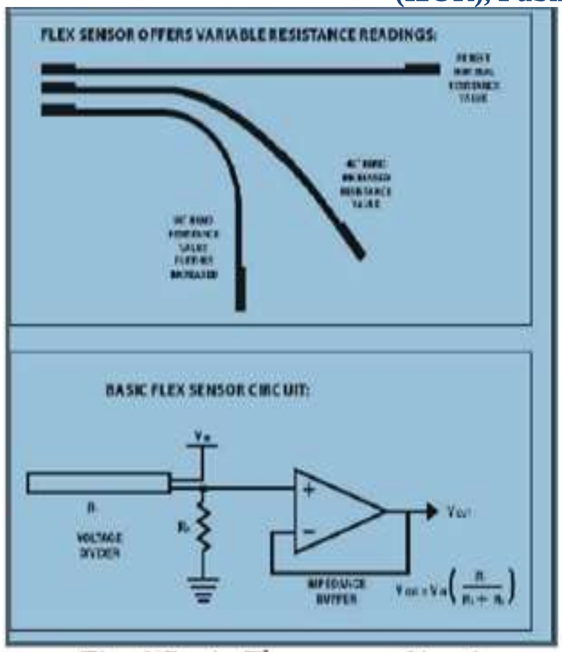


Fig.2.2.2 Flex sensor [8]

vibration is measured with the help of this module. But the most basic function of this module is to measure the tilt of the hand. The output produced by this module is in analog form. This output is given to AVR microcontroller to convert it into a suitable digital form.

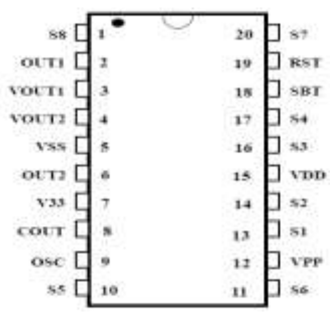


Fig.2.2.4. Speech Synthesizer IC (Ap8942A)

Here the voice IC used is AP8942A. This is a high performance voice OTP which is fabricated using standard CMOS process. This IC stores a voice message of about 42sec.With 4 bit ADPCM compression which is done at the sampling rate of 6KHZ. There are 2 trigger modes, simple key trigger mode & parallel CPU mode.

LCD Display

Fig.2.2.5 LCD

The LCD displays the text which is nothing but the gesture mode by dump people. The gesture detection module detects the gesture & sends the signal to voice IC module & also to the LCD display module. LCD is controlled by AVR. LCD displays text for each gesture. The LCD display used is a 16*2

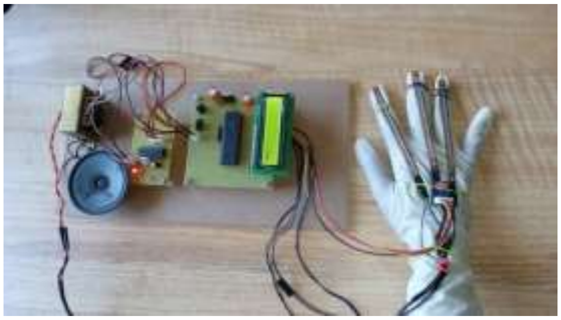
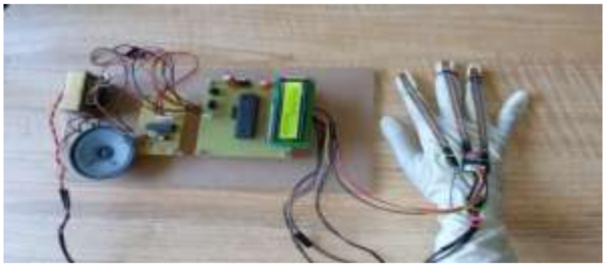


Fig:2.2.6 Gesture vocalizer for deaf and dumb

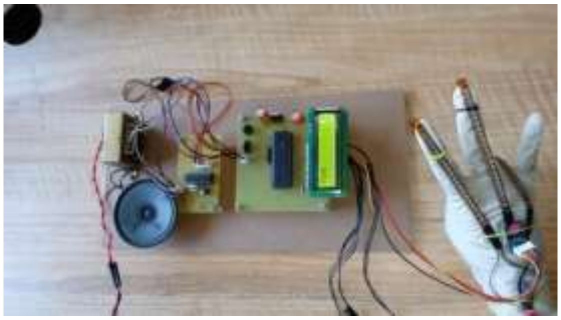
RESULT AND DISCUSSION

In this vocalize system, In the form of Gestures to ensure the recognisation. This System is capable of recognizing gesture more quickly. Hence it is ease of communication conversation Approach whereas, 90% of gesture vocalize can be easily recognized.

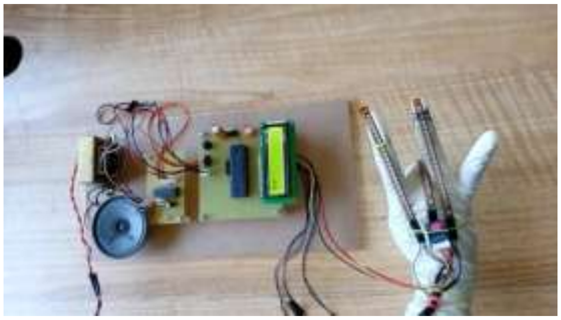
Q.1 What is your name ?
Ans: Raj.



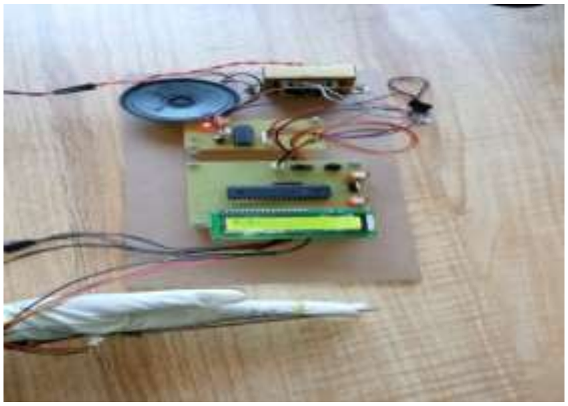
Q.2 Where are you from ?
Ans: Pune.



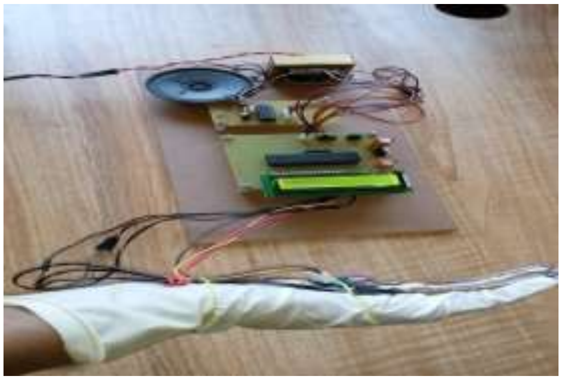
Q.3 What do you want ?
Ans: Job.



Q.4 What is your Qualification ?
Ans: B.E.



Q.5 What are your hobbies ?
Ans: Dance.



Advantages

1) Compact System: The AVR based Gesture Vocalizer is very compact digital device and is easily portable.
2) Flexible: This system is flexible. That is the sign Conversion can be made in any language.
3) Power consumption: It takes less power to operate system.

Applications

1. Gesture recognition and conversion.
2. As a translating device for Mute people.
3. It can be used for Mobiles for SMS sending.

4. Translation of sign language in many languages.

Future scope

1. Virtual reality application e.g. replacing the Conventional input devices like joy sticks in Video games with the data glove.
2. The Robot control system to regulate machine Activity at remote sensitive sites.
3. In future work of this proposed system Supporting more number of signs and different Language mode.

CONCLUSION

Gesture vocalize uses a sign languages which uses to communicate between deaf, dumb, blind with normal human beings. To eliminate barrier in communication between needy people and normal people. Data gloves can put promising result in field of communication This Project based on sensor based technique which is more advantages than vision based technique . This project is used to convert gestures into voice and text on LCD with more than 90% accuracy. So, normal human being can easily understand and communicate with Deaf, Dumb and Blind.

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