

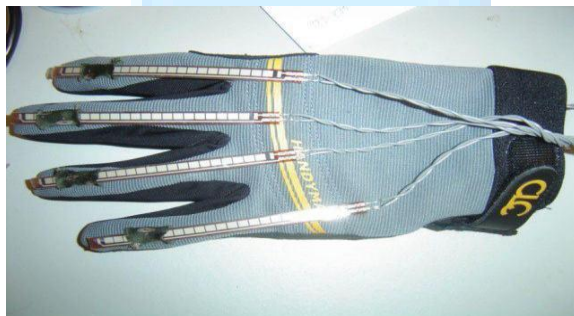
VOICE TO THE VOICELESS ON ANDROID PLATFORM

Abstract: A Dumb person throughout the world uses sign language for the communication. Dumb people are specially trained to use this sign language. But normal people are not able to understand what the dumb and deaf people are trying to say. The advancement in embedded system can provide a space to design and develop a translator system to convert the sign language into speech. Nowadays embedded system has become an important trend in all applications. The work presented in this paper mainly reduces the communication gap between dumb and ordinary people and aims to facilitate dumb person's lifestyle.

Keywords: Embedded system, Flex sensors, AVR microcontroller, ASL (American Sign Language), Android application

I. INTRODUCTION

As the name suggests, this system gives voice to voiceless i.e. voice is given to the person who is not able to speak. Dumb/ mute people use sign language for communication purpose. Sign language uses gestures instead of sound to convey information. This language includes combining hand shapes, hand movements, facial expressions to express individual's thoughts. In this system flex sensors plays the major role. Flex sensors are attached to the glove using needle and thread. Flex sensors are the sensors whose resistivity varies with the amount of bend [1-3]. In this paper, AVR microcontroller is used to take input from flex sensors and then this analogue data is converted to digital form by using micro controller. All the data from microcontroller is sent to android phone and accordingly the android phone will speak the corresponding character which has been sensed.



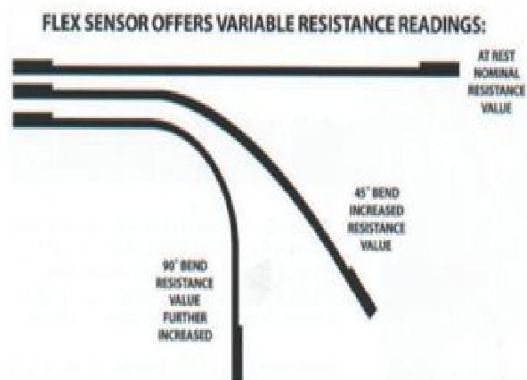
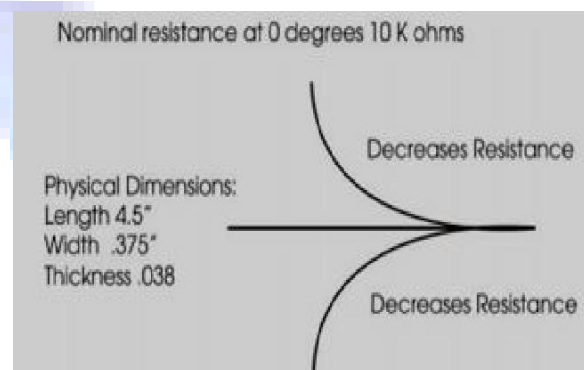
II. IMPORTANT PARAMETERS

A. Flex sensors



Flex sensors are attached to the gloves of the dumb and mute people. Through these gloves gestures has to be performed. Flex sensors changes their resistance as per the degree of bend. When there is no

any bend, its resistance is 10k Ω . Flex sensors consist of number of conducting particles. When there is a bend, conducting particles in the flex sensors get separated. Due to this, current decreases and resistance increases. Therefore, flex sensors are also known as bend sensors.



The following are the electrical specifications of the flex sensors.

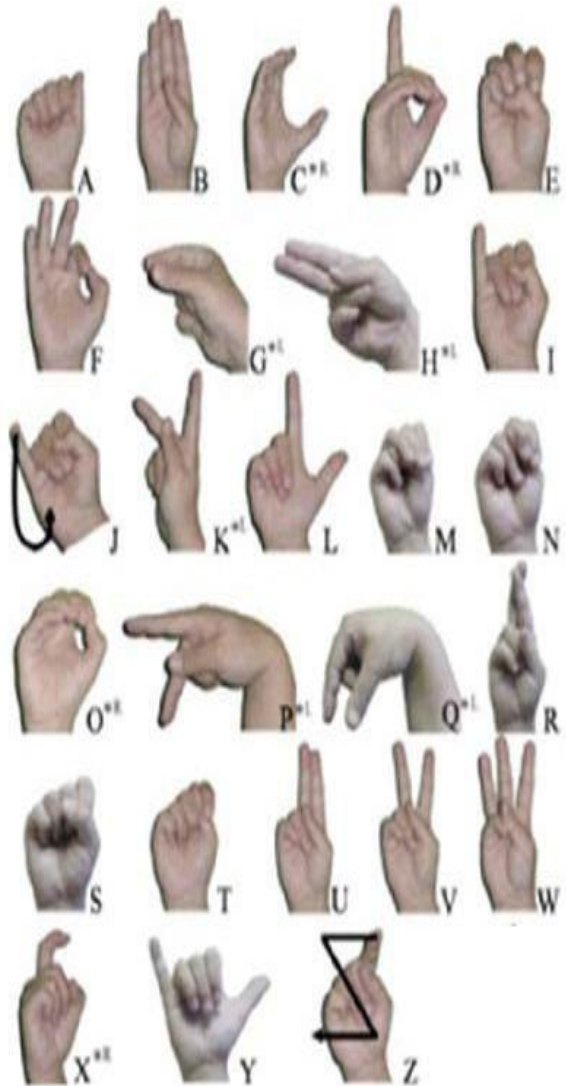
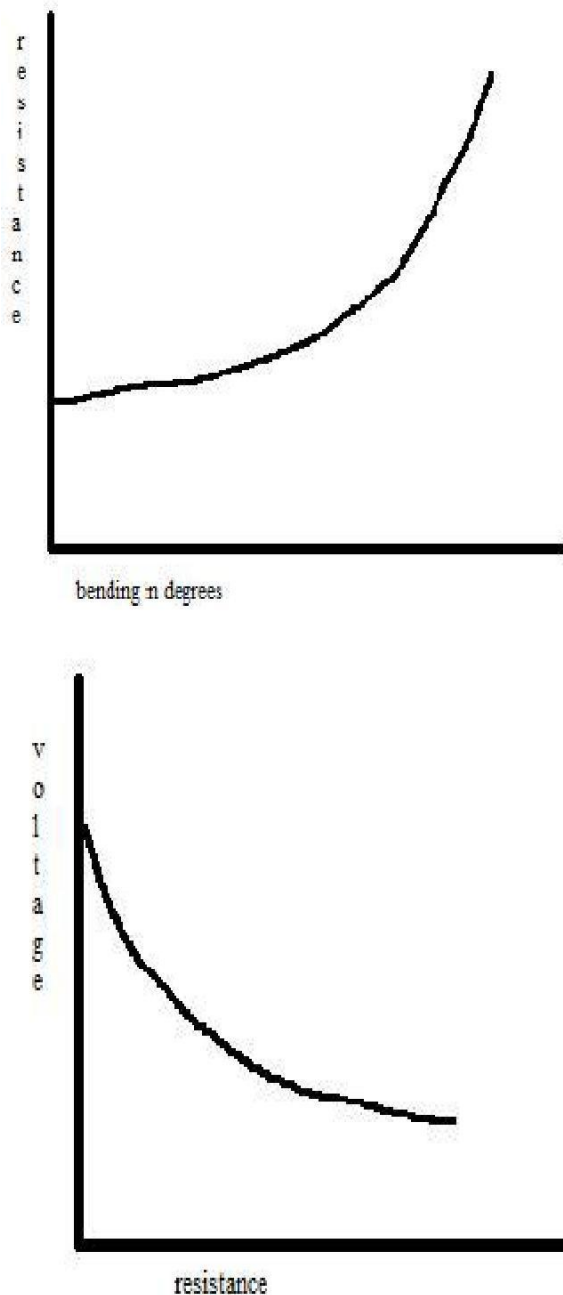
Flat resistance : 10 k Ω

Bend resistance range: 60 k Ω to 110 k Ω

Power ratings: 0.50 watts continuous, 1 watts peak

Height: \leq 0.43 mm

A. Characteristic of flex sensors:



B. American Sign Language

Gestures are specifically performing action or hand movements to convey meaningful information. ASL is a standard sign language which is used in US and Canada. In this research American Sign Language is used. To learn this language dumb/ deaf people need to undergo special training. ASL is transmitted from generation to generation primarily through residential schools and dumb and deaf adults. The most effective way to communicate with dumb/ deaf people is to use sign language. The simplest system includes understanding of finger spellings. These are shown below. According to these finger spellings database has been created for each alphabet [2-4].

C. Proposed system

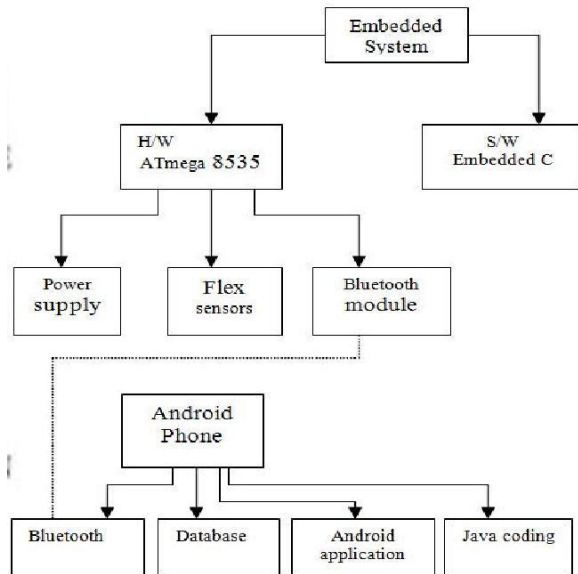
The proposed model will be consisting of combination of hardware and software. Hardware part will include flex sensors on each finger, microcontroller, power supply, and android phone and Bluetooth module. Software part will include programming for android phone application.

Hardware part will be consisting of flex sensors to take input from different gestures through gloves, microcontroller to convert input analogue data to digital data and for further processing, power supply to provide voltages to specific units, and finally Bluetooth module to send the data from controller to android mobile. Here HC-05 Bluetooth module will be used. The proposed system is shown below:

III. THE PROPOSED SYSTEM

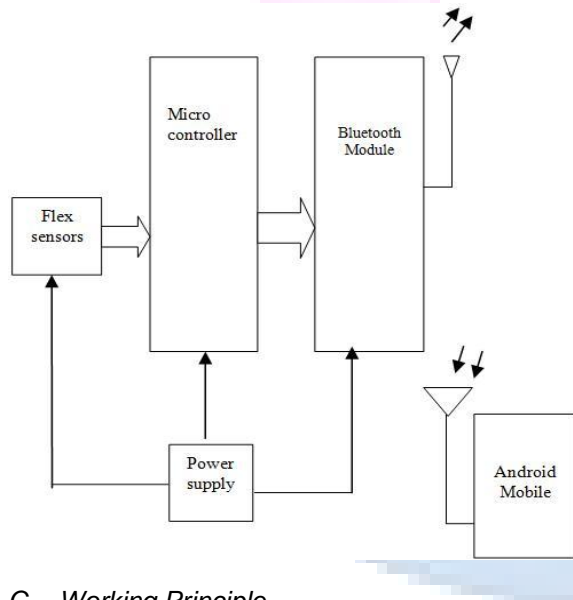
A. System Overview

The proposed system is divided into the following sections:



B. Block Diagram

The Block Diagram of the system is given below:



C. Working Principle

The working principle of the various major blocks or sections used in the proposed system is given below.

Flex sensors

Flex sensors are attached to data glove by using needle and thread. Resistivity of flex sensors changes as per the degree of bend. So, as the dumb people perform different gestures we will get different value of resistance for different gestures. And according to that database is created. This analogue data from flex sensors is given to microcontroller for further processing. Flex sensors are attached to port A of the controller as port A pins are ADC pins. So the analogue data is converted to digital form.

Power Supply

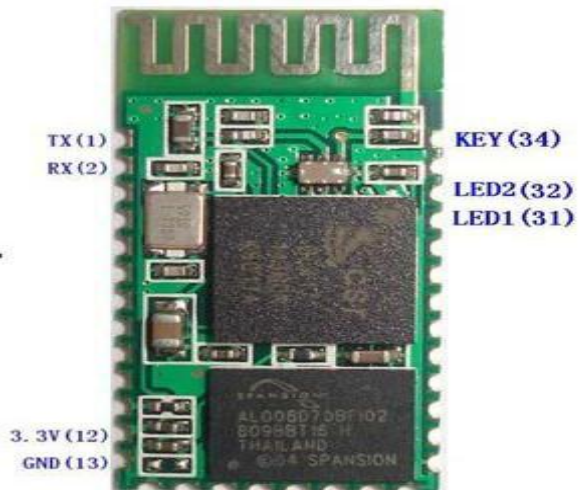
An AVR microcontroller and flex sensor needs 5V DC voltage whereas operating voltage of Bluetooth module is 3.3V. Power supply consists of transformer, rectifier, filter and regulator. The rectifier used here is a Bridge Rectifier which converts 230V AC into desired DC voltage.

Microcontroller

This is the heart of the complete system. Here AVR ATmega328 microcontroller is used. It has in built ADC. The analogue input data from flex sensors is converted to digital form by micro controller. Then the input data has been sent to android phone by Bluetooth module. For programming, embedded C is used.

Bluetooth Module

The microcontroller sends the digital data to android phone by using Bluetooth module. In the proposed system, HC-05 Bluetooth module is used. It makes good serial communication with AVR microcontroller.



• Android Mobile

The digital data from controller is given to android mobile by using Bluetooth module. The database is created for different alphabets of American Sign Language in the android phone. When the input data matches with the data in the database then we will get the required output i.e. speech as well as text. To create android application java coding is used.

D. Technology & Programming Languages

The technology used here is embedded technology which is the future of today's modern electronics. The proposed work includes combination of hardware and software. The followings are the various Programming Languages & technologies used in the proposed system.

For Embedded System

- Embedded Technology
- AVR Based Controller
- Embedded C programming
- Proteus Software for PCB Designing
- Dip Trace for PCB layout

For Android mobile

- SQL server based database
- java coding-Eclipse software
- Android application

E. Steps for project development

The following are the steps for creating such a system:

- Defining the Problem
- Understanding the Need & Usability in real life
- Developing Block Diagram
- Designing Circuits of individual blocks
- Testing circuits in LAB & Finalizing
- Developing PCB on PC and getting it printed
- Soldering the components
- Testing and troubleshooting
- Developing Flowchart for the entire process
- Writing, Compilation & Burning actual Software Program, as well as testing and debugging
- Developing Flowchart for Android Side Software and developing Data Flow Diagram
- Writing actual code and finally Running the system

IV. APPLICATIONS & ADVANTAGES

- The normal person doesn't need to learn sign language as he will get to know by audio and text what the dumb person is trying to say.
- It is a compact device and can be easily carried out anywhere.
- Nowadays most of the people use android mobile so it's a good system because of availability of various features and open source nature of android.
- It is a low cost device.

- It takes less power to operate system.

CONCLUSION

The project aims to reduce the communication gap between deaf or mute community and normal people. This system will improve dumb/deaf person's lifestyle. Even it will be beneficial for the communication between the blind person and the dumb person. Overall System is effective and efficient because of the use of AVR microcontroller and android phone. This paper is an excellent exposure for the people working in the area of designing systems based on microcontroller and android applications.

VI. FUTURE WORK

- The system can be extended to support more number of signs, and different languages mode.
- In future, the system can be extended for designing of a jacket which will be capable of determining movement of animals.
- Different software development strategies and various programming techniques can be exploited to enhance system's efficiency.