A review paper on Hand Gesture Recognition and Voice conversion system

[1]Sonal Garg, [2]Shivani Singhal, [3]Suman Kumari
Department of Electronics & Communication Engineering
Rajasthan college of engineering for women,
Jaipur, Rajasthan, INDIA
garg.sonal95@gmail.com
shivanisinghal487@gmail.com

ABSTRACT: Generally dumb people use sign language for communication but they find difficulty in communicating with others who don't understand sign language. This project aims to lower this barrier in communication. It is based on the need of developing an electronic device that can translate sign language into speech in order to make the communication take place between the mute communities with the general public possible. A Wireless data gloves is used which is normal cloth driving gloves fitted with flex sensors along the length of each finger and the thumb. 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.

Gesture detection mistreatment video and image process is employed for sanctioning the communication between the deaf, dumb and traditional folks. All the obtainable systems aren't moveable and not reasonable to poor folks.
This paper introduce ,the history of communication technologies that have given higher access to the planet for those sensory disabilities that may be are high communication technologies that improve the communication method of deaf and dumb like persons and create them advanced to speak with the opposite traditional persons.

Keywords: Bit Screen, GSM and EEPROM Technology

1. INTRODUCTION

Sign language is the language used by mute people and it is a communication skill that uses gestures instead of sound to convey meaning simultaneously combining hand shapes, orientations and movement of the hands, arms or body and facial expressions to express fluidly a speaker's thoughts. Signs are used to communicate words and sentences to audience. A gesture in a sign language is a particular movement of the hands with a specific shape made out of them. A sign language usually provides sign for whole words. It can also provide sign for letters to perform words that don't have corresponding sign in that sign language. In this project Flex Sensor Plays the major role, Flex sensors are sensors that change in resistance depending on the amount of bend on the sensor. We are in process of developing a prototype using this process to reduce the communication gap between differentially able and normal people.

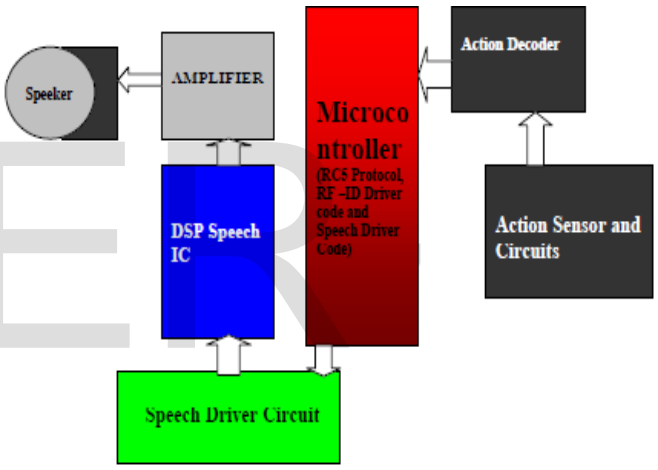


Fig.1. Block diagram of dumb sign using speech communication.

2. SYSTEM ARCHITECTURE AND IMPLEMENTATIONSS

In this project data glove is implemented to capture the hand gestures of a user. The data glove is fitted with flex sensors along the length of each finger and the thumb. The flex sensors output a stream of data that varies with degree of bend. The analog outputs from the sensors are then fed tothe PIC microcontroller. It processes the signals and perform analog to digital signal conversion. The resulting digital signal is encoded and transmitted through RF system. RF receivers receive the signal and fed to the gesture recognition section through the decoder. Text to speech conversion takes place in the voice section and play out through the speaker.

A: *Flex Sensors*

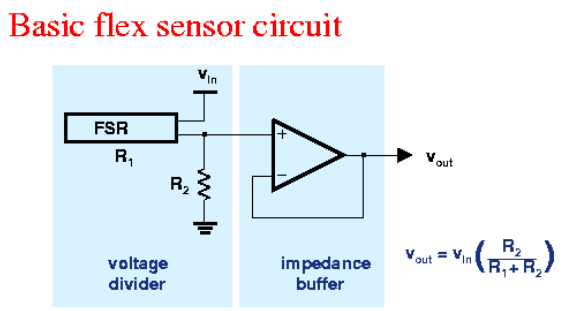


Fig.2.Basic flex sensor circuit

Flex sensors are normally attached to the glove using needle and thread. They require a 5-volt input and output between 0 and 5 V, the resistivity varying with the sensor's degree of bend and the voltage output changing accordingly. The sensors connect to the device via three pin connectors (ground, live, and output). The device can activate the sensors from sleep mode, enabling them to power down when not in use and greatly decreasing power consumption. The flex sensor pictured below changes resistance when bent. It will only change resistance in one direction. An un flexed sensor has a resistance of about 10,000ohms. As the flex sensor is bent, the resistance increases to 30-40kohms at 90 degrees. The sensor measures ¼ inch wide, 4-1/2 inches long and 0.19Inches.

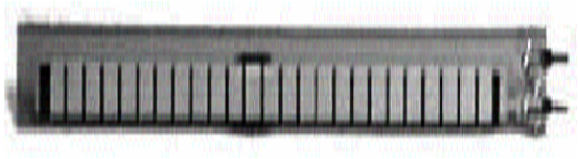


Fig.3. Flex sensors

In this two or three sensors are connected serially and the output from the sensors is inputted to the analog to digital converter in the controller. The outputs from the flex sensors are inputted into LM258/LM358 op-amps and used a non-inverted style setup to amplify their voltage. The greater the degree of bending the lower the output voltage. The output voltage is determined based on the equation Vin * R1 / (R1 + R2), where R1 is the other input resistor to the non-inverting terminal. Using the voltage divider concept the output voltage is determined and it ranges from 1.35v to 2.3v.

Fig.4.Gloves with flex sensors

B.: *PIC Microcontroller*

All output signals generated from flex sensors are in analogue form and these signals need to be digitized before they can be transmitted to encoder. Therefore microcontroller PIC16F877A is used as the main controller in this project. It has inbuilt ADC module, which digitizes all analogue signals from the sensors and inbuilt multiplexer for sensor signal selection. It supports both serial and parallel comm. Facilities.

PIC16F877A:

PIC16F877A devices are available in 40-pin and 44-pin packages.

☐ It is 8-bit Microcontroller

☐ System is RISC Architecture

☐ It has Small set of Instruction set

☐ It has 35-Instructions only

☐ Compatibility: avail 28/40 Pin IC

☐ Operating Speed Max 20 MHz, Voltage (2-5.5)v

☐ Memory: Flash Program-8Kx14 Words, RAM-368 Bytes, EEPROM Data Mem-256 Bytes

☐ Low power, High speed Flash/EEPROM Technology

☐ It has on chip Timers. 3 Timers are avail

☐ It has in built Analog to Digital Converter

☐In built Multiplexer availability for signal Selection

☐It has serial as well as Parallel Communication facilities

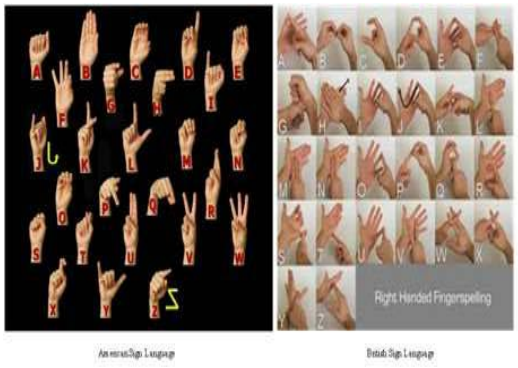
☐In built Capture, Compare and Pulse width modulation

☐ It has 5 Ports for Internal and External usage.

C.: *Encoder/Decoder*

The output from the PIC microcontroller is encoded by using HT12E-212 series of encoder. It is capable of encoding information, which consists of N address bits and 12-N data bits. Each address/data input can be set to any one of the two logic states. The programmed address/data are transmitted together with the header bits Via an RF.

D.: *Gesture Recognition Section*



s Fig.5. Sign language

Sensor recognizes and then records while a user performs
Various sign, correlating these with specific signs and mapping them to a database. The system stores sensor data in an array for recognition. When the sensor data matches the set of values associated with a sign system recognizes that sign and output it as text. Here the microcontroller used is **AT89S51.**

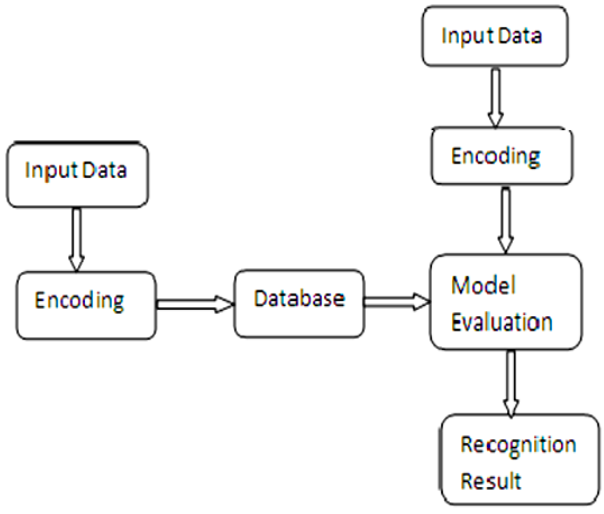


Fig.6: Model of gesture recognition system

The device is manufactured using Atmel's high-density nonvolatile memory technology and is compatible with the industry standard 80C51 instruction set and pin out. The on-chip Flash allows the program memory to be reprogrammed in-system or by a conventional nonvolatile memory programmer.
AT89S51 is a powerful microcontroller which provides a highly-flexible and cost-effective solution to many embedded control applications. The AT89S51 provides the following standard features: 4K bytes of Flash, 128 bytes of RAM, 32 I/O lines, Watchdog timer, two data pointers, two
16-bit timer/counters, a five-vector two level interrupt architecture, a full duplex serial port, on-chip oscillator, and clock circuitry. In addition, the AT89S51 is designed with static logic for operation down to zero frequency and supports two software selectable power saving modes.

E.: *Voice Section*

Once the sensor data is matched with the database then the result of that particular sign will appear as output in the text form. This text output is given to the voice section. The speech of each text is pre-recorded and will only play out through speaker if the sign is matched. In this project AM4EC series is used and it is a very low cost voice and melody synthesizer.

F.: *GSM Technology*

GSM signify international system for mobile communication associate degree is an open, digital cellular technology used for sending mobile voice and information services. The GSM emerged from the concept of cell based mostly mobile radio system at Bell laboratories within the early Seventies.
The GSM makes use of narrowband Time Division Multiple Access (TDMA) technique for sending signals. The GSM provides basic to advanced voice and information services as well as roaming service. The second module is that the ability to send SMS to mobile phones. Even the deaf or dumb have to be compelled to communicate over long distances and thus the device has an built-in GSM module to send SMS supported the touch screen show, the user will enter his text and mobile range similar to in an exceedingly traditional mobile phones to send SMS to others.

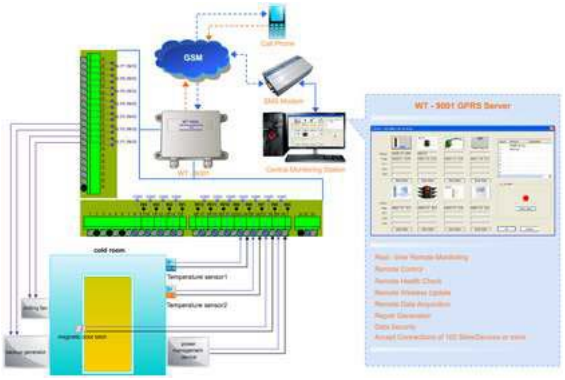


Fig.7. GSM Technology

3 .RESULTS & DISCUSSIONS:

In this Prototype version, the user forms a sign and holds it for two seconds to ensure recognition. The system is capable of recognizing signs more quickly than this arbitrary two seconds limit. Hence it is a low time consuming approach. Furthermore real time recognition ratio of nearly 99% can be easily achieved.

A: *Advantages*

☐ Low cost
☐ Compact system
☐ Flexible to users
☐ It takes less power to operate system
. Used for communicating at long distances.

B.: *Applications*

☐ Physically challenged persons

☐Conveying information related operations

C.: *Problems*

Data gloves can only capture the shape of the hand and not the shape or motion of other parts of the body e.g. arm, elbows, face etc. So only postures are taken and moving gestures are ignored.

D.: *Proposed Solutions*

The problem of recognizing moving gestures can be resolved using 3axis accelerometer sensor at wrist for full capture of the wrist movement changes, while 2 axis accelerometer can be used at elbow and shoulder.

4. FUTURE WORK

The completion of this prototype suggests that sensor gloves can be used for partial sign language recognition. More sensors can be employed to recognize full sign language. A handy and portable hardware device with built in translating system, speakers and group of body sensors along with the pair of data gloves can be manufactured so that a deaf and dumb person can communicate to any normal person anywhere.

5. CONCLUSION

Sign language is a useful tool to ease the communication between the deaf or mute community and the normal people. Yet there is a communication barrier between these communities with normal people. This paper aims to lower the communication gap between the deaf or mute community and the normal world.

This paper was meant to be a prototype to check the feasibility of recognizing sign language using sensor gloves. With this project the deaf or mute people can use the gloves to perform sign language and it will be converted in to speech so that normal people can easily understand. The main feature of this project is that the gesture recognizer is a standalone system, which is applicable in daily life.

REFRENCES

1. IEEE conference on Automatic Face and Gesture Recognition, 2006. FGR 2006. Automatic gesture Recognition for intelligent human-robot interaction.by Seong Whan Lee

2. IEEE conference on Intelligent Transportation Systems , 2004. Recognition of arm gestures using Multiple orientation sensors: gesture classification by JC Lementec.

3. P. Buehler and M. Everingham, "Upper body detection and following in extended sign language sequences .International Journal of laptop Vision".

4. Srinivas Gutta, Jeffrey Huang, Ibrahim F. Imam, And Harry Wechsler, "Face and Hand Gesture Recognition Using Hybrid Classifiers".

5. Seong-Whan Lee, "Automatic Gesture Recognition for Intelligent Human-Robot Interaction" Proceedings of the 7th International Conference on Automatic Face and Gesture Recognition.