Implementation of Sign language to Speech Conversion

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ABSTRACT:

Human being interact each other to convey their ideas ,thoughts , and experience to the people around them. But, there is some deaf mute people in the world. The advancement in embedded system, provides a space to design and develop a sign language translator system to assist the dumb people. This paper mainly addresses to facilitate dumb person's lifestyle. Dumb people throughout the world use sign language to communicate with others, this is possible for those who has undergone special trainings. Common people also face difficult to understand the gesture language. To overcome these real time issues, this system is developed. Whenever the proposed system senses any sign language, it plays corresponding recorded voice. This reduces the communication gap between dumb and ordinary people**.** In this paper , the idea is proposed smart glove which can be convert sign language to speech output. Compared to other gestures like body, face ,and head ; hand gesture plays an important role, because it express as soon as reaction of users view. 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. This is basically, data glove and microcontroller based system. Flex sensor based data glove can detect all the movement of the hand and microcontroller based system coverts some specified movement into human recognizablel voice. This paper provides map for developing such glove.

KEYWORDS: Flex sensors, Gloves, ATMega 328 Microcontroller, Bluetooth module, Speaker, Memory module, LCD Display.

I. INTRODUCTION

In real word, there are many people who are deaf and dumb cannot communicate easily. For communication of deaf and dumb people, we made electronic hand glove for that people. It is portable and easy to handle. There is five flex sensor is used and each are fitted with length of each finger and thumb. Sign language is a system of communication using visual gestures and signs, as used by deaf and dumb people. There are various categories in the sign language like ISL (Indian Sign Language), ASL (American Sign Language), BSL (British Sign Language) and etc... But none of the sign languages are universal or international. The paper is been proposed in the aim of minimizing all those complexions and to attain maximum accuracy in conversion of sign language to speech with gestures. Human gestures are an important sign of human communication and an attribute of human actions informally known as the body language. A lot of methods are being in use to track human gestures [2]. To get maximum accuracy and to bring out the system unique a lot of methods are attempted and best case is user defined actions (gestures) to control the system. For example consider a person who has the disability to speak wants to say “Hello” to a group of people who doesn’t know sign language. The user stands in front of the system and waves the hands and system throws out the speech “HELLO”. Gesture recognition is classed in a pair of main categories vision based mostly and detector based sign language usually provide the sing by the gesture for whole word. A gesture is documented and consequent transcript information identified. An electronic device that can translate sign language into speech in order to make the communication with normal people is made. In this project flex sensor plays important roles that change their resistance according to the degree of bending of sensor. Along the size or length of finger the data glove is fitted with a sensor. The output from the sensor it is in analog form and fed to the AT mega16 microcontroller .This IC converted analog to digital converter the resulting digital signal enclosed by the RF system. When the sensor data matches the set of recognize that sign and output it as text .The output is given on the LCD screen and speaker. Which can be read and listen by a normal person. The proposed system
bridges the gap between people with different ability to normal people.

This paper accentuates the improvement done over the years to increase efficiency and accuracy. In a narrow spectrum it acts as a language interpreter and provides a convenient way for communication and provides a simplified way for communication between deaf and dumb community and normal people. In figure 1.1, we have shown the sample for general Sign Language.

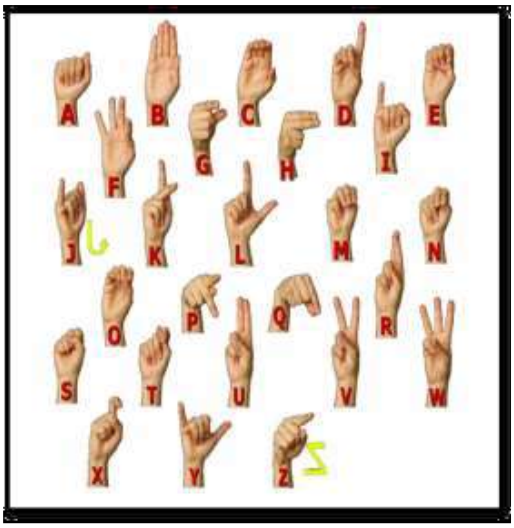

Fig 1.1 Sample Sign Language

The main of the this work is to design and implement a system to translate finger spelling to speech using recognize technique. The other applications of hand gesture recognition system include character recognition , gesture recognition , robotic arm controller. It gives related work , explain the system architecture and information about the component. It provides discussion of applications and conclusions.

II. RELATED WORK

Sign language recognition system mainly have two well known approaches viz. Image processing technique and another is microcontroller and sensor based data glove [5]. These approaches are also known as vision based and sensor based techniques. In the image processing technique camera is used to capture the image/video, in this static images are analyzed and recognition of the image carried out using algorithms that produce sentences in the display. The algorithms used in vision based sign language recognition system are Hidden Markov Mode (HMM), Artificial Neural Networks (ANN) and Sum of Absolute Difference (SAD) [4]. The disadvantage of vision based techniques includes complex algorithms for data processing. Visual based mostly techniques use camera chase technologies, whereby usually the user wears a glove with specific colors or markers indicating individual parts of the hands, specially the fingers. The cameras record the ever-changing image and position of the hand because the user signs and also the pictures are then processed to retrieve the hand form, position and orientation. Another challenge in image and video processing includes variant lighting conditions, backgrounds and field of view constraints and conclusion.

In the another approach data glove are used for sign language recognition or sensor based recognition. This is due to availability of variety of sensors and scope of applications in real life. Many of researcher have started using these technique for gesture recognition. These advance technique of android platform can major back through in the field of Assistive Technology.

Assistive Technology is any device that helps a person with disabilities to complete an everyday task. Assistive technology can include mobility devices such as walkers , wheelchair as well as hardware and software. Assistive technology includes many specialized devices as well as typing telephones for people who are deaf and motorized wheelchair for people who can not walk. In Assistive technology include flex sensors and accelerometer to detect the bend in fingers and position of hands. It send the voltage reading to microcontroller which will be mapped to the text. Assistive technology can be critical for the person using it, if you wear glasses , think how it would be to get through the day without them.

III. PROPOSED SYSTEM

In this project data glove is implemented to capture the hand gesture of user. Talk glove is normal , cloth driving glove is fitted with flex sensors along the length of each finger and the thumb. The sensor output of data that varies with degree of bend . Following figure 3.1 shows the proposed system archicheture of sensor based recognition.

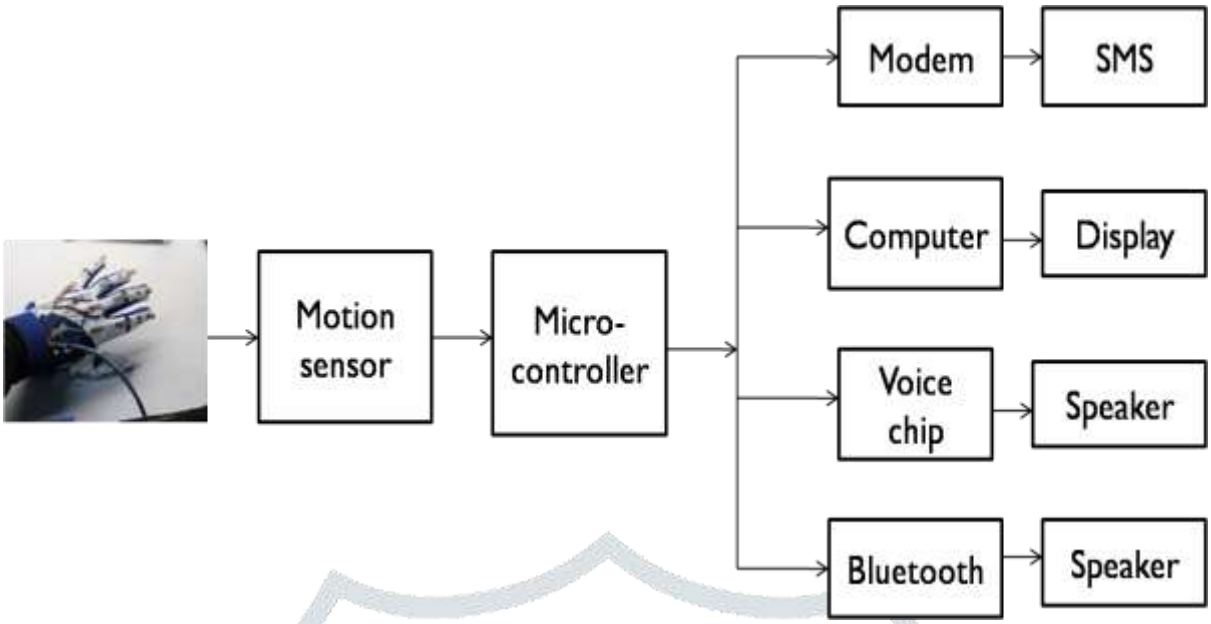

Fig 3.1 Block Diagram of Proposed System

The system mainly composed of several modules including the flex sensor, ATmega328 Microcontroller, modem, display, Bluetooth module and speaker. The first module flex sensor plays important role in this project. Flex sensor are sensor that change in resistance depending on the amount of bend on sensor. They convert the change in electrical resistance , the more bend more is resistance value. Inside flex sensor are carbon resistive element within thin substrate. The output of flex sensor is analog value , it is converted to digital and processed by microcontroller. After that it is will be transmitted through wireless communication. Then it will be received in receiver section. In this system RF signal to transmit the signal. Also, we used a speech IC and speaker to produce the output. This system work on 5V supply via USB cable which are connected to computer for displaying the output. The resulting digital signal is encoded and generate hex. File i.e. digital data dumped and transmitted to the GLCD. It receives the signal and fed to the gesture recognition section. In this section the gesture is recognise and the corresponding text information is displayed on GLCD. This text is converted to audio using wav file.

A.Flex Sensor

Fig 3.2. Flex Sensor Image

Flex sensor are the normally fitted with a data glove. Sensor changes their resistance according to the degree of bending and the output voltage changing consequently. Sensor requires a 5 volt input and output 0 and 5*V*. With a life cycle of over 1 million flexes, its durability is suitable for many consumer applications. The sensors connect to the device via three pin connectors (ground, live, and output).The flex sensor picture above change resistance when send it will only change resistance in one direction. A unflexed sensor has a resistance of about 10,000 ohm. The sensor measure ¼ inch wide 4-1/2 inches long and 0.19 inches thick resistance increase up to 30-40 kilo ohm at 90 degree. The flex sensor is connected to the ATmega16 in micro controller.

B. ATmega16 Micro controller

Fig 3.3 ATMEGA 168 Microcontroller

In this project we are using AT mega 16 microcontroller IC with 28 pin. The Arduino Duemilanove is a microcontroller board based on the ATmega168 or ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. It also has 16KB programmable flash memory, static RAM of 1KB and EEPROM of 512 Bytes. It also has UART peripherals along with other peripherals.

C.GLCD (Graphical LCD)

Innovati's LCD 2x16 A Module provides versatile display functions. Through its simple connections, it can be controlled by Innovati's BASIC Commander for a wide range of LCD applications. In this module, two display lines, each with 16 characters on each line can be displayed. By using the cursor control command, the position of the character to be displayed on the screen can be arbitrarily changed. In this module, the backlight function can be used to change the backlight to allow the message to be read easily.

D. Voltage Regulator IC (7805)

7805 is a voltage regulator integrated circuit (IC). Voltage regulators IC are the IC that is used to regulate voltage. IC 7805 is a series of 78XX voltage regulators and it is fixed linear voltage regulator IC's. In some circuit, the voltage source may have fluctuations and which would not give the fixed output voltage for such situation to ensure constant voltage, IC 7805 voltage regulator is used to maintain the constant output voltage. It maintains output at 5v and protects circuits from short circuit and thermal overloading.

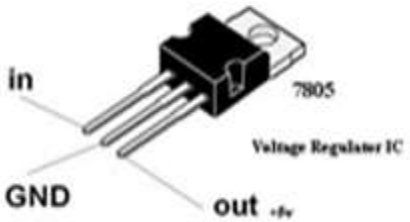

Fig 3.4 Voltage Regulator IC

IV. RESULT ANALYSIS

Fig.4.1 Transmitter Module

In the above transmitter is giving command this command is send it to receiver by using the RFID communication.
In the receiver is giving voice output by using EMIC text too voice conversation is done in the receiver section.

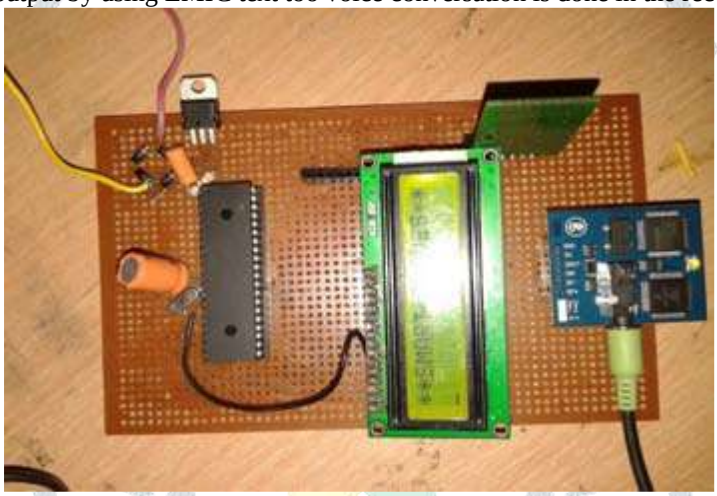

Fig. 4.2 Receiver Module

V. CONCLUSION

Hence this project is an attempt to make it easy to understand the actions of the dumb people by getting the output in the form of text and voice. This project displays the alphabets as the output according to the variations in the resistance of the flex sensors depending on the movement or the bend of the flex sensors. Using Arduino Duemilanove Board makes this system compact and easily portable. It is easy to handle and makes us understand the hand gestures of the dumb people.

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