MULTIPURPOSE HAND GLOVE FOR DUMB PEOPLE

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Abstract— **Hand gesture recognition provides an intelligent, natural, and convenient way of human–computer interaction (HCI). Sign language recognition (SLR) and gesture-based control are two major applications for hand gesture recognition technologies. SLR aims to interpret sign languages automatically by a computer in order to help the deaf communicate with hearing society conveniently. Since sign language is a kind of highly structured and largely symbolic human gesture set, SLR also serves as a good basic for the development of general gesture-based HCI. In this paper we are discussing work done in the area of hand gesture recognition and analyze the methods for recognition of hand gesture**
.Around 5% of human population are dumb. Multipurpose glove aims in helping the dumb people to communicate like normal people. The glove consists of two separate units. The voice control unit is responsible for conversion of ASL (American Sign Language) to speech using voice record and playback module based on the change in flex output. The voice control unit consists of additional sensors for human body parameter measurements like heartbeat, Temperature and ECG. It is helpful during emergency situations. The load control unit consists of Microcontroller, Relay and Bluetooth for communication. The flex output is given to the relay via Bluetooth for load control. These two units are integrated into a glove and OLED. The OLED displays the output corresponding to voice commands. On the whole, it is termed as multifunctional due to its various functionalities. It can be extended in future using machine learning and artificial intelligence using gyroscope angle measurements.

Keywords—OLED, Sign Language Recognition, American Sign language, Human computer interaction, gyroscope

I. INTRODUCTION

The development of the most popular devices for hand movement acquisition glove based systems started about 30 years ago continues to engage a growing numbers of researches. Communication means exchange of information, it becomes effective if all using same media or language for conveying information. Generally, mute people uses sign language for communication in which gestures are used to convey meaning instead of sound. Signs are used to communicate words and sentences to audience. In this system, flex sensor plays an important role. Flex sensor are sensor in which resistance changes according to degree of bending. ―Multipurpose Hand Glove for Dumb People ‖ is a normal , cloth driving glove fitted with flex sensor along the length of each finger and the thumb. The microcontroller and sensor based data glove help to lower communication gap between deaf dumb and normal person. This paper contains the map to develop a gesture voice control. An embedded system is a combination of software and hardware to perform a dedicated task. Some of the main devices used in embedded products are Microprocessor and Microcontroller. Microprocessors are commonly referred to as general purpose processor as they simply accept the inputs , process it and

gives the output. In contrast, a microcontroller not only accepts the data as inputs but also manipulates it , interfaces the data with various devices , control the data and finally gives the result. The ―Multipurpose Hand Glove for Dumb People ‖ using ATMEGA 2560 microcontroller is an exclusive project which is used to help the deaf and dumb people to announce their requirement using voice recognition and playback module. One of the many areas in which embedded system show great promise is assistive technologies, which address the special need of those with impairment. This system present Hand Talk, a ―Smart Glove ‖, worn by a person, which recognize basic hand gestures and convert them into electrical signal using motion sensors and after processing of the signal displays it on the OLED screen in the form of text. The sensors output a stream of data that varies with degree of bend. In this system the Flex sensor is used as a motion sensor. This system uses the ATMEGA 2560 Board as a microcontroller which is an advance version of the microcontroller which makes this system very compact and easily portable. In general, deaf people have difficulty in communicating with others who don ' t understand sign language. Even those who do speak aloud typically have a ― deaf voice‖ of which they are self-conscious and that can make them reticent. 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.

II. SIGN LANGUAGE

Sign languages are visual languages that use hand, facial and body movements as a means of communication. There are over 135 different sign languages all around the world including American Sign Language (ASL), Australian Sign Language and British Sign Language (BSL). There are also signed representations of oral languages such as Signed Exact English (SEE) and mixes such as Pidgin Signed English (PSE). Sign language is commonly used as the main form of communication for people who are Deaf or hard of hearing, but sign languages also have a lot to offer for everyone.

III. PROJECT DESCRIPTION

The development of the most popular devices for hand movement acquisition glove based systems started about 30 years ago continues to engage a growing numbers of researches. Communication means exchange of information, it becomes effective if all using same media or language for conveying information. Generally, mute people uses sign language for communication in which gestures are used to convey meaning instead of sound. Signs are used to communicate words and sentences to audience. In this system, flex sensor plays an important role. Flex sensor are sensor in

which resistance changing according to degree of bending. The Hand Talk Glove is a normal , cloth driving glove fitted with flex sensor along the length of each finger and the thumb. The microcontroller and sensor based data glove help to lower communication gap between deaf dumb and normal person. This paper contains the map to develop a gesture voice control. An embedded system is a combination of software and hardware to perform a dedicated task. Some of the main devices used in embedded products are Microprocessor and Microcontroller. Microprocessors are commonly referred to as general purpose processor as they simply accept the inputs , process it and gives the output. In contrast, a microcontroller not and dump only accepts the data as inputs but also manipulate it , interfaces the data with various devices , control the data and finally gives the result. The ―Speaking Microcontroller for deaf peoples ‖ using ATMEGA 328 microcontroller is an exclusive project which is used to help the deaf and dumb people to announce their requirement using SD card module. One of the many areas in which embedded system show great promise is assistive technologies, which address the special need of those with impairment. This system present Hand Talk, a ―Smart Glove‖, worn by a person, which

recognize basic hand gestures and convert them into electrical signal using motion sensors and after processing of the signal display on the computer monitor in the form of text. In this system the Flex sensor is used as a motion sensor. This system uses the Atmega 2560 Board as a microcontroller which is an advance version of the microcontroller which makes this system very compact and easily portable. In general, deaf people have difficulty in communicating with others who don't understand sign language. Even those who do speak aloud typically have a ―deaf voice‖ of which they are self- conscious and that can make them reticent. The Hand Talk glove is a normal, cloth driving glove fitted with flex sensors along the length of each finger and the thumb. The sensors output a stream of data that varies with degree of bend. The output from the sensor is analog values it is converted to digital and processed by using microcontroller and then it will be transmitted using voice module and speaker. 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. They convert the change in bend to electrical resistance - the more the bend, the more the resistance value. They are usually in the form of a thin strip from 1"-5" long that vary in resistance from approximately 10 to 50 kilo ohms. They are often used in gloves to sense finger movement. Flex sensors are analog resistors. They work as variable analog voltage dividers. Inside the flex sensor are carbon resistive elements within a thin flexible substrate. More carbon means less resistance. When the substrate is bent the sensor produces a resistance output relative to the bend radius. With a typical flex sensor, a flex of 0 degrees will give 10K resistance with a flex of 90degrees will give 30-40 K ohms. The Bend Sensor lists resistance of 30-250 K ohms. In this system we use APR33A3 voice module and a speaker to produce the output. 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.

Fig.1 Alphabet Signs

In fig.1, we have shown the sample for general Sign Language. The main of the this project 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.
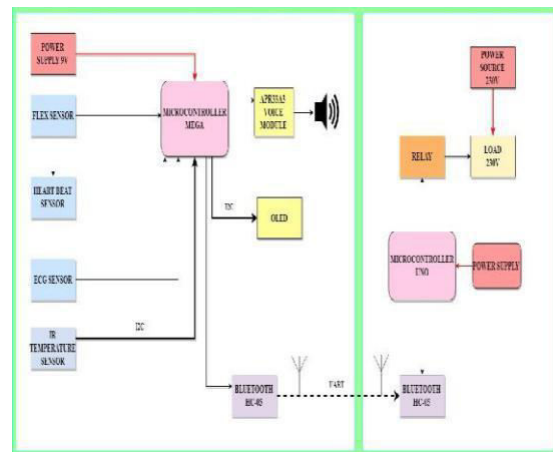

Fig. 2 Functional Block Diagram

IV. PROPOSED METHODOLOGY

Multipurpose glove is basically a sign to talk glove. It is implemented using microcontroller, flex sensor and voice module. The flex changes its resistance according to the bend, hence according to the change in resistance, voice module gets signal and plays the recorded voice. The user can configure any voice command for any signs. It is easy and an efficient method. Moreover, it also consists of various sensors integrated into it for measurement of temperature, heartbeat and ECG. Based on the need, various other sensors can also be incorporated into it. The voice module at present can give 8 different voice commands for duration of 11 minutes each.

All these voice commands are displayed using OLED display. The heart of the system is flex sensor and the brain is the microcontroller unit. It controls all the operations and provides necessary output signals. The embedded C program is used for implemented this project. Hence it is easy when compared to image processing techniques. In sign to speech conversion using image processing technique, complex

algorithms and machine learning techniques are used. It also requires additional camera to capture the image. Hence, simplest as well as multifunctional glove is designed using microcontroller and sensors. It also incorporates load control wirelessly using Bluetooth , relay and flex sensor. On the whole, due to its multispecialty, it is termed as ―Multipurpose Hand Glove for Dumb People‖.
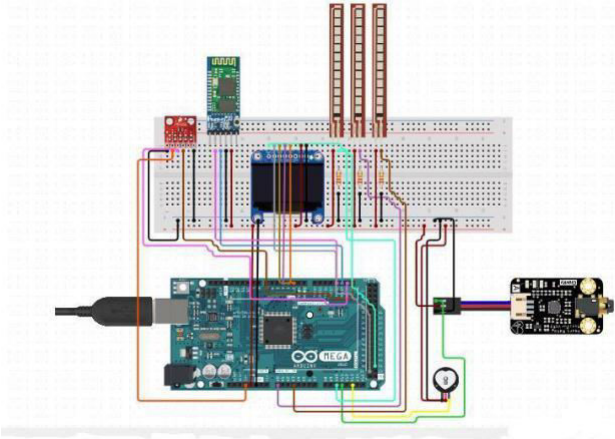
V. SPEECH AND LOAD CONTROL UNIT

Fig. 3 Speech Control Unit

Fig 3 shows the speech control unit with various sensors interconnected. The Load control unit consists of flex sensors along with voice module and other sensors like temperature, ECG and Heart pulse. When the flex sensor is bend its resistance changes. According to the variation, microcontroller sends signal to the voice module. The voice module plays the sound tract recorded. 8 different voice commands can be fed into the voice module. The voice can be in any language. According to the code, the corresponding words in English is displayed on the OLED screen. It also consists of non-contact type temperature sensor, which measures the temperature and heat pulse sensor detects the rate of heart pulse as well as ECG is displayed using ECG sensor. It consists of a Bluetooth module which sends signal to load microcontroller which is connected to the relay and load. Hence the load is turned on and off using flex sensor signals and microcontroller unit. The user can configure the load control unit for any type of loads.
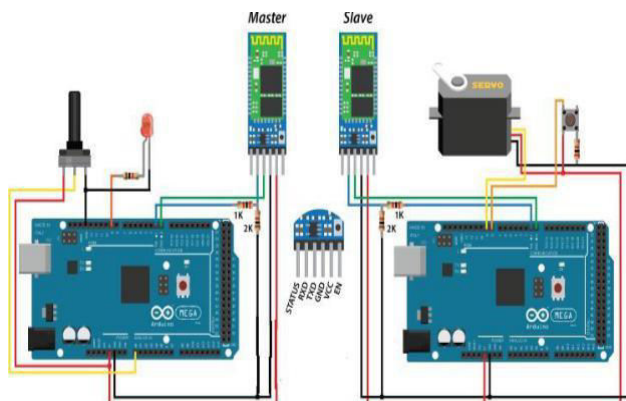
VI. LOAD CONTROL UNIT

Fig. 4 Bluetooth master-slave

Fig 4 describes the Bluetooth master slave configuration of load control unit. The load control unit consist of two bluetooth modules connected in master slave configuration to

receive signals from flex sensor and transmits it to the relay and load via slave bluetooth.

A. SLAVE CONFIGURATION

―AT‖ is a test command we should get back the message ―OK‖. Then if we type ―AT+UART?‖ gives the message that shows the default baud rate which is38400. T ―AT+ROLE?‖ will display a message ―+ROLE=0‖ which means that the Bluetooth device is in slave mode. ―AT+ADDR?‖ will get back the address.
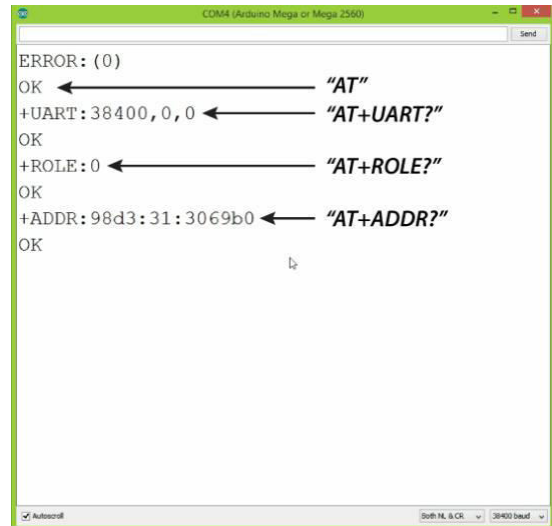

Fig. 5 Slave Configuration

B. MASTER CONFIGURATION

AT+ROLE=1‖ will set the Bluetooth module as a master device. ―AT+CMODE=0 ‖ will set the connect mode to ―fixed address‖ . ―AT+BIND=‖ will set the address of the slave device.
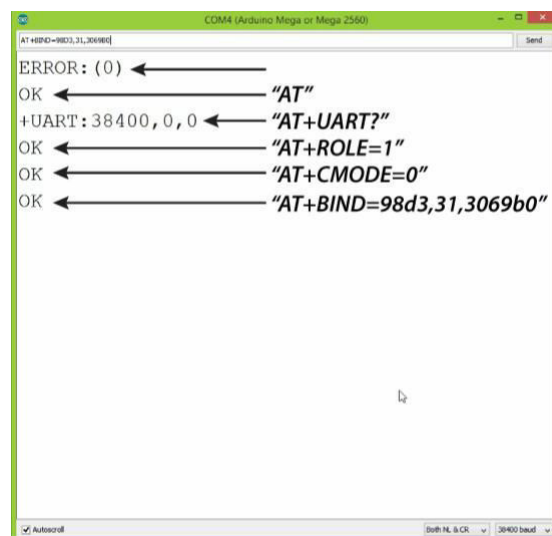

Fig. 6 Master Configuration

C. BLUETOOTH MODULE

Bluetooth module used in this project is HC-05, which supports master and slave mode serial communication (9600-115200 bps) SPP and UART interface. Using these features it can communicate with other Bluetooth-enabled devices like

mobile phones, tablets and laptops. The module runs on 3.3V to 5V power supply.

D. RELAY MODULE

A relay allows you to turn on or turn off a circuit using voltage and/or current much higher than what Arduino could handle. Relay provides complete isolation between the low-voltage circuit on Arduino side and the high-voltage side controlling the load. It gets activated using 5V from Arduino, which, in turn, controls electrical appliances like fans, lights and air-conditioners.
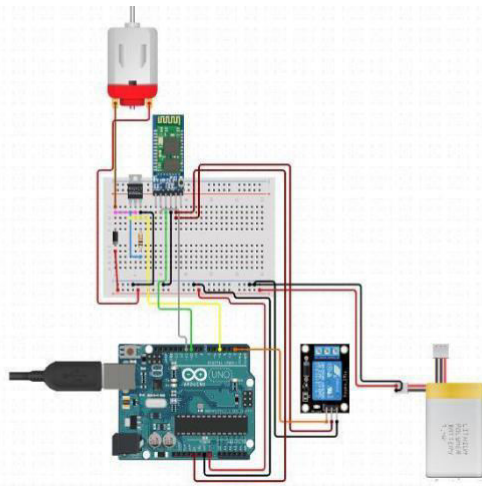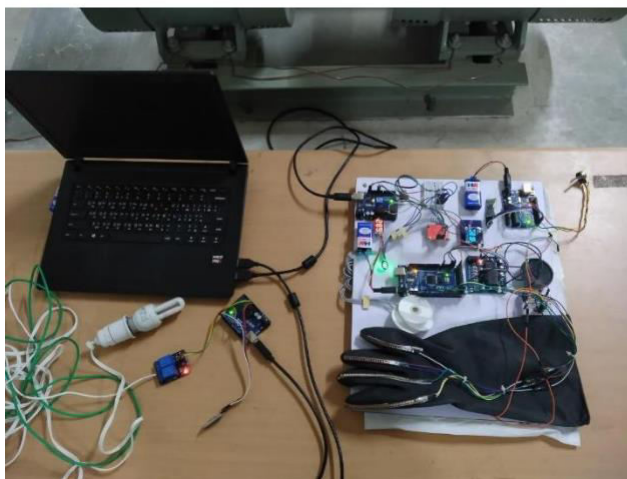

Fig. 7 Load Control Unit

Fig. 8 Hardware Implementation

E. WORKING

The Bluetooth from the voice control unit acts as a master and sends serial clock and serial data to the slave which is connected to the load through relay. When both the master and slave are paired, the signal from the flex goes to the slave from master. Hence according to the variation in the flex sensor, the load can automatically controlled wirelessly.

VII. 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 project aims to lower the communication gap between the deaf or mute community and the normal world. This project 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 into speech so that normal people can easily understand. It also monitors various body measurements like Temperature, ECG and Heart Pulse for emergency situation. It additionally provides a load control using hand movements. On the whole, it serves for multipurpose, hence named as ―Multipurpose Hand Glove for Dumb People‖.

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