

Versatile Mitten for Deaf & Dumb

Maheswari.D¹, Aravind.S², Archana.K³, Ashikabeham.A⁴

Assistant Professor, Dept. of ECE, Agni College of Technology Chennai, Tamilnadu, India¹

UG Student, Dept. of ECE, Agni College of Technology Chennai, Tamilnadu, India^{2,3,4}

Abstract: Generally, deaf & dumb people use sign language for the communication. Therefore, it is necessary to have a gesture recognition or sign language detection system to reduce the communication gap between two communities by using glove. The data of force sensor is given to input pin of microcontroller at transmitter side. We get the corresponding voice output of each gesture and display of recognized gesture in form of text on the LCD display at receiver side. As novelty, we are appending home automation. The corresponding home appliances are controlled by using gesture and operated through relay circuit. The main purpose of smart glove an ease of sharing basic ideas, minimize communication gap and an easier collaboration for the hard of hearing people. The main aim of our project is to develop the cost-effective system. So, disable can able to grow in their respective field.

Keywords: Force sensors, Zigbee, Home automation, LCD Board, APR voice module.

I. INTRODUCTION

One of the important problems that our society faces is that people with disabilities are finding it hard to come up with the fast-growing technology. The access to communication technologies has become essential for the handicapped people. Deaf and dumb people use sign language for communication but they find difficulty in communicating with others who don't understand sign language. Sign language is an expressive and natural way for communication between normal and dumb people. In this project Force Sensor Plays the major role, which are placed on fingers and it changes resistance depending on the amount of force on the sensor.

The proposed algorithm states that four force sensors for four fingers that each sensor has range of voltage and each range indicates one message, the respective message will be displayed on LCD board and vocalized by speaker. Force sensor are load cells, transducers that convert force into measurable electrical outputs. Sensors convert the known applied load into voltage and Arduino microcontroller will receive this sensed data and show output message on the LCD board and vocalized by speaker. The message that have been used are Hungry, Need Water.

OBSERVATION OF THE STUDY:

The objective of the project is to reduce the communication gap between the deaf and dumb people. The main purpose of smart glove an ease of sharing basic ideas, minimize communication gap and an easier collaboration for the hard of hearing people.

II. REVIEW OF LITERATURE

2.1 Hand Gesture Recognition Using Image Processing:

In this paper, A device is specially designed to make effective communication between the dumb and visually impaired person. The major defects between these two persons are vision and voice. In an emergency situation and in need of any usable things, the dumb person cannot communicate, for this purpose this system has been proposed. The interconnection between different components is explained using architecture diagram of the system. The digital pins are connected to 8 pins of the APR voice module. The power supply to the Arduino board was given by the pc or serial port. Direct supply of 5v is given to the APR voice module. The GND – GND connection of both the circuit are interconnected for power back circuit. The speaker was connected to the APR voice module. A Webcam is kept separately or placed on the laptop or other devices. It is used to capture the gestures from the people and this is done to match it with the gestures stored in the database. The voice output for the matched gestures is generated via APR voice module. The speaker produces the voice output.

2.2 An Innovative Communication System for Deaf, Dumb and Blind People:

We propose a system which helps normal and deaf dumb people to effectively communicate with each other. In resolving

these difficulties with visually and vocally impaired people, we have used a tiny credit card size computer named Raspberry Pi. We provide the solution for blind deaf and dumb people by using this device. For blind people, the image is captured using Logitech camera which is converted into text using Tesseract OCR and the resulted text is converted into speech using espeak which is spelled out by speaker and the text is also displayed.

When the dumb people communicating with normal people, the text written by dumb is spelled out by the speaker which can be understandable by normal people. Dumb people, can also use hand gesture to communicate with normal people. For deaf people the speech is converted into text by using a website called speechtexter.com. The rest of the paper is organized as follows: Section II deals with an existing system, Section III and IV deals with hardware and software requirements and section V deals with design and implementation.

III. PROBLEM STATEMENT AND PRELIMINERIES

There may be various technologies and government policies for hearing impaired and dumb people. However, they manage to overcome their difficulties there is always a factor of dependency upon others and a major communication gap between normal people and them. Therefore, arises a demand for a tool to fill this communication gap. And we propose a system that could covert the sign language into speech and can also control any desired home appliances by means of force sensors.

3.1 Transmitter Part of the Proposed System:

In this transmitter part, we use ARDUINO UNO microcontroller which acts as brain of the system, because the entire system program instruction stored in it. When the finger command is given, then the condition in controller satisfies, the LCD board will display the output as well as the voice will be played in the speaker with the voice recorded in the APR module. Recorded sound is retained even after power supply is removed from the APR 9600 VOICE IC module. The replayed sound exhibits high quality with a low noise level. This form of output will help the normal people to response effectively with the deaf and dumb people. The input sensed data is also carried by the wireless zigbee technology through the microcontroller.

3.2 Receiver Part of the Proposed system:

The receiver section communicates with the zigbee gets a value that is sent by sensor. When the person wants to control light or fan, the command is given by zigbee (wireless communication) to turn ON or OFF the light or fan. The zigbee Rx receives signal from the zigbee Tx in order to operate the devices accordingly when they are needed. Relay is used as an electronic control switch. It is also working as an automatic switch when a respective function is to perform.

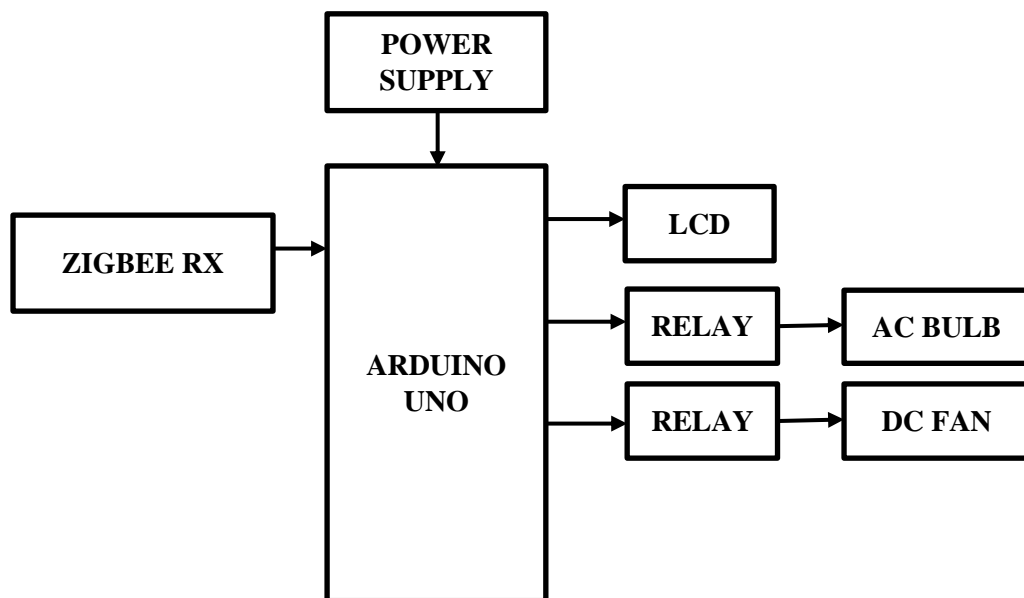


Fig 3.1 Transmitter section of the Proposed System

All the output is displayed in the LCD based on the working condition of the appliances. In RX mode the receiver demodulates the signals from the RF channel, constantly presenting the demodulated data to the baseband protocol engine.

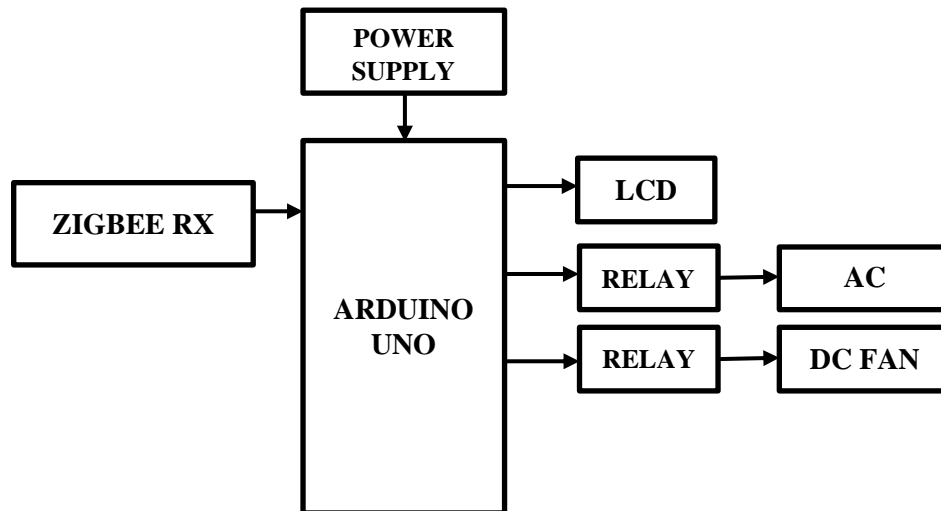


Fig 3.2 Receiver Section of the Proposed System

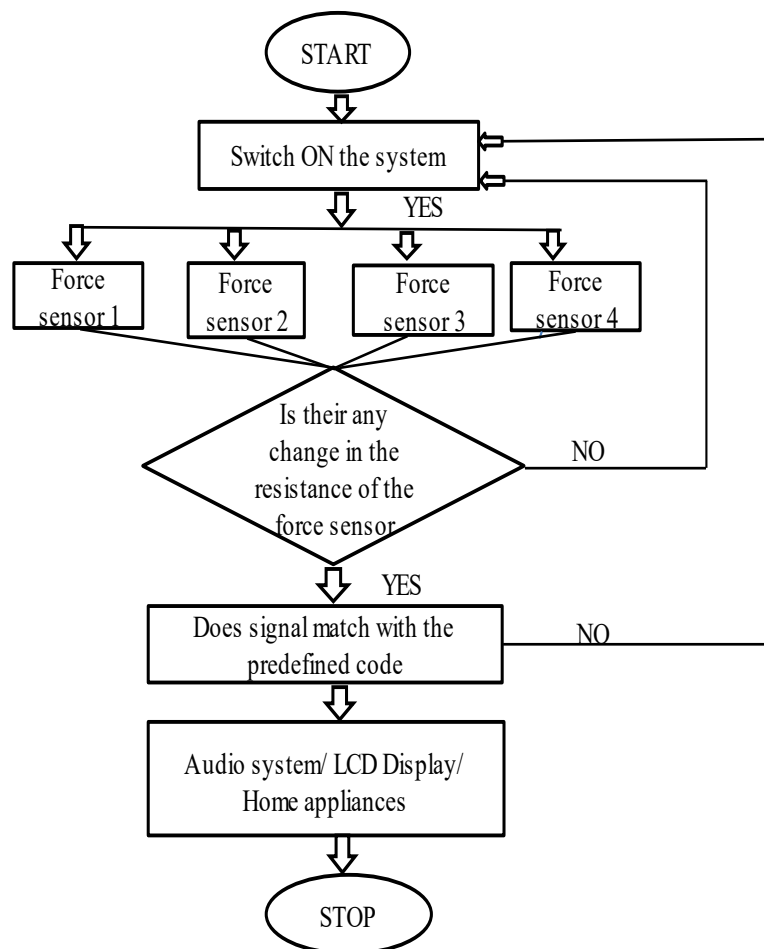


Fig 3.3 Flow Chart of Proposed System

IV. PROGRAM ANALYSIS FOR IMPLEMENTATION PROGRAM

The UNO is the best board to get started with electronics and coding. It plays the major role in the controlling operation inputs and outputs. The UNO is the most used and documented board of the whole Arduino family.

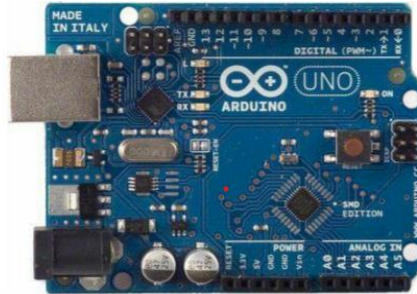


Fig 3.4 Arduino UNO Microcontroller

Arduino UNO has 14 digital input/output pins, 6 analog inputs, a 16 MHz quartz crystal, 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 an AC-to-DC adapter or battery to get started. In software side, Arduino IDE is used for coding workspace using Embedded C language.

Relays are the primary protection as well as switching devices in most of the control processes or equipment. A relay is a switching device as it works to isolate or change the state of an electric circuit from one state to another.



Fig 3.5 Relay

APR9600 is a low-cost high performance sound record/replay IC incorporating flash analogue storage technique. Recorded sound is retained even after power supply is removed from the module. The replayed sound exhibits high quality with a low noise level. Sampling rate for a 60 second recording period is 4.2 kHz that gives a sound record/replay bandwidth of 20Hz to 2.1 kHz

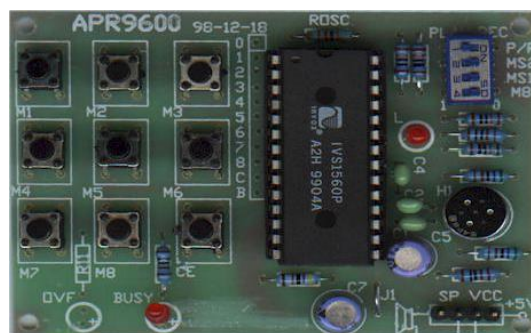


Fig 3.6 APR9600 Voice Module

Force Sensing Resistors (FSR) are a polymer thick film (PTF) device which exhibits a decrease in resistance with an increase in the force applied to the active surface. The Liquid Crystal Display shows the respective output based on the sensed input. In home automation, we are transferring the sensed data through zigbee technology in order to control the applications. The power supply unit converts the 230V level to 12V or 5V level. In this, we are using AC bulb and DC fan as an appliance in home automation.



Fig 3.7 Force Sensor

V. RESULT OF THE STUDY:

The result of the system is that it converts the sign language into some text from also, to facilitate the deaf and dumb as well. This text is display on LCD. In order to improve and facilitate the more gestures recognition, we can accommodate a number of other gestures as well for better and efficient communication.



Fig 3.8 Home Automation Light ON and OFF



Fig 3.9 Home Automation Fan ON and OFF

**Fig 3.10 Basics Needs -Water & Hungry Output**

VI. ADVANTAGES

The main advantage of the versatile mitten is to reduce the communication barrier between deaf and dumb and able people. The mitten serves dual purposes. It can be used to communicate as well as control home appliances. It is user-friendly, easy to operate and provides real-time translation.

VII. CONCLUSION

This paper introduced the smart hand gloves for disabled people. It will provide more reliable efficient easy to use and light weight solution to user as compare to other proposed papers. This will responsible to create meaning to lives of disable people.

REFERENCES

- [1] Aruljothy.S, Arunkumar.S, Ajitraj.G, YayadDamodran.D. Jeevanantham.J, Dr.M. Subba “HAND GESTURE RECOGNITION USING IMAGE PROCESSING FOR VISUALLY IMPAIRED AND DUMB PERSON” – International Journal of Advanced Research in Computer and Communication Engineering (IJARCCE), 2018.
- [2] Anish Kumar, Rakesh Raushan, Saurabh Aditya, Vishal Kumar Jaiswal, Mrs. Divyashree Y.V. “AN INNOVATIVE COMMUNICATION SYSTEM FOR DEAF, DUMB AND BLIND PEOPLE”–International Journal for Research in Applied Science & Engineering Technology (IJRASET),2017.
- [3] Shital P. Dawane, Prof. Hajjali G. Sayyed “A REVIEW ON HAND GESTURE RECOGNITION FOR DEAF AND DUMB PEOPLE USING GSM MODULE” - International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering,2016.
- [4] Pallavi Verma, Shimi S.L, Richa Priyadarshani “DESIGN OF COMMUNICATION INTERPRETER FOR DEAF AND DUMB PERSON “- International Journal of Science and Research (IJSR),2015.
- [5] Netchanok Tanyawiwat and Surapa Thiemjarus “DESIGN OF AN ASSISTIVE COMMUNICATION GLOVE USING COMBINE SENSORY CHANNELS” – IEEE,2012.
- [6] Nikolaos Bourbakis, Anna Esposito, D. Kabraki “MULTI-MODAL INTERFACES FOR INTERACTION COMMUNICATION BETWEEN HEARING AND VISUALLY IMPARED INDIVIDUALS”- IEEE,2007.
- [7] David J. Sturman “A SURVEY OF GLOVE- BASED INPUT”, IEEE-2004.