

# REAL TIME COMMUNICATION FOR DEAF PEOPLE USING IOT

Chandana R\*, Divya N\*, Pooja Manjunath\*, Priyanka K V\*, Mrs Shruthi B#  
Student\*, Assistant Professor #

Department of Electrical and Electronics Engineering  
GSSS Institute of Engineering and Technology for Women, Mysuru, India  
Affiliated to Visvesvaraya Technological University, Belagavi, India

*Abstract-* Human beings have a natural ability to listen, see and interact with their external environment, unfortunately there are some people are differently abled, so such people depends on other means of communication like sign language, sign language is a language through which communication is possible without mean of acoustic sound. Instead, sign language relies on sign pattern i.e., hand movement, orientation to facilitate understanding between people. It exploits unique features of visual medium. The sign language translator we have developed uses a glove fitted with sensors that can interpret the 26 English letters in American sign language (ASL). The IOT is implemented with the help of aurdino, flex sensor, our system consist of two ends, at one end there is a normal person at an another end there is a deaf person. The deaf person will do finger action into aurdino through flex sensor, the translation is transmitted through cloud server which displays as well as pronounces the letter and also interfaces with the computer

*Index Terms-* Embedded system; Internet of things; Monitoring; prototype; Real-time; sensors.

## 1. INTRODUCTION

Internet of things defined as a network that can connect any object with the internet based on a protocol for exchanging information and communication among various smart devices in order to achieve monitoring, tracking, management and location identification objectives.

The significance of the project is that it provides a platform for physically challenged people to communicate efficiently. Since the system converts sign language into text and speech. It also helps physically paralyzed persons to access the internet through the sign language compatible web browser. Communication involves the exchange of information, and this can only occur effectively if all participants use a common language. As known to many, Sign languages are the only medium through which most of the educated deaf-mutes communicate today Sign language is a language through which communication is possible without the means of acoustic sounds. It relies on sign patterns, i.e., finger movement, orientation and movements of the arm to facilitate understanding between people. Sign language has proven effective in communicating across a broad spectrum of requirements from everyday needs to sophisticated concepts. There are different sign languages according to many countries. Most popular and widely used amongst them is the American Sign Language. American Sign Language is the predominant form of visual hand language used in North Hartford. It has been well-developed by the deaf community over the past centuries and is the 3rd most used language in the United States today. The sign language recognition system which we have designed America. ASL is also a visual language based on hand gestures. Figure 1.1 shows hand gestures of ASL for English alphabets. ASL originated in earlier 19th century in the American School for Deaf in uses a glove fitted with sensors that can interpret the 26 English letters in American Sign Language (ASL).

## 2. LITERATURE SURVEY

- [1] B. Rajapandian, V.Harini, D.Raksha, V.Sangeetha, "A novel approach as an aid for blind,deaf and dumb People",2017 IEEE 3<sup>rd</sup> international conference on sensing,signal processing and security(ICSSS)  
**B. Rajapandian, V.Harini, D.Raksha, V.Sangeetha (2017):** They proposed a new system-prototype in an effort to make the process of interaction between the Blind, Deaf and Dumb people much easier. This will make use of the portable technology and Arduino Circuit Boards to provide a means of communication to differently-abled people having one or all of the above mention disabilities.
- [2] Piyush Patil ; Jayesh Prajapat,"Implementation of a real time communication system for deaf People using IOT", International conference on electronics and informatics(ICET) 2017.  
**Piyush Patil , Jayesh Prajapat(2017):** They proposed a development of an advanced communication system for deaf people. To solve this problem of communication we are using internet of things. The IoT is implemented with the help Embedded Linux board named Raspberry Pi.
- [3] Abhinandan das, Lavish Yadav, Mayank Singha, Hemaang Goyal, Keshav Taparia, "Smart glove for sign language communications" , 2016  
**Abhinandan das, Lavish Yadav, Mayank Singha, Hemaang Goyal, Keshav Taparia, (2016):** Authors are develop a smart glove using Intel Galileo Gen 2 IOT kit for real-time gesture recognition. The objective is to create a device which helps the hearing or speech impaired persons to communicate with others.
- [4] Priyanka Lokhande,Riya Prajapathi, Sandeep Pansare,"Data Gloves for Sign Language Recognition System", National Conference on Emerging Trends in Advanced Communication Technologies (NCETACT-2015)

**Priyanka Lokhande, Riya Prajapathi, Sandeep Pansare (2015):** This system consists of a glove that will be worn by a dumb person to facilitate the communication with the normal person. It translates the hand gestures to corresponding words using flex sensors and 3-axis accelerometer. The signals are converted to digital data using comparator circuits and ADC of microcontroller ARM LPC 2138

- [5] Heena Joshi , Shweta Bhati , Komal Sharma , Vandana Matai, "Detection of Finger motion using Flex Sensor for Assisting Speech Impaired", Issue 10, October 2017

**Heena Joshi , Shweta Bhati , Komal Sharma , Vandana Matai,** The main aim of the system is to develop a cheap glove that disabled people can use for communication. When the gesture of an alphabet is made respective alphabet is shown in the LCD. Sign language is prevalent amongst the deaf, dumb or blind individuals. A sophisticated method is required as deaf-dumb people use sign language for their communication which is difficult to understand by the normal people.

### 3. TOOLS USED:

#### 3.1 Flex Sensors

The Flex Sensor patented technology is based on resistive carbon elements. As a variable printed resistor, the Flex Sensor achieves great form-factor on a thin flexible substrate. When the substrate is bent, the sensor produces a resistance output correlated to the bend radius—the smaller the radius, the higher the resistance value. Flex sensors are passive resistive devices that give change in resistance depending upon the amount of bending. Flex sensor work as analog voltage dividers, inside which are carbon resistive elements within a thin substrate, that are flexible. When substrate bends, sensor generates resistance output corresponding to the bend radius. More is the bend, more is the output resistance.

A simple flex sensor 2.2 in length. As the sensor is flexed, the resistance across the sensor increases. The resistance of the flex sensor changes when the metal pads are on the outside of the bend (text on inside of bend). Connector is 0.1" spaced and bread board friendly. The flex sensor produces the change in resistance value depending on the amount of degree bend of each finger and the corresponding hand movement, orientation is reported by the tri-axial accelerometer.

Flex sensors and accelerometer have been used to sense curvature of the fingers and detect motion of the hand respectively. Flex and accelerometers are used for two aspects, one is changing finger position but not hand position and orientation and, other changing both finger and hand position and orientation.

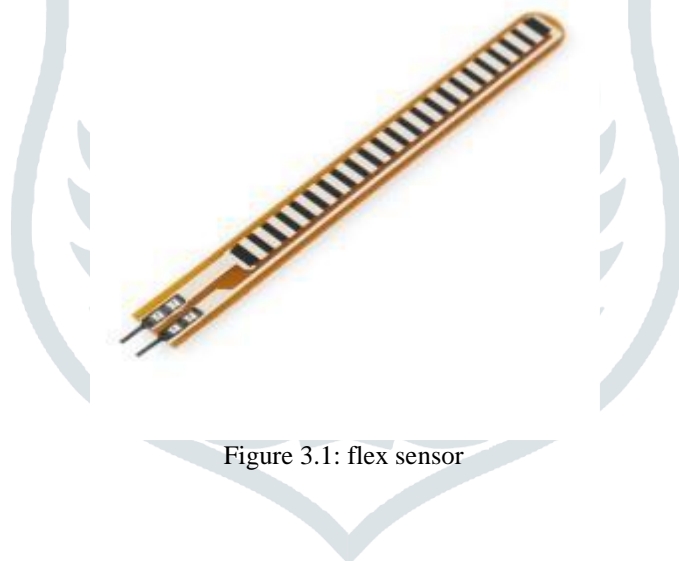


Figure 3.1: flex sensor

#### 3.2 Arduino

Arduino microcontrollers are pre-programmed with a boot loader that simplifies uploading of programs to the on-chip flash memory.

The default bootloader of the Arduino UNO is the optiboot bootloader. Boards are loaded with program code via a serial connection to another computer. Some serial Arduino boards contain a level shifter circuit to convert between RS-232 logic levels and transistor–transistor logic (TTL) level signals.

Current Arduino boards are programmed via Universal Serial Bus (USB), implemented using USB-to-serial adapter chips such as the FTDI FT232. Some boards, such as later-model Uno boards, substitute the FTDI chip with a separate AVR chip containing USB-to-serial firmware, which is reprogrammable via its own ICSP header. Other variants, such as the Arduino Mini and the unofficial Boarduino, use a detachable USB-to-serial adapter board or cable, Bluetooth or other methods. When used with traditional microcontroller tools, instead of the Arduino IDE, standard AVR in-system programming (ISP) programming is used.

The Arduino board exposes most of the microcontroller's I/O pins for use by other circuits. The *Diecimila*, *Duemilanove*, and current *Unoprovide* 14 digital I/O pins, six of which can produce pulse-width modulated signals, and six analog inputs, which can

also be used as six digital I/O pins. These pins are on the top of the board, via female 0.1-inch (2.54 mm) headers. Several plug-in application shields are also commercially available.

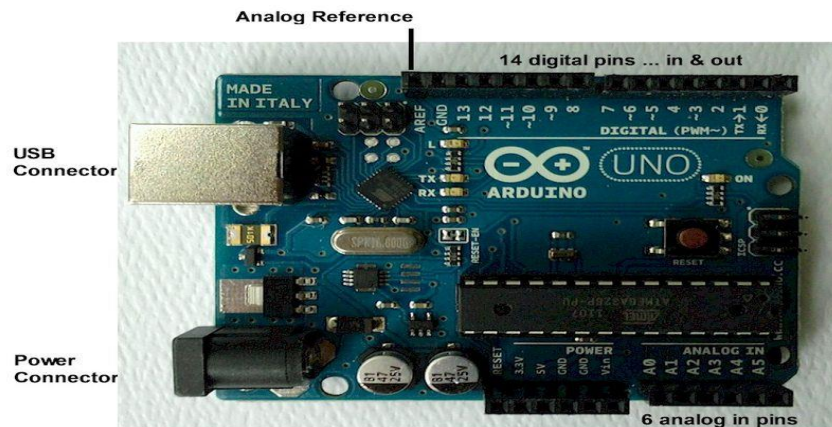


Figure 3.2: Arduino Board

## Pins

- Analog Reference pin (orange)
- Digital Ground (light green)
- Digital Pins 2-13 (green)
- Digital Pins 0-1/Serial In/Out - TX/RX (dark green) - *These pins cannot be used for digital i/o (**digitalRead** and **digitalWrite**) if you are also using serial communication (e.g. **Serial.begin**).*
- Reset Button - S1 (dark blue)
- In-circuit Serial Programmer (blue-green)
- Analog In Pins 0-5 (light blue)
- Power and Ground Pins (power: orange, grounds: light orange)
- External Power Supply In (9-12VDC) - X1 (pink)
- Toggles External Power and USB Power (place jumper on two pins closest to desired supply) - SV1 (purple)
- USB (used for uploading sketches to the board and for serial communication between the board and the computer; can be used to power the board) (yellow)

## 3.3 WI-FI Module(esp8266MOD)

The ESP8266 WiFi Module is a self contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your WiFi network. The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor. Each ESP8266 module comes pre-programmed with an AT command set firmware, meaning, you can simply hook this up to your Arduino device and get about as much WiFi-ability as a WiFi Shield offers (and that's just out of the box)! The ESP8266 module is an extremely cost effective board with a huge, and ever growing, community.

This module has a powerful enough on-board processing and storage capability that allows it to be integrated with the sensors and other application specific devices through its GPIOs with minimal development up-front and minimal loading during runtime. Its high degree of on-chip integration allows for minimal external circuitry, including the front-end module, is designed to occupy minimal PCB area. The ESP8266 supports APSD for VoIP applications and Bluetooth co-existence interfaces, it contains a self-calibrated RF allowing it to work under all operating conditions, and requires no external RF parts.

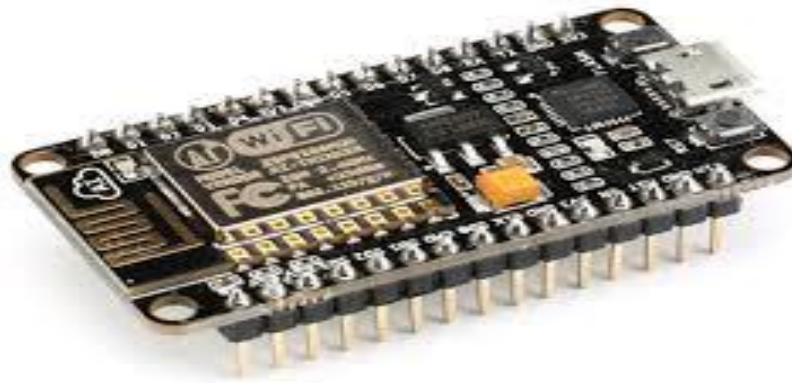
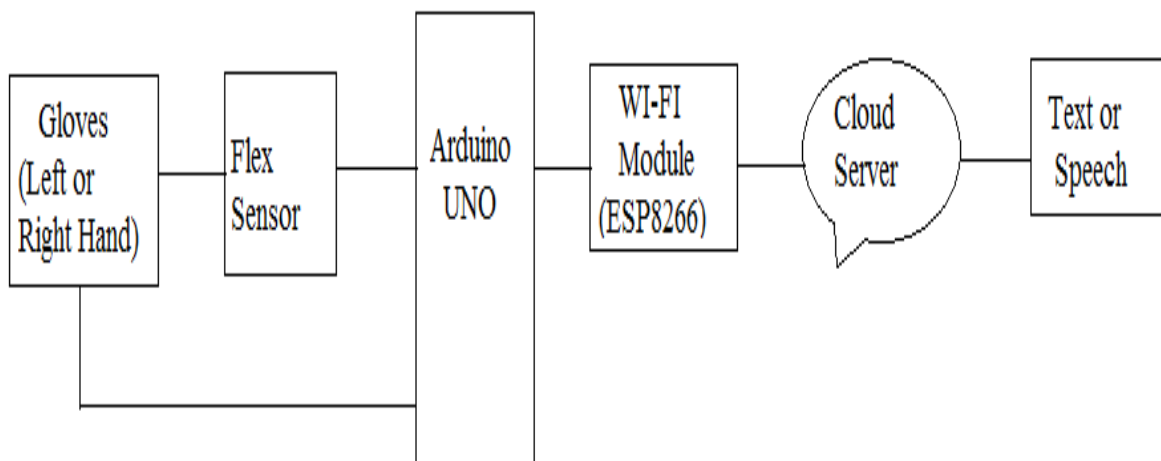


Figure 3.3: WI-FI Module

### 3.4 BLOCK DIAGRAM



The proposed method is to design a sign language recognition system for the physically disabled people. For this purpose, we have turned to glove-based technique as it is more practical in gesture recognition which involves two parts, one is mobile app and another is hand glove. After the hand glove is powered up, every fingers and hand movement each time will try to detect word or letter for its given pattern. If the finger or hand movement data is recognized, then it will be sent on to that app for display. If the finger or hand movement data are not recognized, then letter or word will not be show. The device indicates the hand glove. As we said earlier, this device has two parts app and hand glove. At first, it requires to be power up the device. Through the WI-FI Module(esp8266) the device and the app are connected. After building a successful communication path, hand glove device will be able to communicate with each device. Each and every finger is attached to flex sensor. So, flex sensor will give data for any types of finger movement. For each and every particular letter and word, has a specific meaning. For each combination of the flex sensor data has decoded a specific letter or word. Whenever the data matches with the decoder letter or the word processor, (Arduino Mega 2560) it will send that letter or the word to the app by using cloud server and WI-FI module and displayed in the text editor with voice output through speakers.

### 4. CONCLUSION

The unique method used in the proposed system replaces the web camera in the image processing technique by a sensor glove which provides more accurate results than the previously proposed system The proposed system can be used more efficiently by deaf and dumb people and also physically paralyzed people can use this system to browse the required web pages through internet. It also provides more accurate results.

**5. REFERENCE**

1. Rohit Rastogi,Shashank Mittal,Sajan Agarwal,"A novel approach for communication among Blind, Deaf and Dumb people", Computing for Sustainable Global Development (INDIACom), 2015 2nd International Conference,11-13 March 2015
2. Panikos Heracleous,Hiroshi Ishiguro, Norihiro Hagita,"Visual-speech to text conversion applicable to telephone communication for deaf individuals", Telecommunications (ICT), 2011 18th International Conference, 8-11 May 2011
3. Moataz Soliman<sup>1</sup>, Tobi Abiodun<sup>1</sup>, Tarek Hamouda, Jiehan Zhou<sup>1</sup>, Chung-Horng Lung, " Smart Home: Integrating Internet of Things with Web Services and Cloud Computing" ,Cloud Computing Technology and Science (CloudCom), 2013 IEEE 5th International Conference,2-5 Dec. 2013
4. Cristian Gehrman, Mohamed Ahmed Abdelrahem, ' ' IOT protection through Device to Cloud Synchronization" ,cloud computing technology and science (cloudcom) 12-15 Dec.2016.

