International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 05 Issue: 04 | Apr42018 www.irjet.net p-ISSN: 2395-0072

A REVIEW ON IOT BASED SIGN LANGUAGE CONVERSION

Neha Rajput[1], Mrs. Neetu Sikarwar[2]

[1]Student, M.Tech (Digital Communication)
[2]HOD (Electronics & Communication Dept.)
Institute of Engineering, Jiwaji University, Gwalior , Madhya Pradesh, India

---

Abstract - *Communication between speakers and non-speakers of Sign Language can be problematic, inconvenient, and expensive. This project attempts to bridge the communication gap by designing a portable glove that captures the user's sign language gestures and outputs the translated text on a smart phone. The glove is equipped with flex sensors, contact sensors, and a gyroscope to measure the flexion of the fingers, the contact between fingers, and the rotation of the hand. The glove's Arduino UNO microcontroller analyzes the sensor readings to identify the gesture from a library of learned gestures. The Bluetooth module transmits the gesture to a smart phone. After this work, one day speakers may sign language be able to communicate with others in an affordable and convenient way.*

Key Words: Flex Sensor, Internet of Things, Arduino Atmega, Sign Language etc.

1. INTRODUCTION

India is one of the largely populated countries in the world. There are over millions of people still suffering from deaf and Dum. This proposal helps them to communicate with normal people by understanding their sign language into normal one through mobile communication using internet of things. Communication with deaf people becomes more tough if the distance between them is more .For example, Imagine a scenario in which a normal person wants to communicate with a person having a hearing disability situated at a far distance from him ,then he won't be able to exchange his/her thoughts. The Internet of Things is the internetworking of physical devices ,buildings ,vehicles and other items embedded with electronics ,sensors ,software ,actuators and network connectivity that enable each objects to collect and exchange data. Typically, IOT is expected to offer advance connectivity of devices, systems and services that goes beyond machine-to-machine (M2M) communications and covers a variety of protocols, domains and applications.

2. LITERATURE REVIEW

A. According to Kumar, Gurjar and Singh [2], the glove has four flex sensors each sits on each finger. The microcontroller consistently checks the bowing of flex sensor. At the point when the signal of the letters makes particular word based on the sequence appeared in the LCD. The glove includes a few contact sensors, which help in recognizing couple of comparable motions like of "U" and "V". The precision of each flex sensor is constrained past a specific point. Smaller hands will bring about a bigger level of twist. Therefore, the contrast is very high. Since all correspondence is done through links, our gadget does not meddle with different plans. Any individual who fits into it can utilize the glove; they would just need to prepare on it and create new datasets on the off chance that they wish for a higher forecast precision than the standard or to consolidate new signs.

B. From Arsan and Ulgen [3] we can understand, this framework can be utilized for changing over gesture based communication to voice and furthermore voice to communication via gestures. A movement catch framework is utilized for communication via gestures transformation and a voice acknowledgment framework for voice change. It catches the signs and directs on the screen as composing. It additionally catches the voice and shows the gesture based communication significance on the screen as motioned picture or video. Microsoft Kinect Sensor XBOX 360 is chosen to use for catching capacities and specialized elements to the movement catch of sign to voice change. Google Voice Recognition is utilized for the voice to sign change. Google Voice Recognition is accessible just on android based projects. Inevitably, the voice acknowledgment program CMU Sphinx is picked. This enables us to join the two segments in Java. Change program is likewise outlined and written in Java. At last, Java based program is created which can make voice acknowledgment, movement catch and change over them two to each other. So a hard of hearing individual effortlessly addresses in gesture based communication before movement sensor, the individual behind the screen can see effectively without capacity to talk communication through signing and the other way around.

3. INTERNET OF THINGS

Internet of things is rapidly increasing technology. IOT has given us a promising way to build powerful; industrial systems and applications by using wireless devices, android and sensors. Today, smart grid, smart water networks, smart devices, smart homes, intelligent transportation are infrastructure that connect our world more than we ever thought possible. The common vision of such system is usually associated with one single concept, internet of things, where through the use of sensors, the entire physical infrastructure is closely coupled with information and communication technologies: where intelligent monitoring and

management can be achieved via the usage of networked embedded devices. Different technologies in the market like RFID, machine to machine communication, vehicle to vehicle communication etc are implemented using IOT. There is growing interest in using IOT technologies in various industries. A number of industrial IOT projects has been applied in areas such as food processing industry, environmental monitoring, security surveillance, agriculture and others. Internet of Things (IoT) is rapidly increasing technology. The future is Internet of Things, which will transform the real world objects into intelligent virtual objects. The IoT aims to unify everything in our world under a common infrastructure, giving us not only control of things around us, but also keeping us informed of the state of the things. Many industrial IOT applications have been increasingly developed and deployed in recent years. IoT is the network of physical objects or things embedded with electronics, software, sensors, and network connectivity, which enables these objects to collect and exchange data.

4. SIGN LANGUAGE

Sign languages (also known as signed languages) are languages that use manual communication to convey meaning. This can include simultaneously employing hand gestures, movement, orientation of the fingers, arms or body, and facial expressions to convey a speaker's ideas. Sign languages often share significant similarities with their respective spoken language, such as American Sign Language (ASL) with American English). Grammar and sentence structure, however, may vary to encourage efficiency and fluidity in speaking. It is important to note that just because a spoken language is intelligible transnational, such as English in the United States and the United Kingdom, does not mean that the sign languages from those regions are as well; ASL and British Sign Language (BSL) were formed independently and are therefore unintelligible.

Linguists consider both spoken and signed communication to be types of natural language, meaning that both emerged through an abstract, protracted aging process and evolved over time without meticulous planning. Sign language should not be confused with "body language", a type of nonverbal communication.

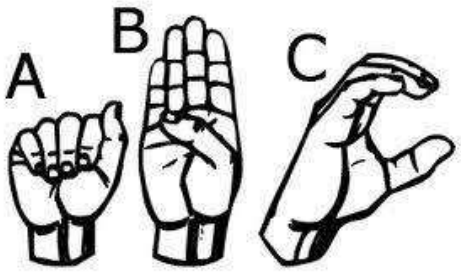

Fig. Sign Language

Wherever communities of deaf people exist, sign languages have developed, and are at the cores of local deaf cultures. Although signing is used primarily by the deaf and hard of hearing, it is also used by hearing individuals, such as those unable to physically speak, or those who have trouble with spoken language due to a disability or condition (augmentative and alternative communication).

5. HARDWARE

A. Arduino Board

Arduino is an open source platform based on simple microcontroller board. The controller used in the device is Arduino duemilanove with inbuilt Atmega328P in it. Atmega328P has 32KB on-chip flash memory for storing codes of which 2KB used for boot loader. It also includes a 2KB of SRAM and 1KB of EEPROM. The program that is developed is to be stored on the flash memory of the controller. The Arduino software also includes a serial monitor which allows data to be sent to or from the Arduino board.

B. Flex Sensor

One of the most important components used on our device is the Flex Sensor. The angle of angle from the curve takes up the measurement when it bends. It is commonly used in areas such as robotics, gaming (virtual motion), medical devices, computer particulars, musical instruments, physical therapy, simple construction, and la profile. It has two types of shapes. One in 2.2 inches and the other is 4.5 inches. It has a temperature range of -35 ° C to + 80 ° C. Flat resistance is about 25K oz and resistant tolerance is about 30%. It is bend resistance range from 45K to 125K ohm (depending on the bend radius). The life cycle of these sensors is more than 1 million.

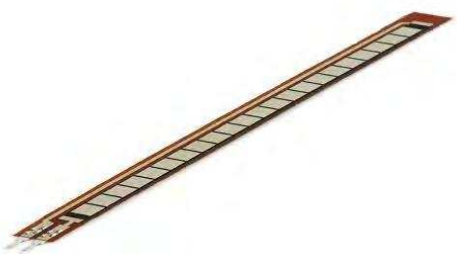

Figure 2: Flex Sensor

6. WORKING & ALGORITHM

There are a total of 5 Flexion (Bend) sensors (for the 5 fingers) used in each glove which are used to detect the movement of joints in fingers and thumb. As the sensor is flexed, the resistance across the sensor increases. Also, a single tri-axial accelerometer is fitted on the back of the palm of each glove so as to capture the orientation of the hands along with the bend angle of the fingers.

Algorithm:

- Start
- Initialize all the devices
- Read the inputs from sensors
- Display it on LCD
- Send it to the android phone
- All the values can be seen from anywhere as it displays on the web page.

7. PROBLEM ANALYSIS & DISCUSSION

While going through the whole process of the project, we faced many difficulties. The major difficulties are discussed in this section. Initially while calibration we figured out those different hands has different values while calibration. So, for every time a new person wears the gloves he has to calibrate once again. We also noticed that, even in case of same hand the values of calibration are never same. So no matter how many times a person calibrates the accuracy in value will not be satisfactory. This is a major drawback of it. Moreover, every individual has different size and shape of hand. So we have to make separate gloves for separate persons as the flex will not be in the correct position and will not bend in the similar ways in case of different size of hands. Another problem that we faced is that, the value of the sensor is never completely stable. And again, the Gloves flexibility is also not stable. It is either more or less rigid while wearing depending on the hand. But if we attach glue with it its flexibility changes. These are the drawbacks related to gloves. Now in case of sensors we faced some major difficulties. The sensors are not reliable. They used to get broken very easily. The metal shouldering of the flex sensors created immense problem as it broke down after getting slightest pressure. Moreover, the sensors are very expensive and the qualities of the sensors are not up to the mark.

8. CONCLUSION

By using this proposed system we can make the disabled deaf and dumb people to be interactive to our environment. It helps need of person who is monitored continuously 24x7 with the help of human power. And also the patient can access their needs in a time without any struggle in conveying their thoughts. This helps them more with ease and it takes away the need of continuous monitoring. By implementing these they can feel free to share their needs and requirements in time and without any struggle and delay. It eliminates the need of a person at all times.

ACKNOWLEDGEMENT

I am grateful to all faculty members and staff of EC Department, IEJU, Gwalior. I express my special thanks to Mrs. Neetu Sikarwar, HOD, Department of Electronics & Communication Engineering for their assistance.

REFERENCES

[1]. S. N. Pawar, D. R. Shinde, G. S. Alai and S. S. Bodke, "Hand Glove To Translate Sign Language," IJSTE - Internationof Science Technology & Engineering, vol. 2, no. 9, 2016.

[2].M. G. Kumar, M. K. Gurjar and M. S. B. Singh, "American Sign Language Translating Glove using Flex Sensor," Journal of Interdisciplinary Research (IJIR), vol. 2, no. 6, 2016.

[3]T. Arsan and O. Ülgen, "SIGN LANGUAGE CONVERTER," International Journal of Computer Science & Engineering (IJCSES), vol. 6, no. 4, 2015.

[4]World Health Organization, "Deafness and hearing loss," February 2017. [Online]. Available:

http://www.who.int/mediacentre/factsheets/fs300/en/. [Accessed 19 August 2017].

[5]. R. Krishna, S. Lee, S. P. Wang and J. Lang, "Cornell University,"[Online].Available:

http://people.ece.cornell.edu/land/courses/ece4760/FinalProjects/s2012/sl787_rak248_sw525_fl229/sl787_rak248_[Accessed 19 August 2017].

[6]. "Arduino Mega," Arduino, [Online]. Available: https://www.arduino.cc/en/Main/ArduinoBoardMega. [Accessed 2017].

[6]. "Arduino Mega," Arduino, [Online]. Available: https://www.arduino.cc/en/Main/ArduinoBoardMega. [Accessed 2017].

[7]. Christian Gehrmann, Mohamed Ahmed Abdelraheem,"IoT Protection through Device to Cloud Synchronization", Cloud Computing Technology and Science (CloudCom), 2016 IEEE International Conference ,12-15 Dec. 2016.

[8]. Akshay Kumar,Nanjangud C. Narendra, Umesh Bellur,"Uploading and Replicating Internet of Things (IoT) Data on Distributed Cloud Storage", Cloud Computing (CLOUD), 2016 IEEE 9th International Conference, 27 June-2 July 2016