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Design and Implementation of Smart Gloves with Jacket for Seamless Communication among the Deaf and Mute People

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ABSTRACT: Deaf-mute people use sign language, while regular people use sound language. The majority of the time, non-deaf people does not understand sign language used by deaf-mutes. There is a gulf between normal people and deaf-mute people, and communication is difficult. The aim is to recognize sign language and translate it to sound language, bridging the communication gap between deaf-mutes and the wider community. An Arduino-based sign-to-speech conversion framework will be presented in this paper. Flex sensors and microcontroller boards will be used in the proposed method to recognize the hand/figure motion and then convert it to sound.

KEY WORDS: a sign language (ASL), International conference on smart and electronic and communication (ICOSEC), Liquid crystal display (LCD), International research journal of engineering technology (IRJET)

I. INTRODUCTION

Sign language may be a natural method of communication between traditional and deaf-dumb folks. Linguistic communication is usually enthusiastic about hand gesture recognition. A gesture is also outlined as a movement, sometimes of hand that expresses a thought. Linguistic communication may be an outlined method of conveyance within which each word or alphabet is delegated some gesture. It's generally difficult for traditional folks to acknowledge the signs properly and perceive what they require to mention. For instance, allow us to take into account a situation within which a traditional person desires to speak with an individual United Nations agency is hearing impaired and he's far from him, then the person cannot speak to him/her simply. The planned work relies on a system which will perceive the linguistic communication accurately in order that the deaf-dumb folks may communicate with the final folks while not the requirement of associate interpreter. By implementing

this planned system these disabled communities become freelance in life in order that they will even be a district of this growing digital world.

In a world where communication is an integral part of daily life, it is essential that everyone, regardless of their abilities or disabilities, can express themselves and interact with others effectively. For individuals who are deaf or mute, the traditional modes of communication, such as spoken language and written text, may not fully address their needs. However, advancements in technology have opened up new possibilities, giving rise to innovative solutions like smart gloves and jackets designed to facilitate seamless communication for the deaf and mute community.

These ground breaking wearable harness the power of emerging technologies, including sensor technology, machine learning, and wireless connectivity, to bridge the communication gap that individuals with hearing and speech impairments often face. By recognizing sign language gestures and converting them into spoken language or text, these smart gloves and jackets offer a means for deaf and mute individuals to express themselves, engage in conversations, and connect with the world in ways that were previously challenging or inaccessible.

This exploration delves into the transformative potential of smart gloves and jackets tailored for individuals with hearing and speech impairments. It highlights the key features, functionalities, and benefits of these innovative wearable's, shedding light on their role in promoting inclusivity, empowering individuals, and enhancing their quality of life. As we delve deeper into the technological intricacies and real-world applications of these assistive devices, it becomes evident that they not only facilitate communication but also represent a significant step towards a more inclusive and equitable society.

II. LITERATURE SURVEY

1. Development of Sign Language using Flex Sensors, Ajay Suri; Sanjay Kumar Singh; Rashi Sharma; Pragati Sharma; Naman Garg; Riya Upadhyaya, 2020 International Conference on Smart Electronics and Communication (ICOSEC). Sign Language is not familiar to those who are not deaf or dumb. When humans talk to each other, they convey their words through both speech and gestures. For a deaf and dumb individual, it is really difficult to lead a normal life with such a big communication barrier. This affects their social life as well as relationships. So, this framework is developed to assist them and help them in conveying their message easily. The creation of such a device involves both electronics and computer engineering knowledge. It will include flex sensors, Arduino, Bluetooth module, accelerometer, glove and an android application to display the results. The framework plans to reduce the communication barrier between a normal individual and a deaf/dumb individual. Also, the aim is to realize the gaps and options available in this field to further improve the framework.

2. Sign Language to Speech Conversion Using Arduino, Yash Jhunjhunwala, Pooja Shah, Pradnya Patil and Jyoti Waykule, Sou. Sushila Danchand Ghodawat Charitable Trust's Sanjay Ghodawat group of Institutions. A huge population in India alone is of the dumb and deaf people. So, the system is working on a glove-based device which will be used for conversion of sign language (ASL) to speech. The basic system consists of two parts; sign language recognition and conversion to text and further to speech. The sign language glove consist of a simple hand gloves fitted with flex sensors which is being used for the monitoring the amount of bend on the fingers. Flex means bend, this is the sensors that change the resistance depending on the amount of bend on the sensor. Data from the sensors is send to the Control unit which is the Arduino Nano the analog signals from the sensors are digitally converted and compared with the stored value for the recognition of sign and then displayed as a text on the 16x2 LCD. Further the text output is wirelessly transmitted to a cellular phone or a PC which consist of a test to speech conversion software. Currently we are working on a simple prototype that will convert the basic Alphabets and numeric which will be further extended for recognition of words.

3. Sign Language to Speech Conversion Gloves using Arduino and Flex Sensors, Mali Pooja Dadaram, Gosavi Deepali Balu, Sonawale Rutuja Ramesh, Prof. S. N. Wangikar, Student's of Department of Electronics and Telecommunication; Dr. Daulatrao Aher College of Engineering, Karad, Tal- Karad, Dist- Satara, Maharashtra, International Research Journal of Engineering and Technology (IRJET). -In general, deaf people have problem in communicating with other people, who unable understand sign language. Even those who do speak aloud typically have a "deaf voice" of which they are self-conscious and they can make them reticent. The Hand Talk glove is a normal cloth driving glove fitted with flex sensor. The sensor output a stream of data that varies with degree of bend made on the sensor. They convert the change in bend to electrical resistance, the more the bend, more the resistance value. The output from the sensor is converted to digital and processed by using controller (Arduino UNO) and then it responds in the voice using speaker. In this project we have used a controller (Arduino UNO), LCD display (16X2), flex sensor, power supply and Voice module, Bluetooth Module (HC-05). Software used is Arduino IDE, Bluetooth DTS (Android Application), embedded 'c', Express PCB and ISP.

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III. BLOCK DIAGRAM

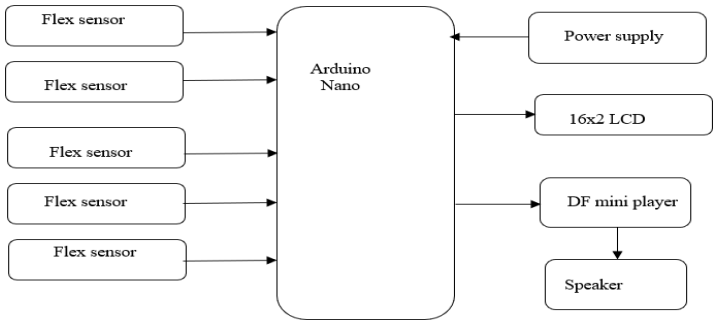

Figure 1. Control Unit Block Diagram.

The figure shows the basic circuit diagram of flex sensor. Using flex sensor, we measure the change in resistance Motion Sensors (Flex Sensor) - The flex sensors are the sensors that change in resistance depending upon the amount of bend on the sensor. They convert the change in bend to electrical resistance. They can be unidirectional and bidirectional available in thin strip form. 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 has the length from 1 inch to 5 inch i.e., near about 73mm in length and 6.35mm in width. The resistance of the flex sensor varies above or below 550Ω. The main difference between unidirectional flex sensor and bidirectional flex sensor is that, as the unidirectional flex sensor is bent, the resistance increases, while when a bidirectional flex sensor is bent, the resistance decreases. At rest or 00 bend, the resistance of the unidirectional flex sensor is 10KΩ.As it is further bent at 450, the resistance increases according to the bent. At 900 bents, the resistances of the unidirectional flex sensor range from 30KΩ to 50KΩ.

IV. SIMULATION DESIGN

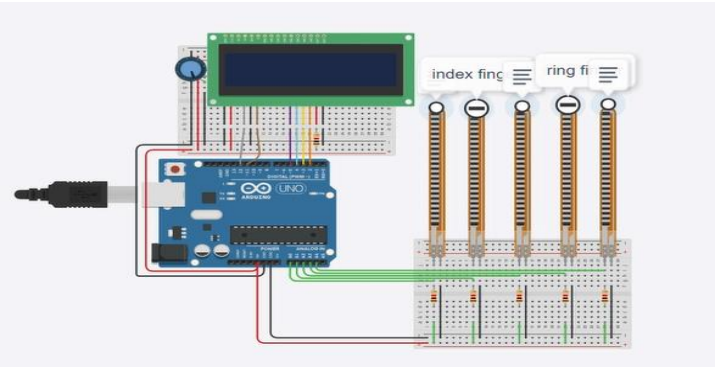

Fig. 2: Simulation diagram.

Flex sensor motion and making sign-

In this case by moving flex sensors, we try to make or create sign. After that output of sensor going to input side of Arduino and Arduino nano will making command to send signal to 16x2 LCD display.

V. SIMULATION RESULT

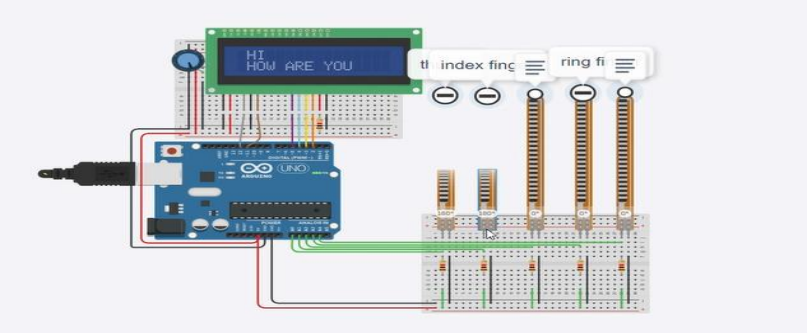

Fig 3. Simulation result

Case 1 Output of Sign converted and display through LCD-

In second case we try to convert sign to word. So, when we create sign then microcontroller convert this signal and send to 16x2 LCD words which we want to talk.

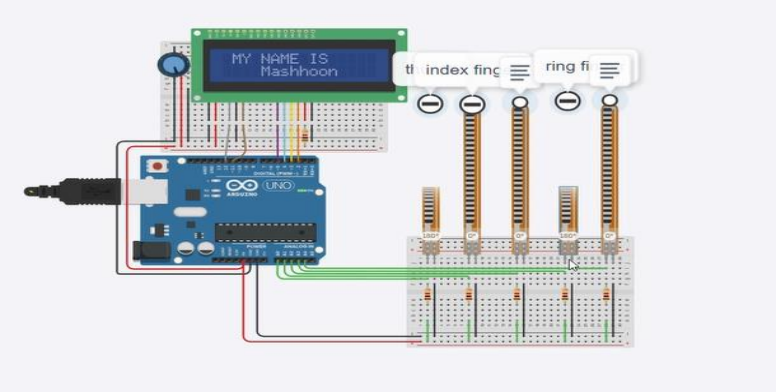

Fig 4. Simulation result

Case 2 Sign language to voice conversion –

In this case we are trying to convert this sign into voice of person. For that we are using DF Mini player. This device use micro SD card to store voice sample of person. When particular sign created then microcontroller point to this voice sample and from speaker that voice is out.

VI. CONCLUSION

Sign language is a useful tools to easy the communication between the deaf and mute community and the normal people. As there is a communication barrier between these communities with normal people. This project is useful for differently abled, speech-impaired and paralyzed patients who cannot speak properly. This work is done to check feasibility of recognizing sign language using flex sensor and displaying the data, which proved to be an efficient system.

VII. ACKNOWLEDGEMENTS

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VIII. REFERENCES

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