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Implementation of IOT Based Sensor Gloves for Impaired People

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Abstract- In the past, the system relied solely on computer vision, requiring the user to stand in front of the camera and make hand gestures so that the system could predict the gesture. The primary concern of today's less intelligent people is how to communicate their ideas to other intellectually challenged people and to other everyday people. In the proposed system, a flex sensor is a piece of hardware that the user can wear in his hand, and the system verifies the gesture based on the reaction. These guidelines will aid such people by providing a means of instruction. Devices like microcontrollers and flex sensors are used to carry it out. Index Terms—Gesture, flex sensor, microcontroller

Keyword :- Gesture, flex sensor, microcontroller

I. INTRODUCTION

There are 9,000 million nearly dumb people on the earth. How often do we hear these people talking to people in the real world? In contrast to correspondence between visually handicapped and typical visual folks, correspondence between a hard of hearing person and a typical person is expected to be a challenging issue. As correspondence is an important aspect of our lives, this creates a very retail centre location for them. Visually impaired people can speak freely using standard language, however hard-of-hearing people who are quiet have their own manual-visual language that is frequently used for communication through gestures. A non-verbal form of intercommunication used by people who have hearing loss worldwide is gesture-based communication. The dialects lack a typical beginning, making them challenging to understand. A device called the Silent Correspondence Mediator translates hand gestures into audible speech for people who have trouble hearing. In sign languages, a motion is a particular development of the hands with a distinctive finger-made shape. Also, consideration is given to the mobility of the looks. On the other hand, a signal is a static shape made by the hand that indicates something. Signal recognition is divided into two main groups, including sensor-based and vision-based. The sensor-based Identify applicable funding agency here. If none, delete this. approach provides greater adaptability. The main goal of this essay is to present a system that can effectively translate American Sign Language (SSL) signs into text and audible discourse. Here, the converter makes use of a glove-based technique that includes flex sensors. The sensors generate a signal for each hand motion done, and after matching it to the hand sign, the controller synchronizes the motion with previously saved SD card contributions. The device interprets letter combinations and may form words using the user's explicit movements.

II.Related Work

Salih Ertug Ovur, , "A novel autonomous learning framework to enhance sEMG-based hand gesture recognition using depth information", Science Direct 2021

• A novel autonomous learning framework was presented to integrate the benefits of both depth vision and EMG signals.
• Combination of depth information and sEMG with HSOM and MNN adopted to achieve better accuracy for the designed VR application.
• A hand gesture recognition demonstration was implemented to verify the effectiveness of the proposed framework.[1]

Xuanyi Zhou and , Wen Qi , "Multi-Features Capacitive Hand Gesture Recognition Sensor: A Machine Learning Approach", IEEE Sensors Journal 2021

• Best Results other than using the sensor for hand gesture recognition
• Error Correction Output Code Support Vector Machines (ECOC-SVM) and K -Nearest Neighbour (KNN) classifiers
• Sensors were used to captures finger capacitance values
• Achieved a classification rate of 97N. [2]

Gopinath, J. Anuja, S. Anusha, V. Monisha, "A Survey on Hand Gesture Recognition Using Machine Learning", International Research Journal of Engineering and Technology 2020

• Provides two-way communication which helps to interact between the impaired people to normal people without any difficulties
• Used CNN algorithm techniques for hand gesture recognition
• NLP was used to feed the data • Best Results other than using the sensor for hand gesture recognition[3].

Rupesh Prajapati, Vedant Pandey, Nupur Jamindar, Neeraj Yadav, "Hand Gesture Recognition and Voice Conversion for Deaf and Dumb", International Research Journal of Engineering and Technology 2018

• K nearest neighbors from the training data. The distance is calculated using n Euclidean Distance.

• Support Vector Machine" (SVM) a supervised machine learning algorithm was used for both classification and regression challenges
• Obtained Accuracy 90 [4].
Omkar Vedak, Prasad Zavre, Abhijeet Todkar, Manoj Patil, "Sign Language Interpreter using Image Processing and Machine Learning", International Research Journal of Engineering and Technology 2019
• 6000 images Database used of English alphabets
• 4800 used for training and 1200 for testing
• Dataset consisted of 26 signs
• SVM techniques used for classification • Obtained Accuracy around 88 [5].
Badri Narayan Mohapatra "Path Guidance System For Blind People"(International Journal of Open Information Technologies ISSN:2307-8162 vol. 7, no.5, 2019. It was very comfort, easy to handle and carefree navigation, also it provides GPS based real time assistance. Raspberry Pi based smart stick provides detection of object and warning back to the blind through buzzer sound. Wide survey of the proposed system will help to decide new approach to the existing system.[6].
Md. Mohsinur Rahman Adnan "Design and Implementation of SmartNavigation System for Visually Impaired"(International Journal of Engineering Trends and Technology (IJETT) – Volume 58 Issue 2 - April 2018) Narrates about the device that helps the blind detect stairs. A pairof sunglasses is used in which ultrasonic sensor, buzzer are fitted to it.It is used to detect the stairs.[7]
Jinqiang bai-"Smart guiding glasses for visually impaired People in indoor environment" (IEEE journal paper, Vol. 63, No. 3, August 2017). Narrates the obstacles detection module which has a ultrasonic sensor,processing unit and buzzer fitted to sunglasses that helps the visually impaired people by detecting obstacles by giving a buzzer sound as output.[8]
Rohit agarwal (2020) "low cost ultrasonic smart glasses for blind"(IEEEconference paper) Proposed a system to assist blind users in their navigation. With the proposed design and architecture the blind people will able to move easily from one place to another without help from other people. Our paper analyzed the existing electronic aids for the blind people. The proposed system was more useful and efficient than the conventional ones. As far as the localization is concerned, it will be able to provide accurate details of the location of the blind person with the help of the GPS if in case s/he gets lost or faces any danger.[9]
S.Gangwar, "A Smart Infrared Microcontroller-Based Blind Guidance System", Hindawi Transactions on Active and Passive Electronic Components,Vol.3, No.2, pp.1-7, June 2013. Designed a smart stick for blind which can give early warning of an obstacle using Infrared (IR) sensors. After identifying the obstacles, the stick alerts the visually impaired people using vibration signals. However the smart stick focused only for obstacle detection but it is not assisting for emergency purposes needed by the blind. And also the IR sensors are not really efficient enough because it can detect only the nearest obstacle in short distance.[10]

III.PROBLEM STATEMENT

The Aim of the project is to develop a hand glove equipped with sensors such as Flex sensor, Accelerometer, Touch sensor which sense different sign language gestures. Flex sensors are placed on fingers which measure the bending of fingers according to a gesture made. An accelerometer is placed on the palm which measures the location of the hand in X, Y, Z axes. Touch sensors are placed in between the fingers and measures if there is any contact between the fingers. Firstly sensors were simulated to extract the sensed data. Secondly the sensed data from sensors is sent to Arduino UNO board for further processing and transfer data to web application The data will be in the form of text. This text data is then converted into voice

IV. OBJECTIVE

• To integrate all sensors
• To work with Arduino pins and configurations
• To handle all command from Arduino to web-based application
• To build automate gesture recognition system

V. SYSTEM ARCHITECTURE

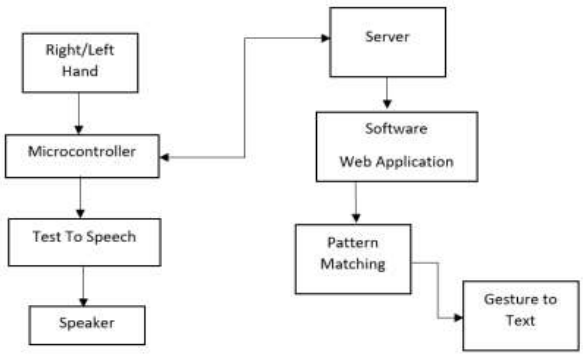

FIG 1.1 SYSTEM ARCHITECTURE

The suggested system has been built via a variety of hardware. The primary controller is an Arduino, and five flex sensors are used to recognize gestures. After the system is set up, the controller receives the output from Flex. It is turned to text by the controller, which also translates the text to speech and delivers the response to the web application. Based on user hand motion, a gesture image is displayed on a page in a web application. The Apache web server and MySQL database are used to communicate between the hardware and the online application. To convert sign language to speech user needs to wear the Gloves which consist of the flex sensors. • When the user makes the hand gesture the

fingers are either folded or may not be folded. • When fingers are folded the value of resistance of flex sensor changes it becomes 30KOhms. • When fingers are not folded the value of resistance of flex sensors is 10KOhms. • These resistance values are used to determine the gesture of hand and text and converted to voice.

VI. ADVANTAGES AND DISADVANTAGES

A. Advantages

1. Requires fewer components so its cost is low.
2. It is economical.
3. It is small in size, due to the small size we can place its hardware on our hand easily.
4. The whole apparatus carries less weight. Hence they are portable and flexible to users.

B. Disadvantages

1. More Additional sensors could be used which would increase the accuracy of the system

VII.RESULT

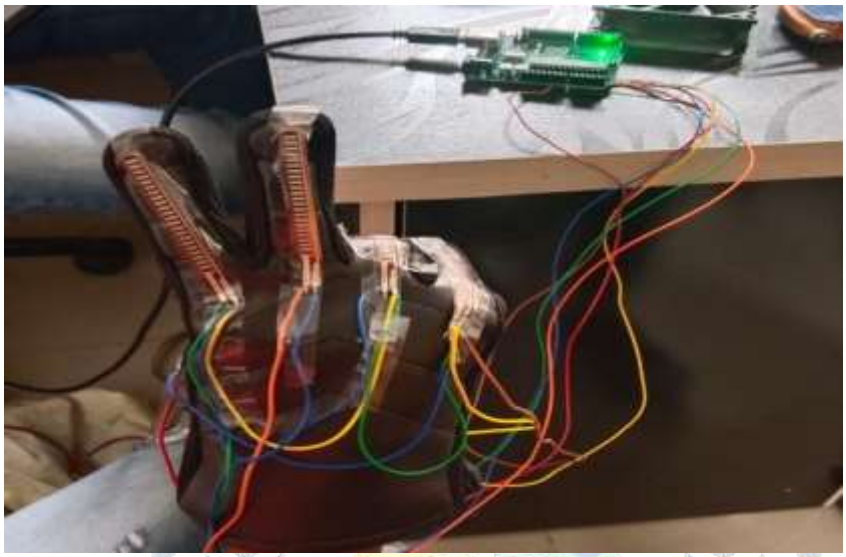

Fig 1.2 Hardware

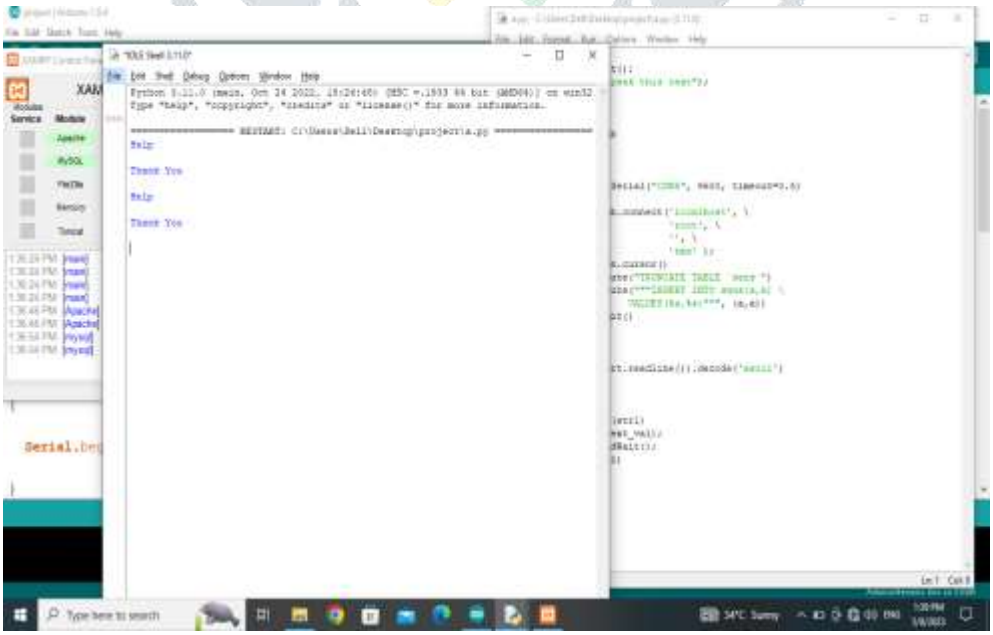

Fig 1.3 Output of Signs

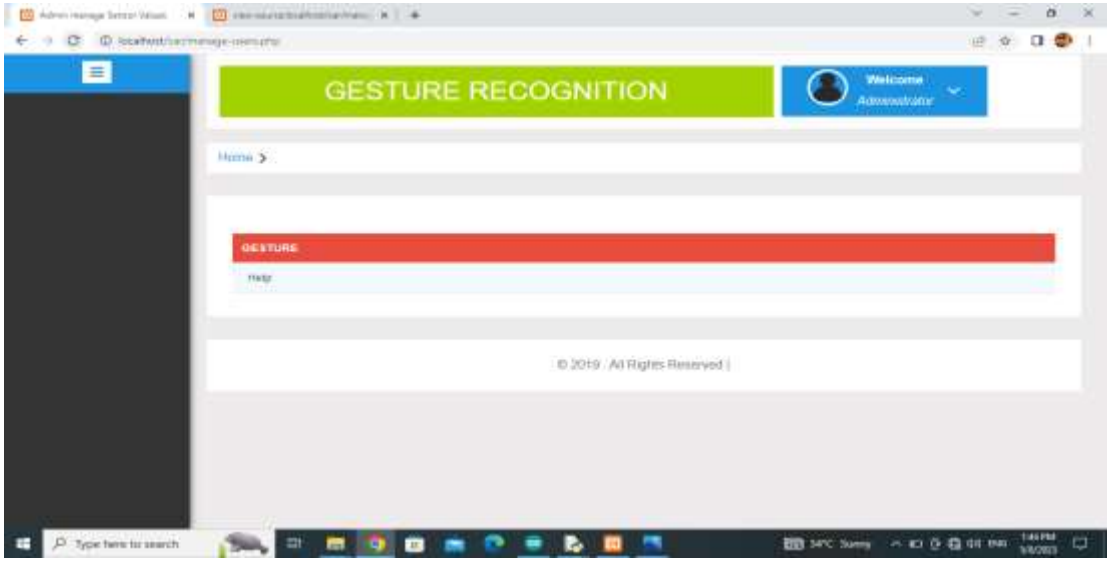

Fig 1.3 Output on Web Application

VIII.CONCLUSION

This paper gives a short about the venture that is helpful for discourse disabled and incapacitated patient. This work was able to meet our expectations quite well. This undertaking was intended to be a model to really look at the possibility of perceiving gesture based communications utilizing sensor gloves. The finishing of this model proposes that sensor gloves can be utilized for partial sign language recognition. More sensors can be utilized to perceive full communication via gestures.

IX.FUTURE SCOPE

The proposed system gives a short about the venture that is helpful for discourse disabled and incapacitated patient. This work was able to meet our expectations quite well. This undertaking was intended to be a model to really look at the possibility of perceiving gesture-based communications utilizing sensor gloves. The finishing of this model proposes that sensor gloves can be utilized for for partial sign language recognition. More sensors can be utilized to perceive full communication via gestures

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