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Gesture Vocalizer Smart Glove for Deaf and Dumb

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Abstract:

This project primarily focuses on communicating with those who can speak and listen by rather than Deaf and Dumb individuals. The communication gap between them can be easily reduced by this project. The device can be loaded with the fundamental and necessary commands to solve the problem. Hand motions are more important than other forms of touches like (arm, face, head, and body) representing the user's perception and with Arduino R3, the hand motion are received as input &processed. The displacement of the hand is determined by the accelerometer, which can comprehend and resolve. Moreover, the Voice Board is placed to convey the message through voice outcome via a speaker and understand it easily.

Index Terms - Arduino Uno R3, Voice board, Communication, Accelerometer, Speaker, Flex Sensor

I. INTRODUCTION

With a global population of 7.6 billion, communication is a powerful tool for understanding one another. But to interact with the rest of the world, people with speech impairments need to learn a special set of abilities known as sign language. They believe it is difficult to interact with the broader public because so many people do not comprehend sign language. The most practical and straightforward means of communication for those who are unable to hear or speak is sign language. The population who are deaf and dumb will be able to communicate with the rest of the world through natural way of noises using this equipment. In Indian sign language (ISL), both hands are used We have designed this disabled assistance glove for a faster and smarter response. There are two types of gesture recognition, namely data glove-based and vision based. Vision-based recognition is not accurate as it has noise disturbance and is difficult to process data. Data glove based is said to have a faster response than vision based. We have proposed a data glove-based approach because the result obtained is accurate and feasible. Based on the movement which is done by the fingers, the flex sensors detect the bend made by the finger and the output is varied in terms of resistance. Due to its flexibility and a large range of resistance, many commands can be fed into it. We have used Arduino uno for more storage and faster response.

II. LITERATURE SURVEY

[1] Smart Hand Gloves enable disabled persons to coexist with these smart gloves enabling them to translate hand gestures into text and voiceovers. This makes it easier for the average individual to comprehend healthy individuals. Since a deaf person cannot communicate, what he is saying and respond appropriately. The ability to operate home appliances is a feature of these smart gloves that enable people with physical disabilities to live independently

[2] Communication plays a vital role for human beings. This project helps in improving communication with dumb people using flex device technology. a tool is developed that may translate different signs as well as Indian language to text also as voice format. The people who are communicating with dumb people might not perceive their signs and expressions. Through language, communication is feasible for a deaf-mute person without the means of acoustic sounds.

[3] Communication between normal people and people with vocal and hearing troubles is a difficult task. The sign language used by these people is not understandable by the common people, so it creates a communication barrier. People who are paralyzed also require assistance regularly. For such people, we have proposed the Implementation of IOT-based Smart assistance gloves for disabled people. The gloves we designed are very simple yet effective when compared to the existing system. With the help of flex sensors, finger gesture is detected.

III. SYSTEM STUDY/EXISTING SYSTEM

In this existing system study, a copper plate is used and placed on the palm as the ground. In the rest position, the copper strips will indicate a voltage level of logic 1. The voltage associated with copper strips and the ground plate will be drained when copper strips and the ground plate come into contact

and will indicate a voltage level of logic 0. And all the components are placed on the glove so it is a little heavy to communicate and flex the sensors. The glove is uncomfortable for long use because the use of a copper plate makes it bulky

3. PROPOSED WORK

In this proposed work, the problem of the previous system is addressed by replacing it with a lighter and more efficient glove. This new glove is designed to transmit functions over all its components, which makes it much easier to use and more comfortable for the user. It also reduces the amount of energy required for operation, allowing for longer periods of use without having to recharge. The new glove is expected to revolutionize how people interact with technology in their everyday lives, as well as provide a more efficient way of doing tasks such as typing or controlling devices. The new system will make use of technology to reduce the weight of the glove while still providing the necessary functions. This will make it easier for users to wear and operate, allowing them to enjoy a more comfortable experience. Additionally, this new system will also help reduce costs associated with manufacturing and distribution due to its lightweight design.

BENEFITS OF PROPOSED WORK

- It is helpful for the Deaf and Dumb Communities
- It is an Easier Way to Communicate with People
- It can be Recorded in their Own Native Language.
- It is Customizable to new Input Values can be given to it.
- Deaf and/or mute people who use the gesture vocalizer glove can converse with others more successfully.
- And people can benefit from the gesture vocalizer glove by becoming more independent in their daily activities.
- People who are deaf or mute may benefit from increased safety thanks to the gesture vocalizer glove. Without using words, they can rapidly and covertly warn others of impending danger or urgent situations by using the glove.
- Deaf and/or mute people who use the gesture vocalizer glove may feel more accepted in social settings. With the glove, they can engage in conversations and social interactions more readily, lessening their social isolation.
- For those who are deaf and/or mute, the gesture vocalizer glove can offer a more organic method of communication.
- Instead of relying entirely on written or typed communication, they can communicate themselves in a way that is more intuitive and familiar by employing hand gestures.

IV. MODULE DESCRIPTION

1 ARDUINO UNO R3

The Arduino Uno is one of the best boards to get started with electronics and coding. Arduino platform is one of the most robust boards you can easily work on it and it has even more updated and more features to the board so it can Process many more executions to the board and responds to them Quickly.

Fig 1 Arduino Uno R3

2 FLEX SENSOR

Flex Sensors are made of resistance of conductive ink, which is used to make flex sensor sensors and varies with the degree of bending. They highlight the transition from bending to resistance. The resistance value of the flex sensor is directly proportional to the sensor's flexing.

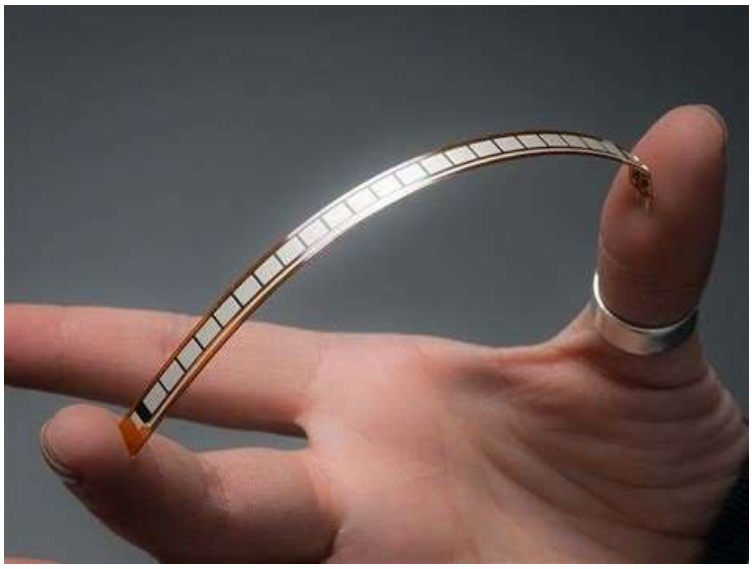

Fig 2 Flex Sensor

3 HAND GLOVE

Four flex sensors are placed along the length of the fingers of a standard hand glove to create the Hand

Glove. Glue or threading is used to affix the sensors to the glove. Hand motions are designed so that the sensors on the glove flex correctly and produce the proper voltage drop for the controller to detect.

Fig 3 Hand Glove

4 ACCELEROMETER MPU -6050

A suitable motion processing module is the MPU 6050 Accelerometer. By integrating a 3-axis accelerometer, 3-axis gyroscope, and onboard digital motion processor that can perform the 9-axis Motion Fusion algorithm onto the same silicon dies. Although each channel has a 16-bit analogue to digital conversion, it is extremely accurate**.**

Fig 4 Accelerometer Mpu 6050

5. VOICE BOARD

The APR33A series was created specifically for the straightforward key trigger. A switch allows the user to record and playback audio messages an average of 1, 2, 4, or 8 times. The sampling rate may also be changed by changing the value of the resistors. It works well with simple interfaces or where the length of a single message needs to be limited, such as in toys, leave messages systems, answering machines, etc.

Fig 5 Voice Board APR33A V2

6 AMPLIFIER SPEAKER 9V

Many describe how to build a speaker. These speakers can be built as size of your palm and as tall as you. Yet, have you ever considered creating a speaker with a 9 V battery? Although it may seem strange, but it is conceivable. A 9V battery can be used to create a speaker with respectable volume and intensity.

Fig 6 Amplifier Speaker

V. SOFTWARE IMPLEMENTATION

5.1 Arduino IDE

The Arduino Integrated Development Environment (IDE) is a software tool used to write and upload code to Arduino boards. It provides a user-friendly interface for coding, compiling, and uploading programs to Arduino boards. The IDE supports the Arduino programming language, which is based on C++ and has a simplified syntax. It also includes a set of libraries that provide pre-written code for common functions, such as controlling LED lights or reading sensor data.. It also has a serial monitor tool that allows you to view and send data to and from the Arduino board.

5.2 Flex Sensor

System hardware to read the analog signal from the flex sensor, configure the necessary hardware peripherals and attach the sensor to a microcontroller. For instance, you must configure the ADC registers if you are using an ADC to convert an analog signal to a digital one.

Identify commands Decide the instructions you want the flex sensor to interpret. For instance, you might want to distinguish between different levels of flexion as instructions or identify particular gestures or movements as commands.

5.3 Voice Board

The APR33A V2's capacity to retain audio recordings in distinct paragraphs is one of its standout features since it makes it simple to playback single messages or segments of a lengthier recording. The device's internal command set can be used to individually address and play back each paragraph, which can be up to 180 seconds long.

5.4 Accelerometer MPU -6050

To Set up the necessary hardware peripherals to read the analog or digital signals from the accelerometer by connecting it to a microcontroller. Establish the commands you want the accelerometer to understand. Utilize the accelerometer to get information about each command. As the sensor is moved or positioned in various ways, the acceleration measurements are recorded, and each reading is then connected to a particular command. Utilizing embedded C, implement the command recognition method in your software. To increase the software's accuracy and usability, test it out on various users and in various situations. You can add output functionality to make a command recognized by the algorithm take the desired action once it is functioning correctly.

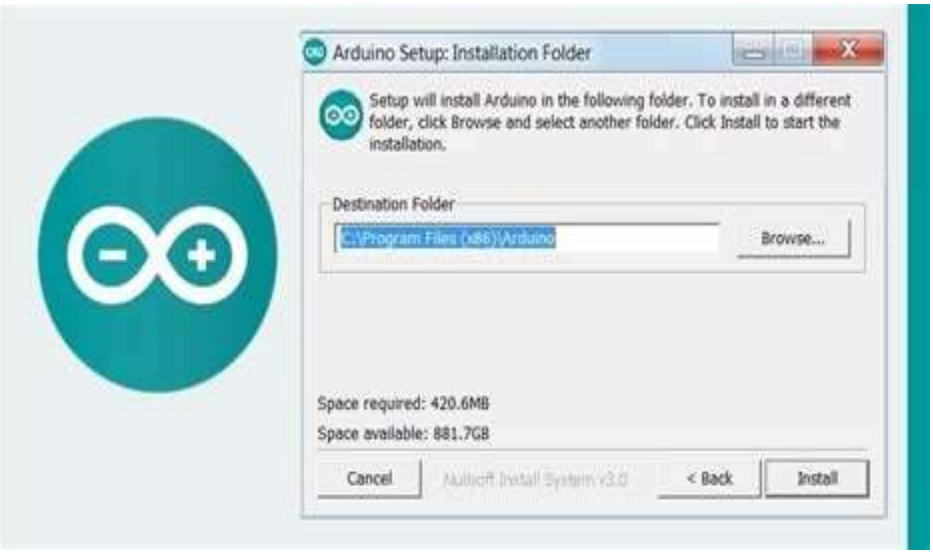

Fig 7 Arduino IDE Software

BLOCK DIAGRAM

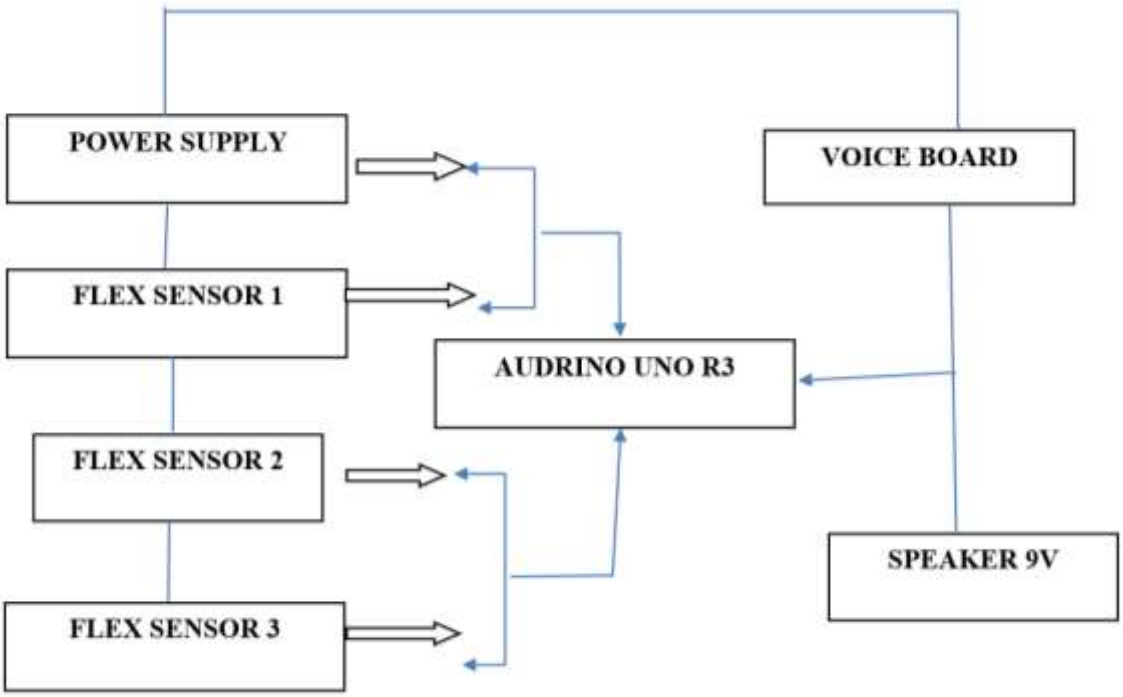

Fig 8 Block Representation Sketch

The Gesture Vocalizer Glove for the Deaf and Dumb is a device that converts hand gestures into spoken words, allowing deaf and mute individuals to communicate more easily. Here is a block diagram explanation of its key components and their functions Flex Sensor: The signals from the gesture sensors are processed by a flex sensor which interprets the gestures and converts them into digital data. Voice Board:: The receiver unit contains speech

synthesis software that converts digital data into spoken words. This may use machine learning algorithms or pre-defined gestures for speech mapping. Speaker: The spoken words are then output through a speaker, allowing the user to hear and understand the message

VII. CIRCUIT DIAGRAM

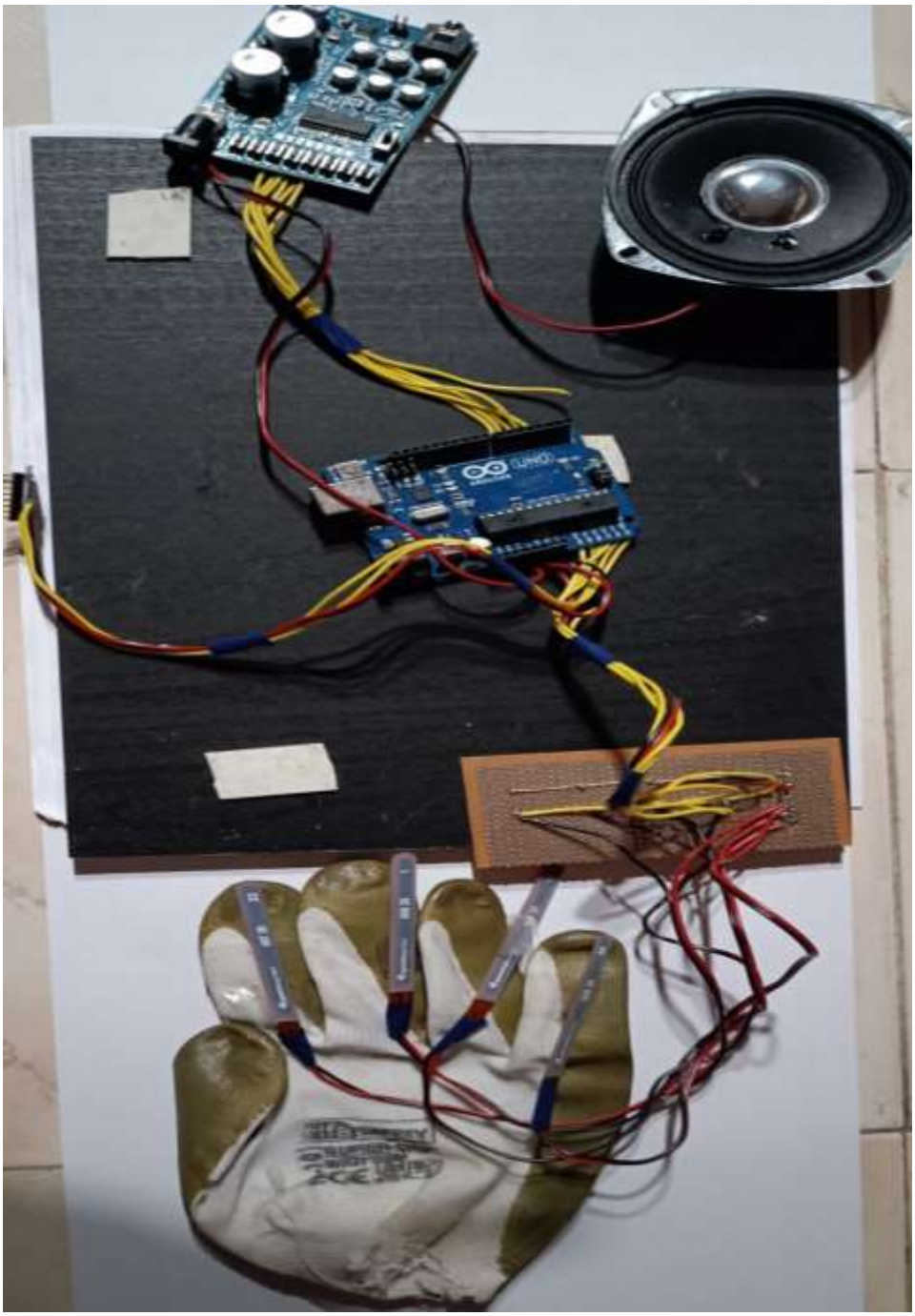

Fig 9 Circuit diagram

VIII. CONCLUSION

The Gesture Vocalizer Glove for the Deaf and Dumb, in conclusion, is a promising tool that has the potential to significantly enhance communication for deaf and mute people. The device can translate hand motions into spoken words using gesture recognition technology and wireless connection, making it simple for users to communicate with others. Although the technology is still in its infancy, it represents a tremendous advancement in the field of assistive technology and has the potential to greatly enhance the quality of life for deaf and mute people**.**

IX. FUTURE SCOPE

In the future, we can improve this suggested model by adding the most possible commands. The data-based approach can be improved with speech recognition by using AI. We can effectively control a variety of fundamental functions for home automation, such as turning on and off appliances, by employing a variety of gestures.

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