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FLEX SENSOR INTEGRATED HAND GLOVE TO ASSIST MULTI-DISABLED PEOPLE

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Abstract- *When it comes to listening and communicating with multi-disabled people, sign language is the only way to communicate. Sign language is used as a first language by around 80% of deaf, blind and dumb people. We propose a flex sensor integrated hand glove that makes sign language accessible to all. Multiple flex sensors made up of "bend-sensitive resistance components" are integrated in to glove's surface. Internal flex sensors create a proportional change in resistance of different elements for each particular gesture. The text is received from hand glove via a wireless communication device and an Android cell phone app is used to convert text to speech. The outcome of the glove is also displayed in LCD display for visual communication. Vibrators are also used to recognize finger movements through touch. Data to be transmitted will be identified based on valid finger movements. As a result, the output is also spoken out by a mobile device as well as displayed in LCD screen.*

Key Words: *Multi-disabled, Flex sensor, Hand glove, Text to speech.*

1. INTRODUCTION

Aristotle was the first to recognize the importance of sign language in the fifth century BC. In western cultures, sign language has been recorded since the 17th century. Different regions of the world have different sign languages, just as they do with other languages. ASL stands for American Sign Language. BSL stands for British Sign Language.Hindus were relocated to west Bengal during the 1947 partition, while Muslims were relocated to east Bengal (Bangladesh). As a result, it developed two distinct sign languages: WBSL for West Bangla and BaSL for Bangladesh. The World Federation of the Deaf (WFD) estimates that over 70 million deaf and mute people use sign language as their first language in 2014.They number 2.6 million in Bangladesh. As a result, their proportion is 1.733 percent. American Sign Language (ASL) is the easiest of all the languages to understand. As a result, we created a device that allows anyone to understand ASL. We chose a project that will assist a community of individuals who are unable to listen and talk in the same way that other people do. This initiative makes it easier for certain individuals to engage with the general public. This project includes not only a theoretical method, but also a prototype that can be used in the real world.

2. MOTIVATION TOWARDS THE WORK

It is really so hard for normal people to understand what multi-disabled people want to say. Normal people do not understand what they are saying. For their disabilities, they are almost ignored in our society. But we believe they can contribute to our society. We try to solve this problem for multi-disable peoples.

3. LITERATURE SURVEY

A variety of potential solutions have been discovered by several researchers. Bhatti et al [2] created a hand glove that can display text on an LCD display through a computer interface and uses a PIC 18F8680 microcontroller with a DC power supply rather than a battery. Edin et al [3] created a robotic hand that can grasp and raise various objects. Wald [4] created tools for deaf and hard-of-hearing people to edit automatic speech recognition in real time. Simone and colleagues [5] devised a low-cost system for measuring hand and finger range of motion. Zhao et al [6] developed a prosthetic hand with five fingers.

4. PROPOSED SYSTEM

The proposed project involves converting finger movement into meaningful information. This information is communicated via a wireless communication device such as Bluetooth and an Android cell phone app is used to convert text to speech. The outcome of the glove is also displayed in LCD display for visual communication. Vibrators are also used to recognize finger movements through touch. Data to be transmitted will be identified based on valid finger movements. As a result,

the output is also spoken out by a mobile device as well as displayed in LCD screen.

A. HARDWARE REQUIREMENTS

- Arduino uno
- LCD
- Flex sensors
- vibrators
- Bluetooth module
- Power supply

B. SOFTWARE REQUIREMENTS

- Arduino software
- Embedded c

C. BLOCK DIAGRAM

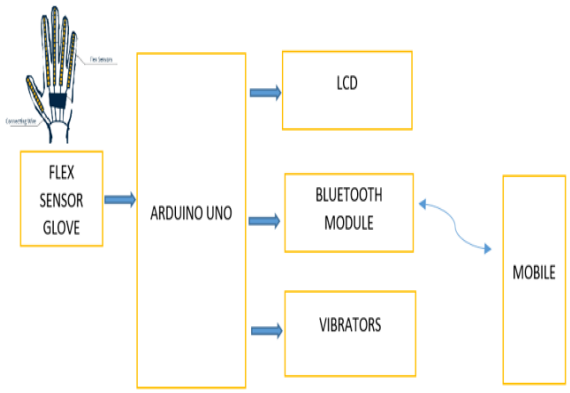

Fig. 1 Block diagram of proposed system

D. COMPONENT DESCRIPTION:

ARDUINO UNO:

- The Arduino uno is a microcontroller board based on the ATmega328P.
- It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, 1 UART (hardware serial port), a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button.
- It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

Fig. 2 Arduino UNO

LCD DISPLAY:-

- LCD display module with YELLOW Backlight
- Operate with 5V DC
- SIZE : 16x2 (2 Rows and 16 Characters Per Row)
- Can display 2-lines X 16-characters Wide viewing angle and high contrast.

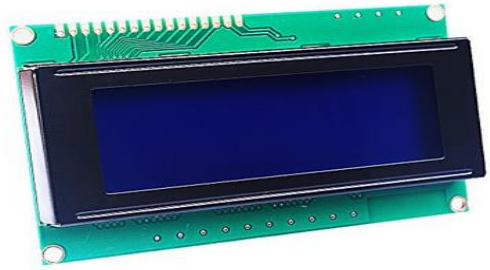

Fig. 3 16*2 LCD DISPLAY

FLEX SENSOR:-

Flex sensors usually come in two sizes. One is 2.2 inches long and the other is 4.5 inches long. Despite the differences in scale, the basic function remains the same. They're also split up by opposition. There are three forms of resistance: LOW resistance, MEDIUM resistance, and HIGH resistance. Depending on the situation, we have to choose the appropriate sensor.

Fig. 4 Flex sensor

VIBRATOR:-

When enough power is applied to a vibration motor, it vibrates. It's a shaky engine, to be sure. It works well with vibrating objects. It can be used in a variety of devices and serves a variety of functions. Cell phones, for example, are one of the most popular vibrating objects. When put in vibration mode, they vibrate when called.As a result, vibration motor circuits are extremely useful and practical, with a wide range of applications. It's very simple to make a vibration motor vibrate.

All we have to do now is connect the two terminals and apply the necessary voltage. A vibration motor normally has two terminals, one red and one blue. For engines, polarity is irrelevant.So if we connect 3 volts across its terminal, it will vibrate really well, such as shown below:

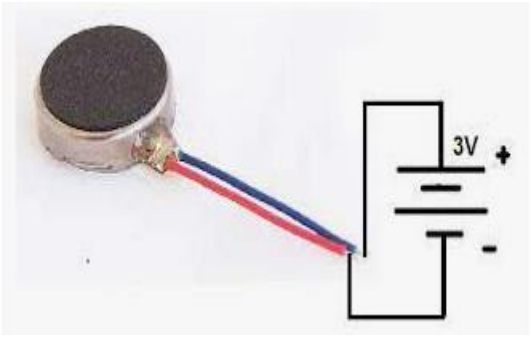

Fig. 5 vibrator

HC-05 BLUETOOTH MODULE:-

- The HC-05 is a Bluetooth module that is used to communicate wirelessly. This module can be used as either a master or a slave.
- It's used in a variety of consumer products, including wireless headsets, game controllers, wireless mice, wireless keyboards, and more.
- It has a range of up to 100 metres, depending on the transmitter and receiver, as well as the atmosphere, geographic, and urban conditions.
- It communicates with computers using serial communication. It uses a serial port to connect with the microcontroller (USART).

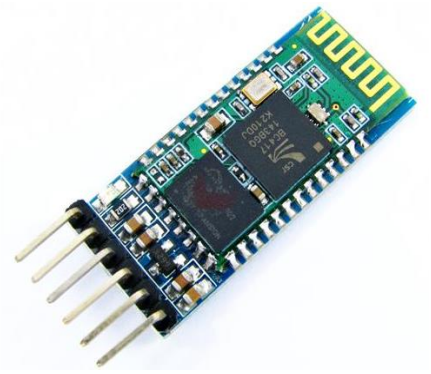

Fig. 6 Bluetooth module

SOFTWARE:

The Arduino Integrated Development Environment - or Arduino Software (IDE) -contains a text editor, a message field, a text console, a toolbar with buttons for common functions, and a set of menus for writing code. It communicates with the Arduino and Genuino hardware by connecting to them and uploading programmes.Sketches are programmes created with the Arduino Software (IDE). These sketches were created in a text editor and saved with the .ino file extension. Cutting/pasting, as well as searching/replacing text, are all available in the editor.

The message area shows errors and provides input when saving and exporting.The Arduino Software (IDE) outputs text to the console, which includes complete error messages and other information. The designed board and serial port are shown in the window's bottom right-hand corner. You can use the toolbar buttons to verify and upload programmes, as well as to create, open, and save sketches and to open the serial monitor.

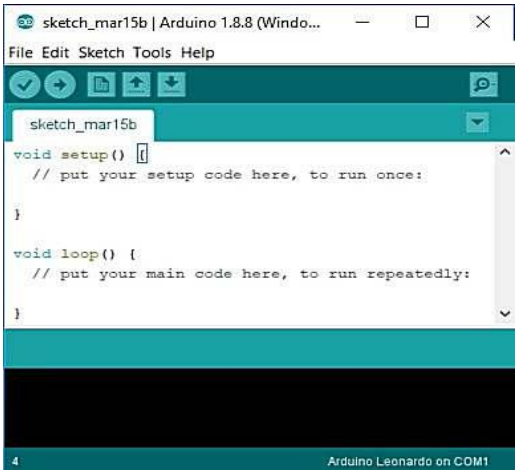

Fig. 7Arduino IDE

5. WORKING ALGORITHM:

Step 1: Internally, the glove is fitted with four flex sensors. The flex sensor generates a proportional change in resistance for each particular gesture.
Step 2: The Arduino uno Board, a more advanced version of the microcontroller, is used to process these finger movements.
Step 3: The processed information is text equivalent of received data from hand glove which is further transmitted via a wireless communication device and an Android cell phone app is used to convert text to speech.
Step 4: The outcome of the glove is also displayed in LCD display for visual communication. Vibrators are also used to recognize finger movements through touch and also spoken out by mobile speaker.

6. ADVANTAGES:

- Easy to communicate
- Portable device
- Less weight
- Low power consumption
- Easy to use

7. RESULTS:

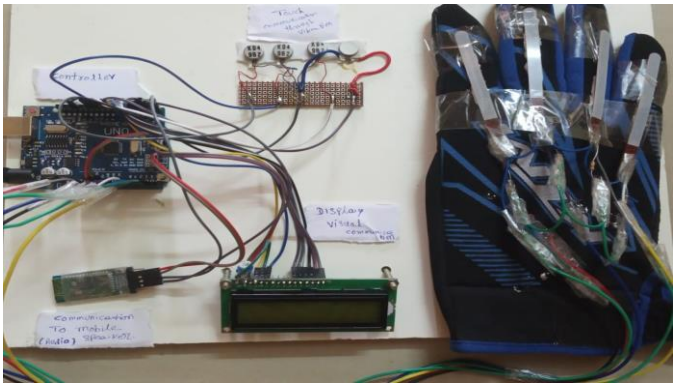

Fig. 8 Figure showing hand glove, controller and other peripherals required for communication.

Fig. 9 Figure illustrates some of the Gestures made using hand glove

Fig. 10 Figure showing waiting for message in LCD when there is no specific gesture made with glove

Fig. 11 Figure showing "I AM FINE" message for specific gesture

Fig. 12 Figure showing "DANGER" message for specific gesture

Fig. 13 Figure showing "HOW ARE YOU" message received from wireless module

8. CONCLUSION:

We face various challenges during this project. We tried to keep the issue to a minimum. Since this was a prototype, our main goal was to create a model that could fix or reduce the communication issue for disabled people.This prototype is intended to improve the quality of life for multi-disabled people. This is also advantageous in terms

of reducing the contact gap between the blind, dumb and the deaf.

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