Talking Hand Gloves

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ABSTRACT

The paper describes an aiding device for the dumb and physically challenged people. Such people are made to wear gloves fitted with flex sensors and tactile switches whose resistance changes with each gesture shown by them. This produces a voltage change and given to the microcontroller which will send the sign language codes corresponding to each gesture to the android app and then sounds the code of sign which is given by hand via speaker. Dumb people normally communicate by means of sign-language. A gesture in a sign language, is a particular movement of the hands with a specific shape made out of them. Gesture Recognition is classified into two main categories, that is vision based and sensor based. The disadvantage of vision- based techniques includes complex algorithms for data processing and requirement of more computing power. But glove-based gesture recognition is simple and user-friendly. It has built in emergency button which can be used by dumb people when they are in panic state.

Keywords— Sign language, Flex sensor, Tactile buttons, Bluetooth HC-05, GSM modem, Gloves, Arduino Uno, Speaker, Text message

1. INTRODUCTION

1.1 Motivation

Communication is the most basic and efficient way to convey one's point. Every individual has the right to communicate irrespective of their condition, that is even impaired people need to communicate to satisfy their basic necessities.

Observing the conditions and noticing the challenges faced by the dumb people or the deafmute people, we have designed this equipment so that to some extent these challenges can be overcome. The challenges faced by the dumb- people are:

- Communication
- Audio results cannot be retrieved
- Cannot understand that is read or write

Out of these challenges, communication is the most important and challenging one. If one cannot communicate there are certain chances that one might take an advantage of the situation and condition. This could bring a negative impact on the person later in the near future. In order to help them that are not to face any kind of such situations we have designed this low-cost efficient model of talking gloves.

1.2 Objective

In this busy world everyone is not accurate. Each and every one faces problems which can be physical or mental. A person facing physical problems, that is if they are impaired, special devices are being implemented to help them as well as normal people to overcome the challenges being faced to communicate. Sign language is the main communication medium for impaired people. It uses gestures instead of sound to elaborate their meaning. So, our project aims to bridge this gap by enabling communication between dumb people on one hand and normal people on the other. To make communication to be easier we have designed this inexpensive electronic device named talking gloves. These talking gloves translate sign language to text and speech as per our needs.

The proposed system will be able to recognize different hand gestures and also through the tactile buttons which have special combinations. These combinations help normal people to understand what they want to speak or convey. In this project we have also designed an emergency button which can be used when they are in any danger and require immediate help. The use of this support device in the communication for a dumb person may give him/her a better quality of life to work in basic situations.

2. LITERATURE SURVEY

[1] Meghana A S, Niveditha M, Prathibha K, Raksha G R, Dr. H C Sateesh Kumar, IRJET, Volume: 06 Issue: 06 | June 2019

In this paper, the proposed device uses synthesized speech for

easy means of communication between speech impaired people and normal people. It consists of a glove that is embodied with flex sensors for making gestures by the user. Based on the gesture made by the user, the flex sensor's resistance values changes and produces a voltage which is in analog form. This voltage is further converted to digital form by using the in-build analog to digital converter of microcontroller Atmega 2560. Predefined gestures with the corresponding messages are put down into the microcontroller in two different languages namely English and Kannada. The user selects one of the two languages before giving any gestures. The microcontroller matches the signal motion with the stored values in the database producing speech signal using APR (Auto Playback Recorder). This is played through the speaker in the language selected by the user at the beginning. For the emergency purpose, this device consists of a GPS module that tracks the user's location and also a GSM module to send a text of the user's location address to the guardian's number stored in the sim.

[2] Prof. Raviprakash Shriwas, Mr. Nitesh Vihirkar, Ms. Kshama Morey, Ms. Nikhita Gulhane IJRASET, Volume 3 Issue IV, April 2015

In this paper, the authors came with this device that mainly consists of two units namely the transmitter unit and the receiver unit. In the transmitter unit, a glove is incorporated with flex sensors. Flex sensors are sensors that produce a change in its resistance value when it is bent. The change in the bend is converted to electrical resistance - more is the bend, more will be the resistance value. The output from the flex sensor is in its analog form which is converted to digital using an analog to digital converter in the microcontroller. This message given by the transmitter is modulated using an encoder and sent to the receiver. Here, the message is demodulated using a decoder and is sent to the voice recorder and the flex deflected output is acquired from the speaker. The transmitter unit is also equipped with an LCD screen which displays a few characters for better understanding.

3. COMPONENTS USED

3.1 Arduino Board

An Arduino microcontroller board can be thought of as a user-friendly, open-source input output system. An input can range from anything from a finger pressing a button to a change in light intensity, and outputs can range from lighting up a simple LED light to sending out a Twitter message.

There are several features of Arduino that truly make it stand out from the rest of the microcontrollers on the market. For example, the software is open source, so you can "look under the hood" so to speak, and is free to download, modify, and re-use (which is always a plus for more advanced developers). Even the basic plans for the Arduino are open source, so users can build their own without having to buy one.

There are several companies that make Arduino boards, too, and you can buy full kits breadboards, wiring sensors, and more. Even fully assembled, Arduino is on the lower end of the cost spectrum, and is compatible with Windows, Mac, and Unix systems. Most importantly for beginners, perhaps, is the fact that the development environment for the Arduino is aimed at people with little to no microcontroller experience, but powerful and flexible enough for experienced users.

There is a great deal of quality information out there to help even the most inexperienced user navigate the Arduino and put it to use in exciting and creative ways. In short, it has made

microcontrollers accessible to everybody, even those with a minimal computer background, regardless of age.
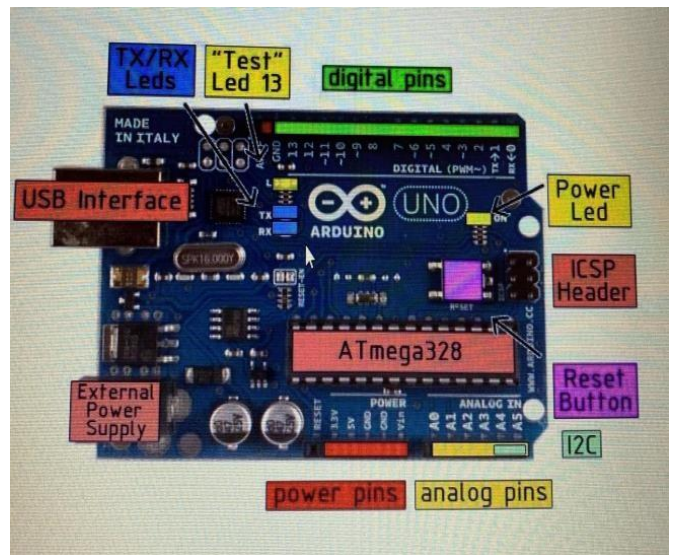

Fig. 1: Arduino Board

3.2 Bluetooth Communication

HC -05 Bluetooth: HC-05 module is an easy to use Bluetooth SPP (Serial Port Protocol) module, designed for transparent wireless serial connection setup. The HC-05 Bluetooth Module can be used in a Master or Slave configuration, making it a great solution for wireless communication. This serial port bluetooth module is fully qualified Bluetooth V2.0+EDR (Enhanced Data Rate)3Mbps Modulation with complete 2.4GHz radio transceiver and baseband. It uses CSR Bluecore 04- External single chip Bluetooth system with CMOS technology and with AFH (Adaptive Frequency Hopping Feature).
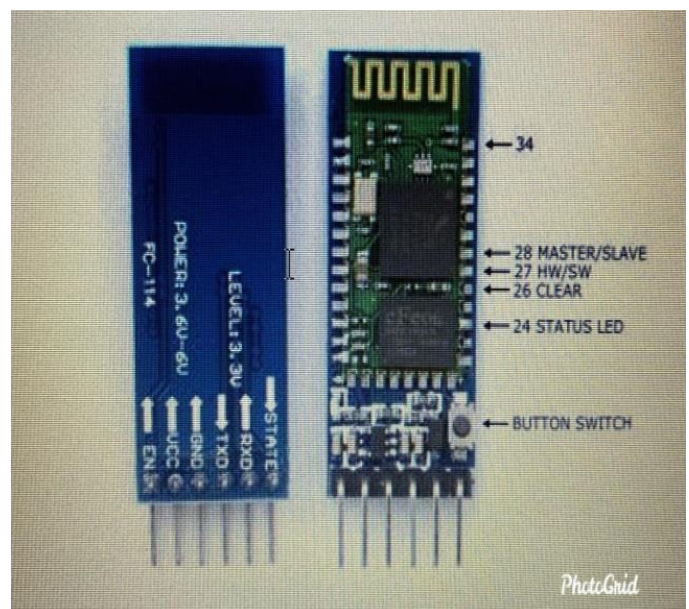

Fig. 2: Bluetooth

3.3 Flex Sensor

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. Spectra Symbol has used this technology in supplying Flex Sensors for the Nintendo Power Glove, the P5 gaming glove.
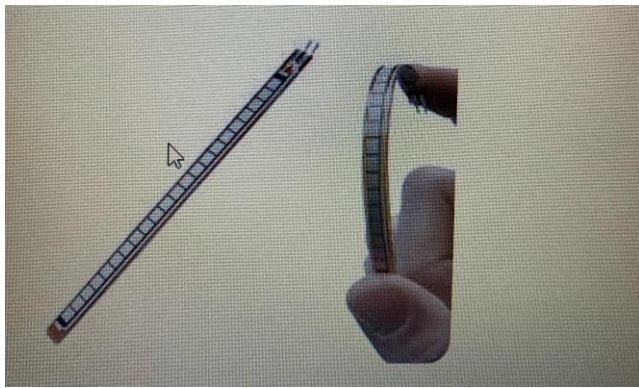
Fig. 3: Flex Sensor

3.4 Tactile switches or buttons

Tact switches are tactile electromechanical switches for keyboards, keypads, instruments or interface control-panel applications. Tact switches react to user interaction with the button or switch when it makes contact with the control panel beneath. A tactile switch is an on/off electronic switch that is only on when the button is pressed or if there is a definitive change in pressure. Another way to consider it, as a momentary make or brake switch. As soon as a tactile switch button is released, the circuit is broken.

Fig. 4: Tactile switch or button

3.5 GSM Modem

A GSM modem is a device which can be either a mobile phone or a modem device which can be used to make a computer or any other processor communicate over a network. A GSM modem requires a SIM card to be operated and operates over a network range subscribed by the network operator. It can be connected to a computer through serial, USB or Bluetooth connection. A GSM modem can also be a standard GSM mobile phone with the appropriate cable and software driver to connect to a serial port or USB port on your computer. GSM modem is usually preferable to a GSM mobile phone. The GSM modem has a wide range of applications in transaction terminals, supply chain management, security applications, weather stations and GPRS mode remote data logging.
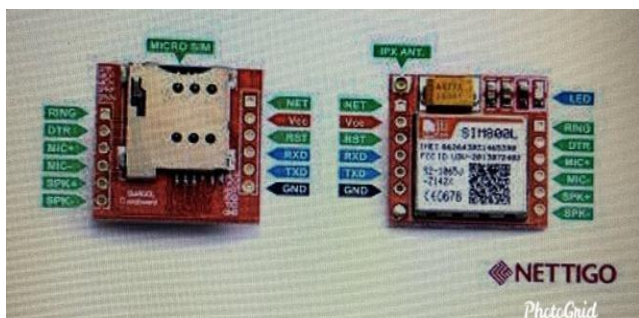

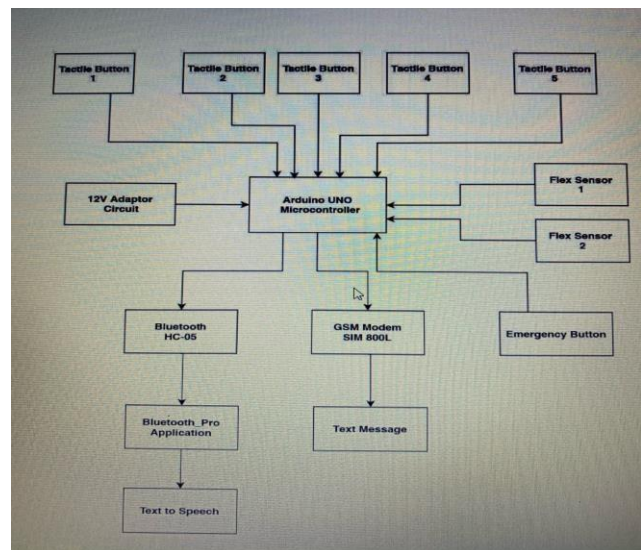**Fig. 5: GSM Modem**

4. DESIGN AND IMPLEMENTATION

Fig. 6: Design

We have used Flex Sensors, Tactile Buttons, Arduino UNO Microcontroller, 12V Adaptor Circuit, Emergency Button, GSM Modem SIM800L, Bluetooth HC-05, Bluetooth_Pro application for the design of this project.

In this project we have given importance to the Tactile Buttons. Instead of using a particular hand gesture for each alphabet, we have designed special patterns for the hand glove that are (1,2) (1,3) (1,4) (1,5) (2,3) (2,4) (2,5) (3,4) (3,5) (4,5) to reduce complexity. The patterns contain some of the basic words which specially challenged people use in their day to day lives. These words corresponding to a particular pattern have been hardcoded. For Example: I'M HUNGRY.

This project is an aiding device for the dumb people. In this version we take inputs from Flex Sensors and Tactile Switches whose resistance changes with each gesture shown by them. This produces a voltage change and is given to Arduino UNO Microcontroller. We have used Bluetooth for sending the text to android mobile, in android mobile we have an application which converts text to speak.

When the buttons are pressed in a corresponding pattern i.e. (1,2) or (1,3) the signal goes to the Arduino board. The Arduino's transmitter pin is connected to Bluetooth's receiver pin. Each of these patterns generate a unique message when Bluetooth HC-05 is paired with Android mobile's Bluetooth. Once paired, the Bluetooth_Pro application will make the sound and will also display the word of the corresponding pattern.

We have also implemented an immediate alert system. The emergency button can be used when the person is in most danger and needs immediate help. When this emergency button is pushed or gently pressed like wisely the signal is processed to the Arduino board. The Arduino's transmitter pin is connected to GSM Modem SIM800L's receiver pin. A message from the SIM in GSM modem is then passed to the registered mobile number. This message alerts the person on the opposite side and hence an immediate action can be taken.

5. APPLICATIONS
Communication between mute people and the normal people.
- Physically challenged people.
- Conveying information related operations.
- If furtherly developed we can use this sign language converter not only for dumb people but also for deaf people. Both deaf and dumb people can use this sign language converter.
- In case of emergency we can use this system to protect one from danger.
- Physically Challenged Job / IT/Corporate employees.

6. CONCLUSION
This project is very useful for dumb people who can communicate with people using hand signs , in this version we take inputs from buttons and flex sensors to compose the sign to text and we have used Bluetooth for sending the text to android mobile, in android mobile we have application which converts text to speak. The employment of emergency button is helpful for the dumb people when they are in panic state.
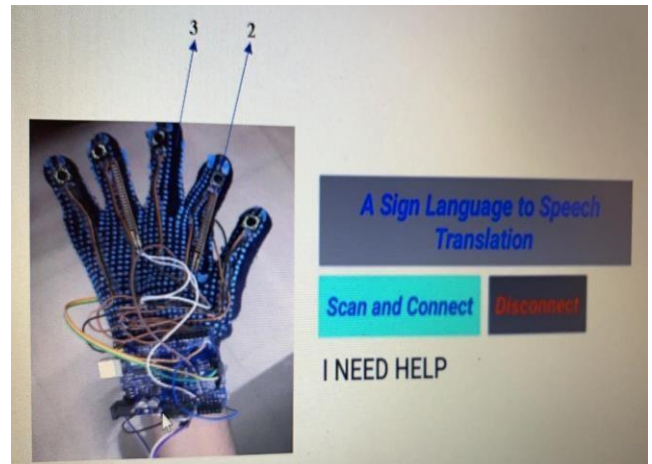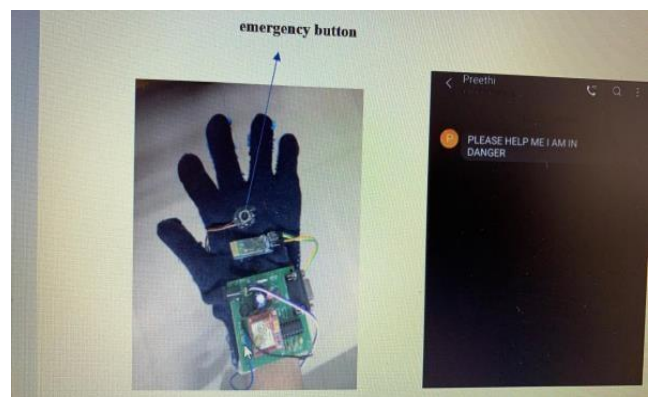
7. TESTING AND DATAFLOW
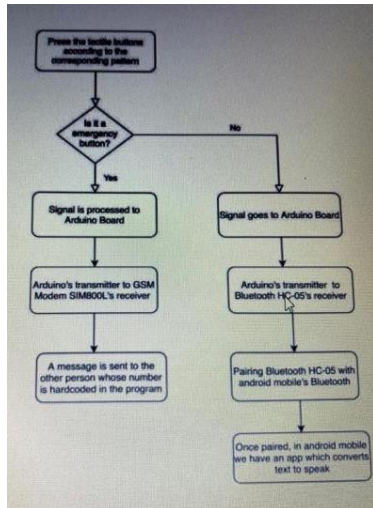
The output obtained on pressing tactile buttons in the pattern of (1,2)
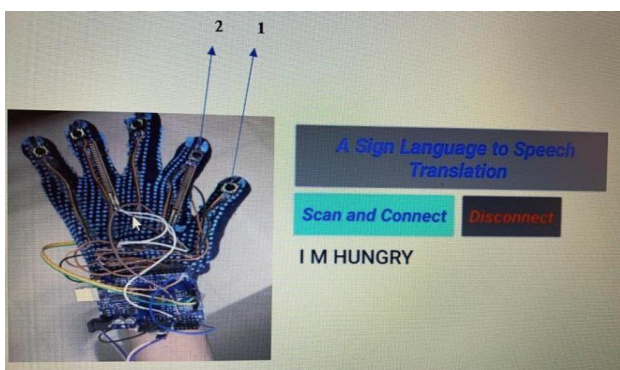
The output obtained on pressing tactile buttons in the pattern of (2,3)

The output obtained on pressing the emergency button:

8. FUTURE SCOPE
Talking hand gloves for dumb people can be developed further such that it can be used by the deaf people. This development can be done by using the concepts of image processing on Raspberry Pi instead of Arduino. Through image processing, we can enable the deaf person to visualize colors for each and every message we would like to convey. For example, when the person is in danger, we can process the colour red so that the deaf person can understand and react accordingly. When they are willing to go out the deaf can process the colour green symbolizing they want to go out. Similarly, for every colour a text message can be developed or identified which would be easy to communicate.

9. REFERENCES
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