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Chapter -1

INTRODUCTION

1.1 Introduction:

Science and technology by way of inventions and innovations has made life easier for everybody in all spheres of life. The project "Sign to Text Converter" is for those people who are either completely or partially deaf. Sign is the most natural and expressive way for the hearing impaired people. People, who are not deaf, never try to learn the sign for interacting with the deaf people. This leads to isolation of the deaf people. But if the computer can be programmed in such a way that it can translate sign to text format, the difference between the normal people and the deaf community can be minimized. Indian sign language(ISL) uses both hands to represent each alphabet and gesture. ISL alphabets are derived from British Sign (BSL) and French Sign (FSL). Most of the researchers in this area concentrate on the recognition of American Sign Language (ASL) since most of the signs in ASL are single handed and thus, complexity is less. Another attractive feature is that ASL already has a standard database that is available for use. When compared with ASL, Indian Sign language relies on both hands and thus, an ISL recognition system is more complex. A few research works carried out by the researchers in the recognition of ISL. Currently, more researchers have started doing research in ISL. Here this proposed system is able to recognize the various alphabets of Indian Sign Language; this will reduce the noise and give accurate result.

The sign language is a language through which communicatiion is possible without the means of acoustic sounds. Instead, Sign language relies on sign patterns, i.e., orientation and movements of the arm to facilitate understanding between people.

This project is a portable Glove based Sign Translator with LCD Display with flex sensors. They are used to sense the movement of fingers to give corresponding input to a microcontroller.

People who are deaf and dumb often tend tofeel uncomfortable around other people, when drawing attention to their hearing problem. Those people wants to be like their friends with good hearing, so this drives a thought in them to mainly keep to themselves and to not take part in activities with those normal people.Sign languages are used by mute people as a medium of communication. Sign languages are used to convey thoughts with symbols, and objects etc. They also convey combination of words and symbols(i.e. gestures). Gestures are different patterns made by the curls and bends of the fingers. Gestures are the best medium for their communication .

Sign language recognition is an important application of gesture recognition. Sign language recognition has two different approaches.

-Glove based approaches

-Vision based approaches

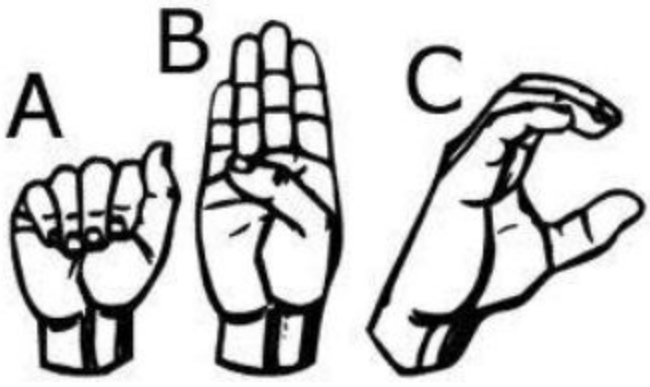

Fig.1: simple gestures

Chapter -2

GESTURE DETECTION SYSTEM

In this system glove is implemented to capture the hand gestures of a user. The gloves are having flex sensors along the length of each fingers and the thumbs. The flex sensors output a stream of data that varies with degree of bend. The analog outputs from the sensors are then fed to microcontroller. It processes the signals and perform analog to digital signal conversion. The gesture is recognized and the corresponding text information is identified. The user need to know the signs of particular alphabetsand he need to stay with the sign for two seconds. There are no limitations for signs it is hard to build a standard library of signs. The new gesture introduced must be supported by the system. These sensors are attached along the fingers and thumb. The degree of bending of fingers and thumb results in the output Of voltage variation, which while converting to analog form, produces required voice. A pair of gloves along with sensors enables mute people to interact with the public.

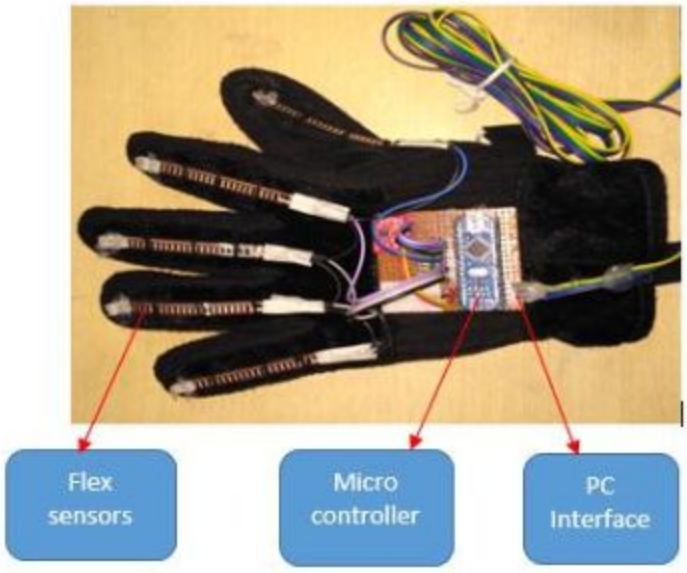

Fig 2.1: Experimental Setup

Chapter - 3

COMPONENTS

3.1 Flex Sensor:-

A **flex sensor** or **bend sensor** is a sensor that measures the amount of deflection or bending. Usually, the sensor is stuck to the surface, and resistance of sensor element is varied by bending the surface. Since the resistance is directly proportional to the amount of bend it is used as goniometer, and often called flexible potentiometer. Flex sensor is used in wide areas of research from computer interfaces, rehabilitation, security systems and even music interfaces. It is also famous among students and Hobbyists.

Fig 3.1: Flex Sensor

3.2. LCD Display:-

The Model JHD 162A Series LCD is the typical standard HD44780 type of LCD with 16 X 2 row LCD module. Since this project the Heart Rate, temperature, adders and contact no to display; therefore, a LCD module is necessary.

Fig 3.2: LCD display

3.3. Arduino:

Arduino/Genuino 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, a 16 MHz quartz crystal, 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 an AC-to-DC adapter or battery to get started. You can tinker with your UNO without worrying too much about doing something wrong, worst case scenario you can replace the chip for a few dollars and start over again. "Uno" means one in Italian and was chosen to mark the release of Arduino Software (IDE) 1.0. The Uno board and version 1.0 of Arduino Software (IDE) were the reference versions of Arduino, now evolved to newer releases. The Uno board is the first in a series of USB Arduino boards, and the reference model for the Arduino platform; for an extensive list of current, past or outdated boards see the Arduino index of boards.

Fig3.3: Arduino Nano

3.4. Potentiometer:-

A **potentiometer** is a three-terminal resistor with a sliding or rotating contact that forms an adjustable voltage_divider. If only two terminals are used, one end and the wiper, it acts as a **variable resistor** or **rheostat**.

The measuring instrument called a potentiometer is essentially a voltage divider used for measuring electric potential (voltage); the component is an implementation of the same principle, hence its name.

Potentiometers are commonly used to control electrical devices such as volume controls on audio equipment. Potentiometers operated by a mechanism can be used as position transducers, for example, in a joystick. Potentiometers are rarely used to directly control significant power (more than a watt), since the power dissipated in the potentiometer would be comparable to the power in the controlled load.

Fig 3.4: Potentiometer

3.5. Jump wires:-

Fig 3.5: Jump Wires

Jump wires (also called jumper wires) for solderless breadboarding can be obtained in ready-to-use jump wire sets or can be manually manufactured. The latter can become tedious work for larger circuits. Ready-to-use jump wires come in different qualities, some even with tiny plugs attached to the wire ends. Jump wire material for ready-made or homemade wires should usually be 22 AWG (0.33 mm^2) solid copper, tin-plated wire - assuming no tiny plugs are to be attached to the wire ends. The wire ends should be stripped $^3/_{16}$ to $^5/_{16}$ in (4.8 to 7.9 mm). Shorter stripped wires might result in bad contact with the board's spring clips (insulation being caught in the springs). Longer stripped wires increase the likelihood of short-circuits on the board. Needle-nose pliers and tweezers are helpful when inserting or removing wires, particularly on crowded boards.

Differently colored wires and color-coding discipline are often adhered to for consistency. However, the number of available colors is typically far fewer than the number of signal types or paths. Typically, a few wire colors are reserved for the supply voltages and ground (e.g., red, blue, black), some are reserved for main signals, and the rest are simply used where convenient. Some ready-to-use jump wire sets use the color to indicate the length of the wires, but these sets do not allow a meaningful color-coding.

3.6. Breadboard:-

A breadboard is a solderless device for temporary prototype with electronics and test circuit designs. Most electronic components in electronic circuits can be interconnected by inserting their leads or terminals into the holes and then making connections through wires where appropriate. The breadboard has strips of metal underneath the board and connect the holes on the top of the board. The metal strips are laid out as shown below. Note that

the top and bottom rows of holes are connected horizontally and split in the middle while the remaining holes are connected vertically.

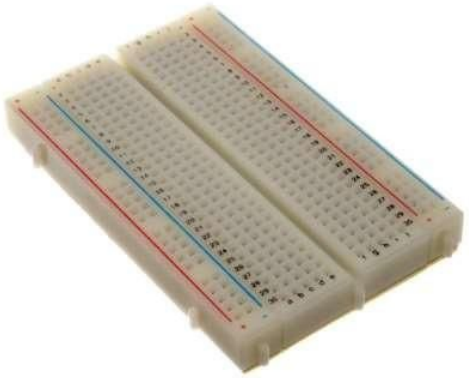

Fig 3.6:Breadboard

3.7. Circuit Diagram:-

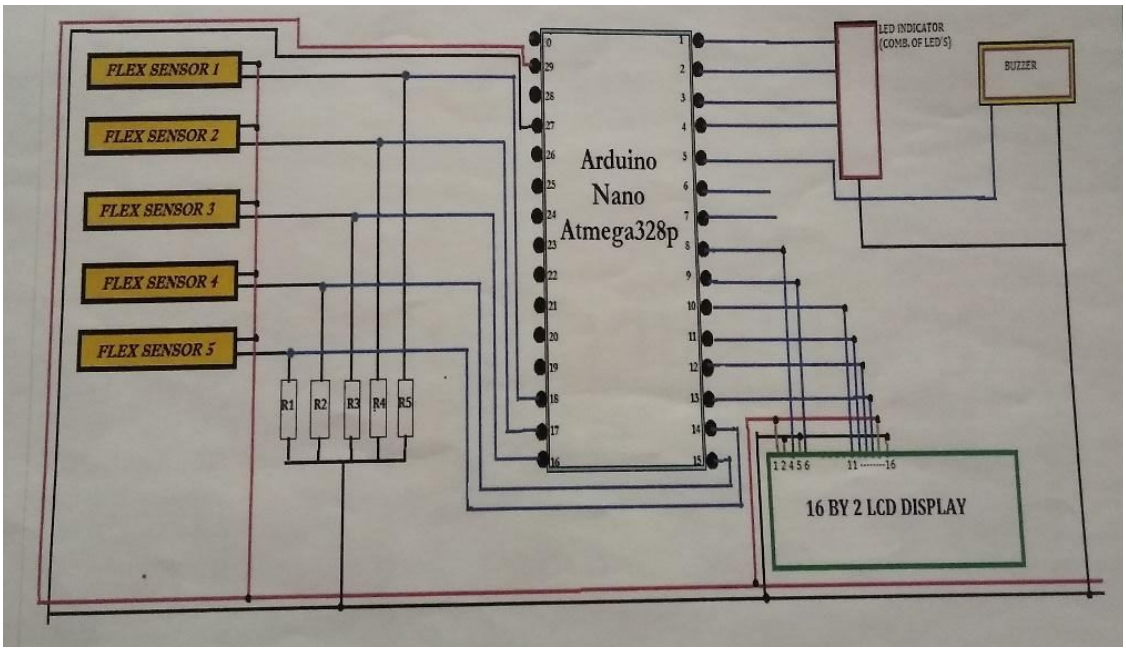

Fig 3.7: Circuit Diagram

3.8. Project Top View:-

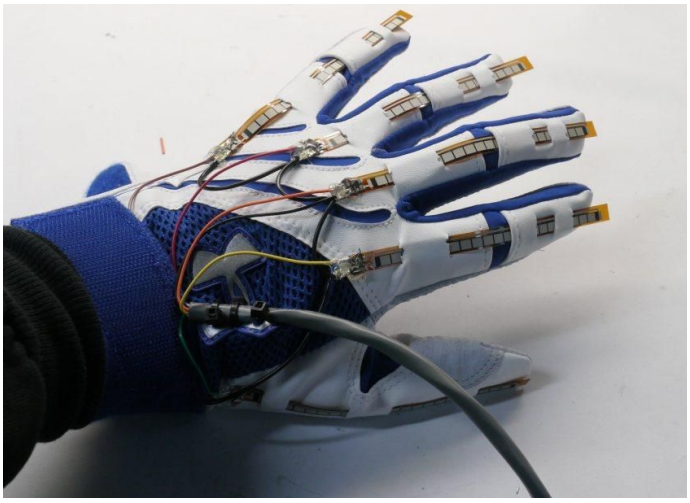

Fig 3.8: Top view of the project

Chapter – 4

CONCLUSION

4.1 Conclusion:

As a sign language is a method to convey the thoughts of Deaf and Dumb people, this system will make that medium more reliable and helpful. Here, the system will convert the sign into text as well as speech, using these Gloves. In order to improve and facilitate the more gesture recognition, we have added the option to add more Gestures into the database.

4.2 Advantages:

· Requires fewer components so its cost is low.

· It is economical.

· It is small in size, due to the small size we can place its hardware on our hand easily.

· The whole apparatus carries less weight. Hence they are portable and flexible to users.

4.3 Future Work:

· In this system, more sensors can be embedded to recognize full sign language with more perfection and accuracy.

· The system can also be designed such that it can translate words from one medium to another.

Chapter – 5

Appendix

```
#include <LiquidCrystal.h>
//const int rs = 12, en = 11, d3 = 4, d4 = 3, d5 = 3, d6 = 2;
LiquidCrystal lcd(7, 8, 9, 10, 11, 12);

void setup() {
  lcd.begin(16, 2);
  lcd.clear();
  Serial.begin(9500);
  pinMode(3, INPUT);
  pinMode(4, INPUT);
  pinMode(5, INPUT);
  pinMode(6, INPUT);
  pinMode(2, OUTPUT);
  lcd.setCursor(0, 1);
  lcd.clear();
}

void loop() {


  if (digitalRead(3) == LOW) {
    if (digitalRead(4) == LOW) {
      if (digitalRead(5) == LOW) {
        if (digitalRead(6) == LOW) {//0000
          lcd.clear();
          lcd.print("      J.A.G.");
          lcd.setCursor(0, 2);
          lcd.print("     M.A.I.T.");
          delay(100);
        }
        else
        { lcd.clear();
          lcd.print("Hello");//0001
          digitalWrite(2, HIGH);
          delay(100);
          digitalWrite(2, LOW);
        }
      }
      else if (digitalRead(6) == LOW) {
        lcd.clear();
```

```
    lcd.print("Water");//0010
    digitalWrite(2, HIGH);
    delay(100);
    digitalWrite(2, LOW);
  }

  else {
    lcd.clear();
    lcd.print("Help");//0011
    digitalWrite(2, HIGH);
    delay(100);
    digitalWrite(2, LOW);
  }
} else {
  if (digitalRead(5) == LOW) {
    if (digitalRead(6) == LOW) {
      lcd.clear();
      lcd.print("Food");//0100
      digitalWrite(2, HIGH);
      delay(100);
      digitalWrite(2, LOW);

    }
    else {
      lcd.clear();
      lcd.print("Morning");//0101
      digitalWrite(2, HIGH);
      delay(100);
      digitalWrite(2, LOW);
    }
  }
  else     {
    if (digitalRead(6) == LOW) {
      lcd.clear();
      digitalWrite(2, HIGH);//0110
      lcd.print("Evening");
      digitalWrite(2, LOW);
    }
    else {
      lcd.clear();
      lcd.print("Bye");//0111
      digitalWrite(2, HIGH);
      delay(100);
      digitalWrite(2, LOW);
    }
  }
```

```
  }
} else {
  if (digitalRead(4) == LOW) {
    if (digitalRead(5) == LOW) {
      if (digitalRead(6) == LOW) {
        lcd.clear();
        lcd.print("Time");//1000
        digitalWrite(2, HIGH);
        delay(100);
        digitalWrite(2, LOW);

      }
      else {
        lcd.clear();
        lcd.print("Good");//1001
        digitalWrite(2, HIGH);
        delay(100);
        digitalWrite(2, LOW);
      }
    }
    else {
      if (digitalRead(6) == LOW) {
        lcd.clear();
        lcd.print("7065141890");//1010
        digitalWrite(2, HIGH);
        delay(100);
        digitalWrite(2, LOW);

      }
      else {
        lcd.clear();
        lcd.print("Home");//1011
        digitalWrite(2, HIGH);
        delay(100);
        digitalWrite(2, LOW);
      }
    }

  } else {
    if (digitalRead(5) == LOW) {
      if (digitalRead(6) == LOW) {
        lcd.clear();
        lcd.print("Full address ");//1100
        lcd.setCursor(0, 2);
        lcd.print("comes here");
        digitalWrite(2, HIGH);
```

```
          delay(100);
          digitalWrite(2, LOW);


        }
        else {
          lcd.clear();
          lcd.print("Yes");//1101
          digitalWrite(2, HIGH);
          delay(100);
          digitalWrite(2, LOW);
        }


      } else {
        if (digitalRead(6) == LOW) {
          lcd.clear();
          lcd.print("No");//1101
          digitalWrite(2, HIGH);
          delay(100);
          digitalWrite(2, LOW);

        }
        else {
          lcd.clear();
          lcd.print("Thank You");//1110
          digitalWrite(2, HIGH);
          delay(100);
          digitalWrite(2, LOW);
        }
      }
    }
  }
}
```

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