# SIGN LANGUAGE TRANSLATOR
# A MINI PROJECT-I REPORT

*Submitted by*


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*in partial fulfilment for the award of the degree*

*of*

BACHELOR OF ENGINEERING

*in*

COMPUTER SCIENCE AND ENGINEERING


## SRI RAMAKRISHNA ENGINEERING COLLEGE

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# SRI RAMAKRISHNA ENGINEERING COLLEGE

## BONAFIDE CERTIFICATE

**16CS266 – MINI PROJECT I**

Certified that this Mini Project - I Report "**Sign Language Translator**" is the bonafide work of "**Ajay Poudar, Andro Benoson N, Ayush Dutta, Kugaanesen Sukumaran**" who carried out the project under my supervision.

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Submitted for the Mini Project Viva-Voice Presentation held on _____

INTERNAL EXAMINER

EXTERNAL EXAMINER

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# ABSTRACT

**Sign Language Translator** also known as (SLT ) is a device which is used for the communication of deaf, dumb & Hemiparesis people through the medium of signs. This device reads the sign language of the deaf people and conveys the message as an output on the LCD display and audio output through mobile application via Bluetooth Module (HC-05). This makes others easy to read, listen and understand what they are trying to say and express their feelings. So as a whole it will make the demotivated people life into something and hence they will be communicating with normal people without feeling of being disabled.

# CHAPTER 1
# INTRODUCTION

According to reports in 2020, 2.21% of india's population are physically challenged, of which 7.5% of people are dumb and 5.8% are deaf. Communication is the biggest hindrance in their life. Lack of communication leads to lack of opportunities and talents gets unnoticed. So a gap is built between normal people and them. This makes them feel unworthy and uneasy, to overcome this issue this project is created.

Sign Language Translator also known as (SLT) is a device which is used for the communication of deaf and dumb people by converting the Indian Sign Language(ISL) to voice and text format using a flex sensor embedded on the glove.

The movement of hands are converted to voice and text format using flex sensor. This makes others easy to read it and understand what they are trying to say and express their feelings.

# CHAPTER 2
# LITERATURE REVIEW

**Hand Gesture Recognition forSign Language Recognition:CHANDEEP KAUR ..et al(2010):-** Various method of hand gesture and sign language recognition proposed in the past by various researchers. For deaf and dumb people, Sign language is the only way of communication. With the help of sign language, these physical impaired people express their emotions and thoughts to other person.

**Design Issue and Proposed Implementation of Communication Aid for Deaf & Dumb People, Volume 4:PRATIBHA PANDEY ..et al(3,March 2015):-** Communication of deaf and dumb people using Indian sign language (ISL) with normal people where hand gestures will be converted into appropriate text message. Main objective is to design an algorithm to convert dynamic gesture to text at real time

**SignPro-An Application Suite for Deaf and Dumb:NEELAM K ..et al(2014):-** Author presented application that helps the deaf and dumb person to communicate with the rest of the world using sign language. The key feature in this system is the real time gesture to text conversion. The processing steps include: gesture extraction, gesture matching and conversion to speech.

**Offline Signature Verification Using Surf Feature Extraction and Neural Networks Approach: ASHISH SETHI ..et al(2012):-**In this paper, off-line signature recognition & verification using neural network is proposed, where the signature is captured and presented to the user in an text and voice format.

# CHAPTER 3
# MODELLING ATTRIBUTES

## 3.1 PROTOTYPE MODULE:

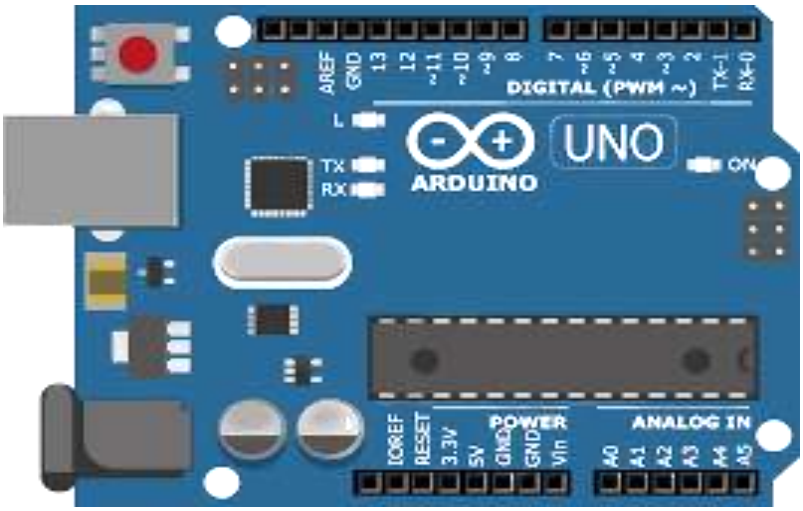
1. Designing the circuit and building hardware of our product.
2. Implementing software by Coding Using Arduino.
3. Sign & Symbol Identification.
4. Flex signal to text conversion.
5. Displaying the text in LCD display.
6. Text to Voice conversion using an app through bluetooth module(HC-05).
7. Prototype Building
8. Testing prototype.

### Designing the circuit and building hardware of our product:

### Materials Required:

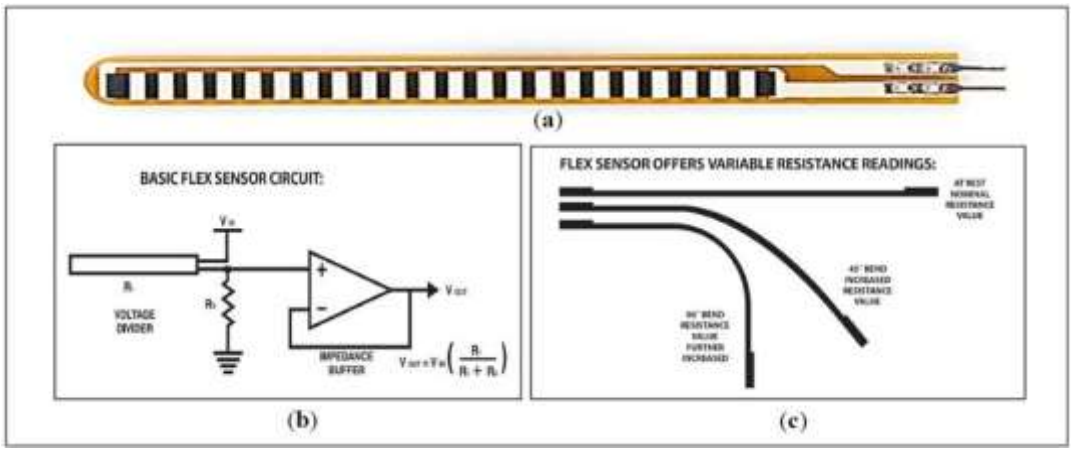
- **Arduino Uno:**

  It is a microcontroller board based on the ATmega328P (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator (CSTCE16M0V53-R0), a USB connection, a power jack, an ICSP header and a reset button.



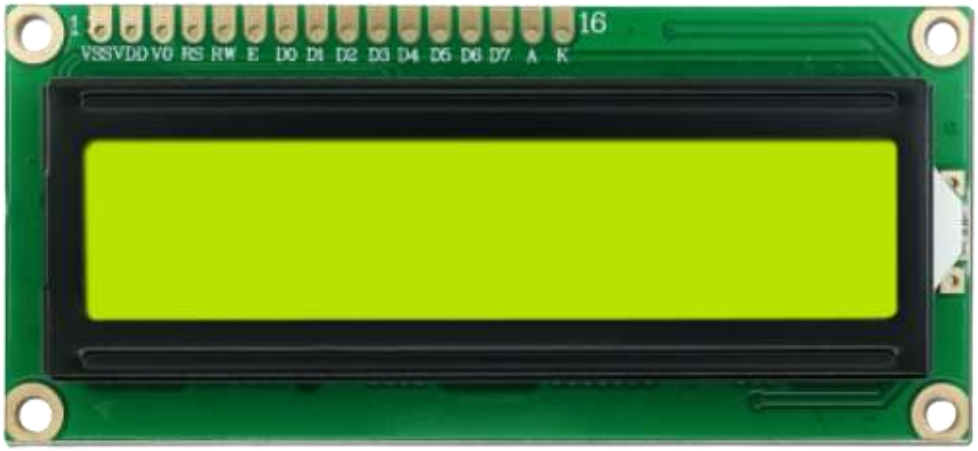
- **Flex Sensors (2.2”):**

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.

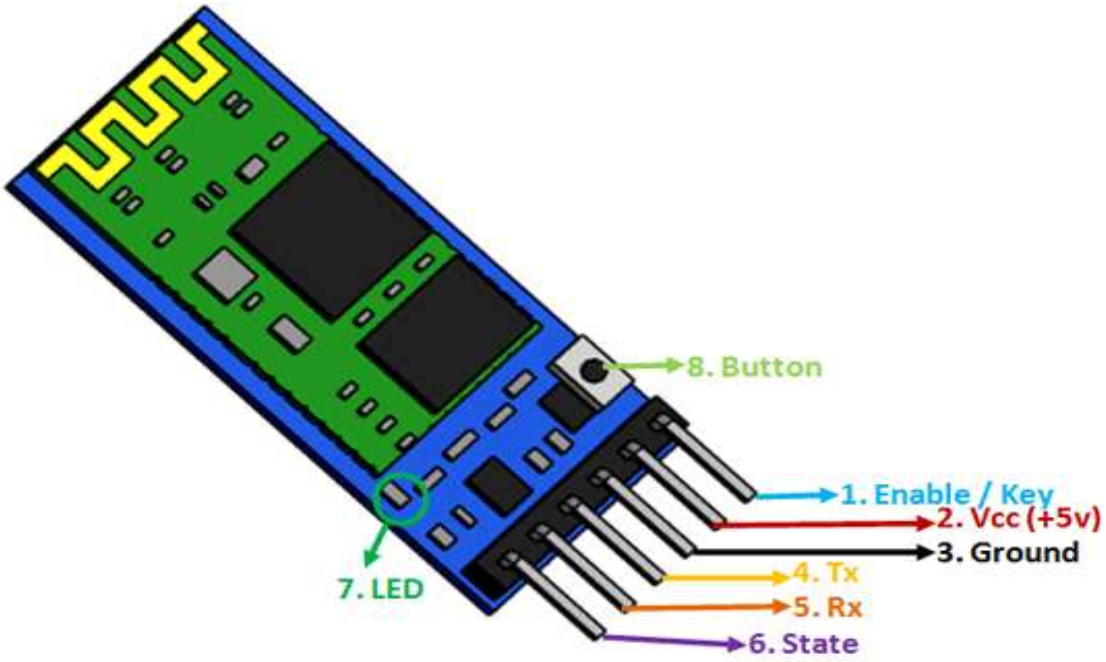



- **16*2 LCD Display:**

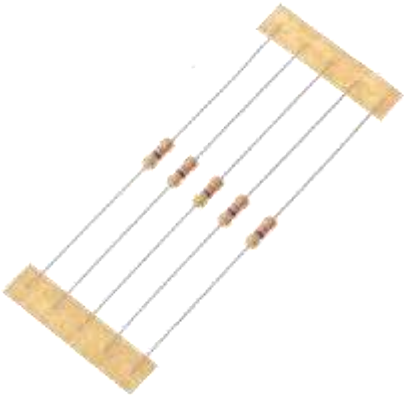
An LCD (Liquid Crystal Display) screen is an electronic display module and has a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. A 16x2 LCD means it can display 16 characters per line and there are 2 such lines.



- **Bluetooth (HC-05):**
    - HC-05 is a Bluetooth module which is designed for wireless communication. This module can be used in a master or slave configuration.
    - It has range up to <100m which depends upon transmitter and receiver, atmosphere, geographic & urban conditions.
    - It is IEEE 802.15.1 standardized protocol, through which one can build wireless Personal Area Network (PAN). It uses frequency-hopping spread spectrum (FHSS) radio technology to send data over air.
    - It uses serial communication to communicate with devices. It communicates with microcontroller using serial port (USART).



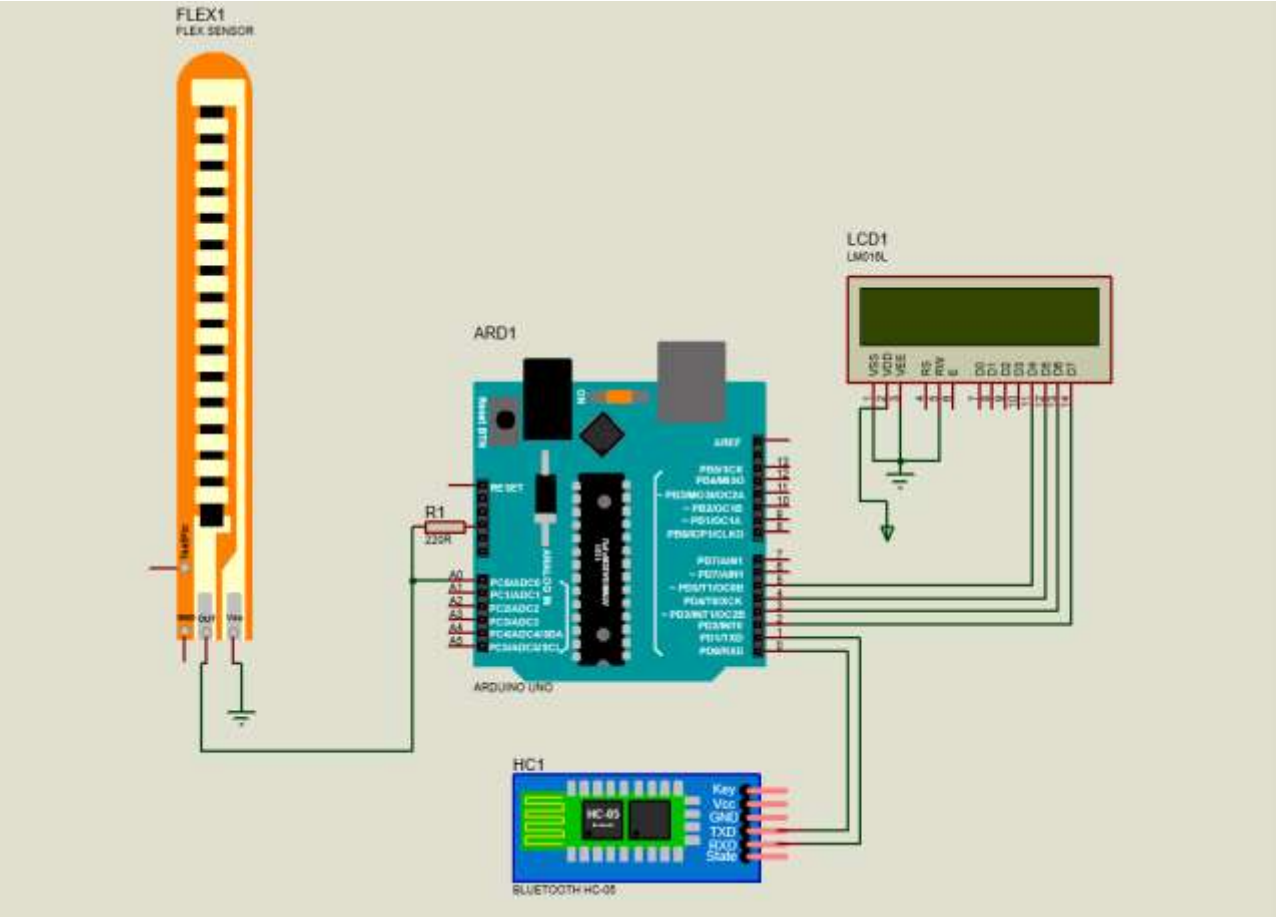

- **47k & 220 ohms Resistors:**



- **Jumper Wires:**

- **Gloves**

## Circuit Diagram:



## Sign & Symbol Identification:

The movement of flex sensors produces variation in resistance value, based on the resistant values symbols are identified. The flex sensors produces various signals for various symbols.

## Program:

```
const int flexPin1 = A0;
const int flexPin2 = A1;
const int flexPin3 = A2;
const int flexPin4 = A3;
const int flexPin5 = A4;
void setup()
{
  pinMode(A0, INPUT);
  pinMode(A1, INPUT);
  pinMode(A2, INPUT);
  pinMode(A3, INPUT);
  pinMode(A4, INPUT);
  Serial.begin(9600);
}
void loop()
{
int flexPin1 = analogRead(A0);
int flexPin2 = analogRead(A1);
int flexPin3 = analogRead(A2);
int flexPin4 = analogRead(A3);
int flexPin5 = analogRead(A4);
Serial.print("Sensor");
Serial.println(flexPin1);
Serial.println(flexPin2);
Serial.println(flexPin3);
Serial.println(flexPin4);
Serial.println(flexPin5);
if((flexPin1>610)&&(flexPin2>600)&&(flexPin3>600)&&(flexPin4<6
00)&&(flexPin5<600))
{
Serial.println("How are you");
}
else
if((flexPin1<550)&&(flexPin2>600)&&(flexPin3<500)&&(flexPin4<5
00)&&(flexPin5<500))
{
Serial.println("You");
}
delay(1200);
}
```

## Flex Signal To Text Conversion:

Flex Sensor produces fluctuating resistance value based on movement of finger. The 5 Flex sensor is connected to Arduino attached in all 5 finger of glove. Now the movement of finger produces the fluctuating resistance value. If the flex sensor is shrink the resistance will decrease and if the sensor is raise up the value will increase. Depending on this increase and decrease of value we use if-else statement to print the text it the resistance value increase or decrease while moving the finger.

## Program

```
if((flexPin1>620)&&(flexPin2<490)&&(flexPin3<490)&&(flexPin4<5
00)&&(flexPin5<500))
{
Serial.println("I am Fine");
else
if((flexPin1>610)&&(flexPin2>600)&&(flexPin3>600)&&(flexPin4<6
00)&&(flexPin5<600))
{
Serial.println("How are you");
else
if((flexPin1<560)&&(flexPin2<480)&&(flexPin3<490)&&(flexPin4<5
40)&&(flexPin5>610))
{
Serial.println("I want to go restroom");
}
```

## Displaying the text in LCD display:

- For Displaying the text into LCD, we have interface the 16*2 LCD Module with Arduino UNO.
- The LCD is enabled in a 4-bit mode.
- The output is displayed using lcd.print() function.

## Program:

```
#include<LiquidCrystal.h>
const int rs = 12, en = 11, d4 = 5, d5 = 4, d6 = 3, d7 = 2;
LiquidCrystal lcd(rs, en, d4, d5, d6, d7);
void setup()
{
  lcd.begin(16, 2);
  Serial.begin(9600);
}
void loop()
{
lcd.clear();
lcd.setCursor(0,0);
lcd.print("I NEED WATER");
delay(500);
}
```

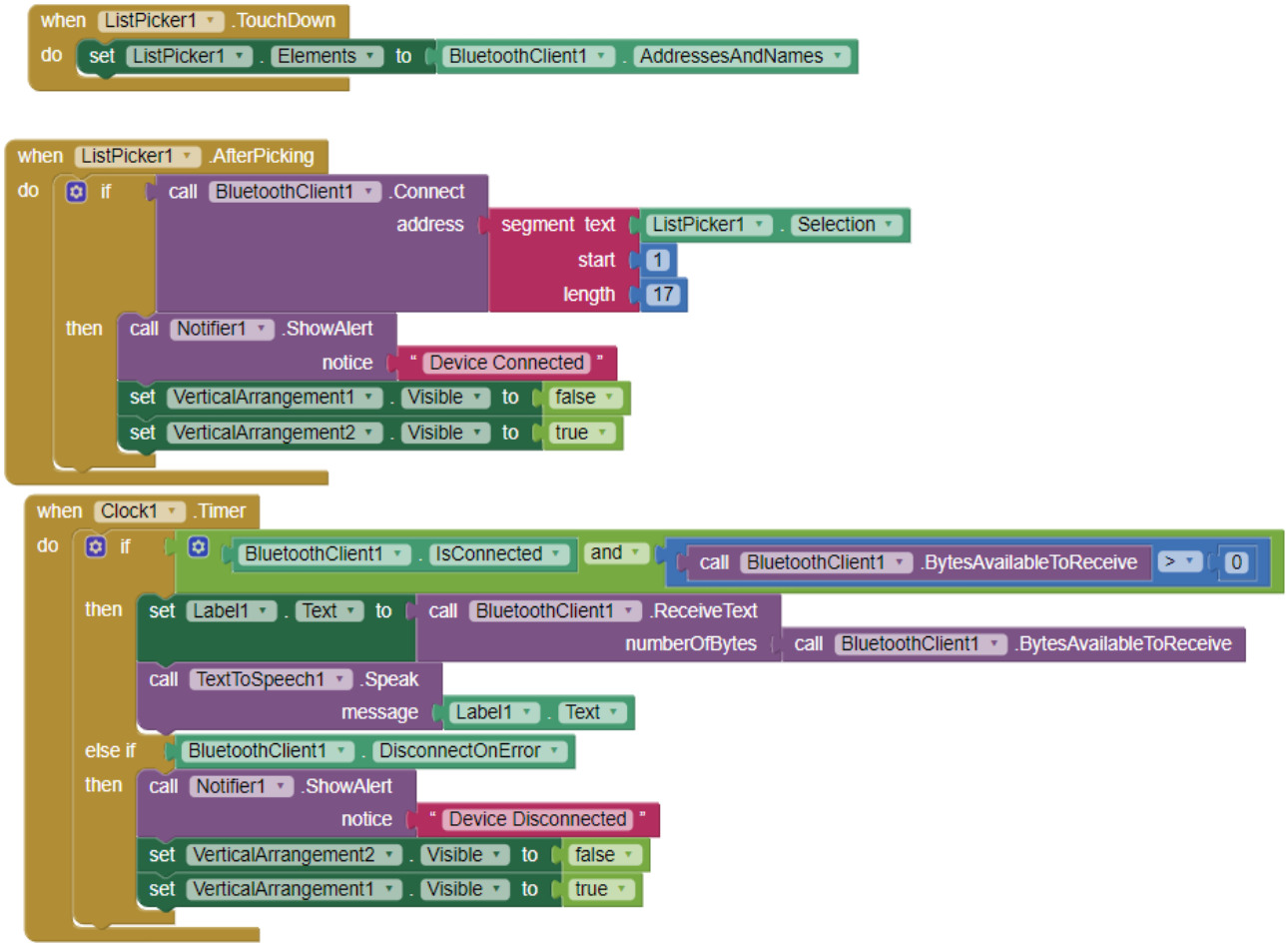
## Text to Voice conversion using an app through bluetooth module(HC-05):

The flex signal are collected and transferred to the Voice SLT by Neptune app through the Bluetooth module(hc-05).

## 3.2 APP WORKING MODULE

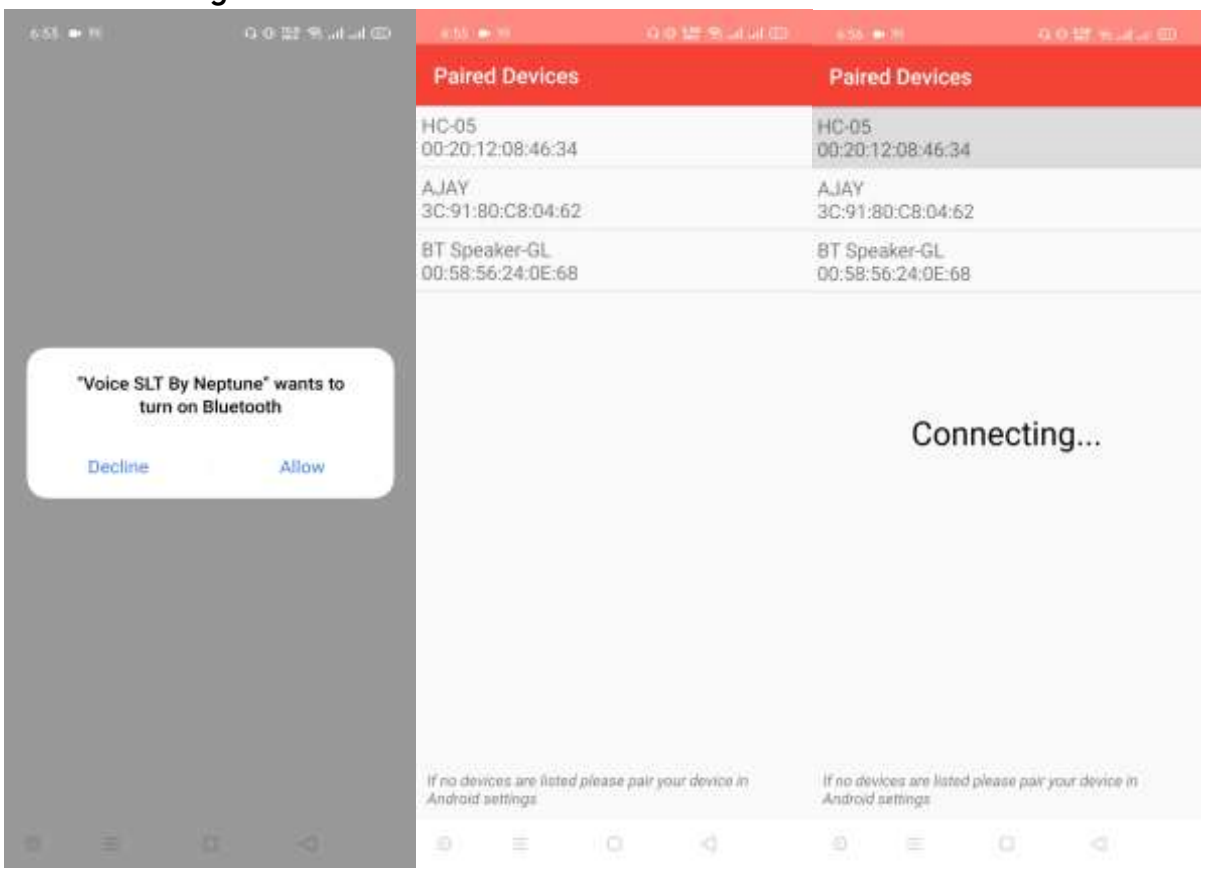
- Blocks of Voice SLT by Neptune App.
- Pairing the Voice SLT by Neptune app with the Bluetooth Module.
- Audio Output through Voice SLT by Neptune app.

### Blocks of Voice SLT by Neptune App:



**Pairing the SLT by Neptune app with the Bluetooth Module:**

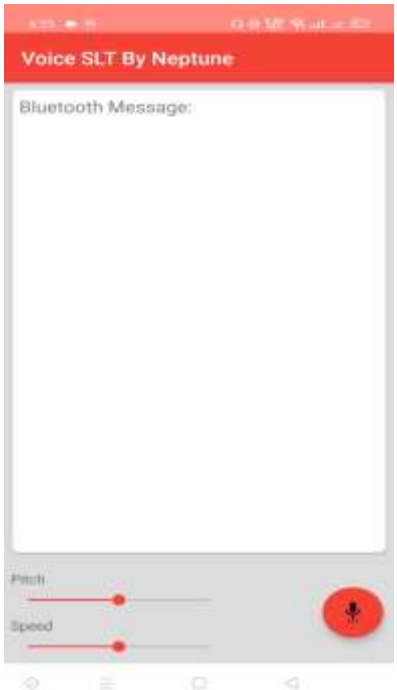
Pair the bluetooth module with mobile and after that we need to open app then the paired device will listed then we need to select it will start working.



**Audio Output through the app:**

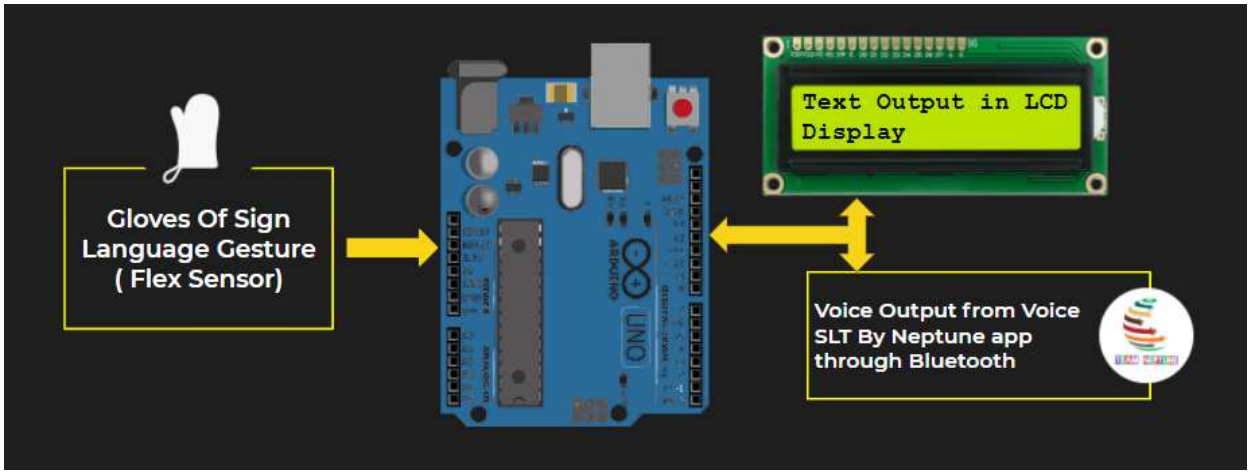
The signal generated by the flex sensors will be converted to text and be sent to bluetooth module. The Voice SLT app will receive the signal from bluetooth module and will print the output in the form of Voice and Text.


**Feature:** we can control the desire speed and voice of the speech

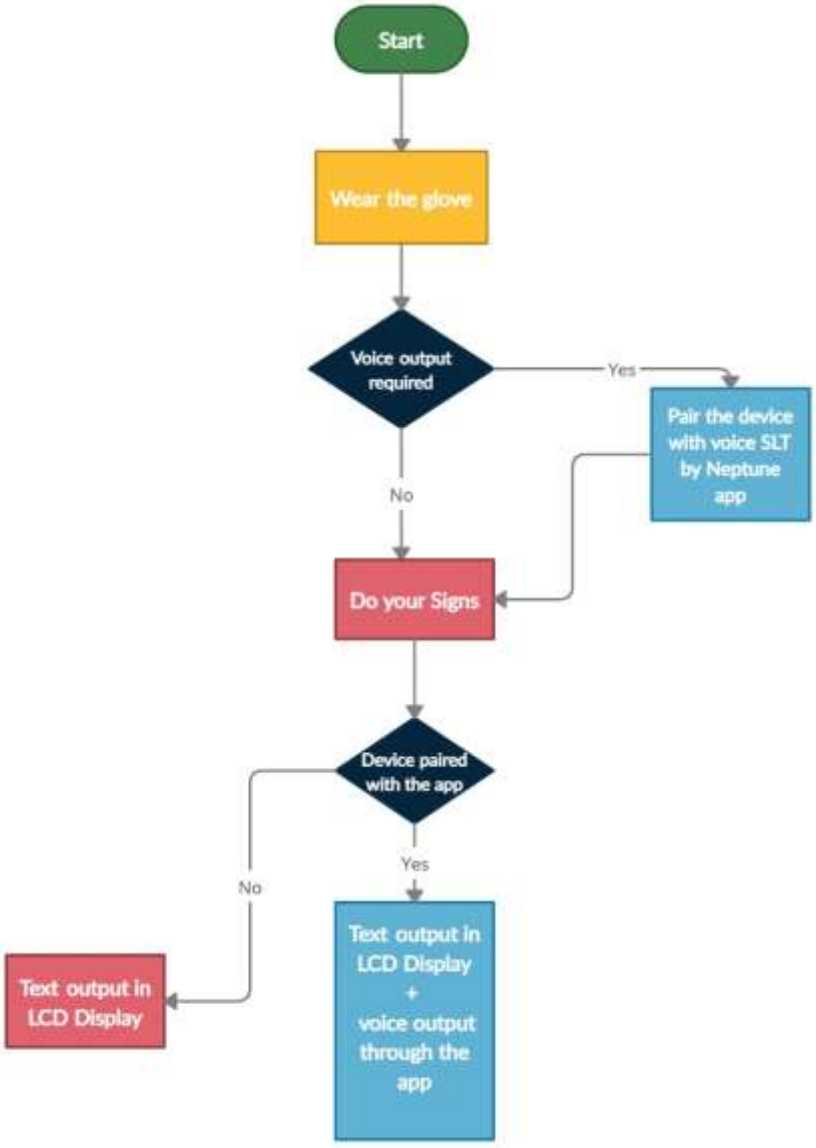



Application Link: https://bit.ly/3xk4cQ

## 3.3 BLOCK DIAGRAM:




## 3.4 FLOWCHART



## 3.5 MERITS AND APPLICATION

### 3.5.1 Merits of SLT:

- Our product will be a gamechanger for the physically challenged people.
- Its special features are sign to voice and sign to text conversion.
- Our product is cost effective and user friendly.
- Its compact and easily portable.
- Our product is capable of changing life of physically challenged by giving them new opportunities and new aspect of life making their dream possible and giving a new hope to live their life.

### 3.5.3 Applications

Application of Sign Language Translator are as follows:

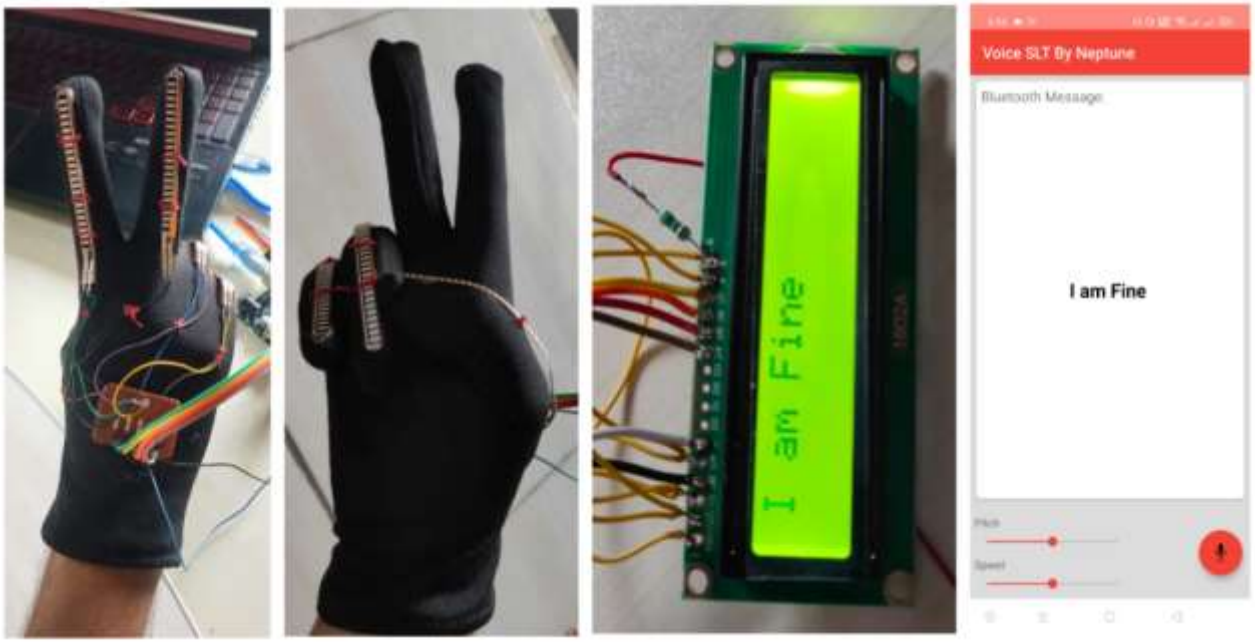
Sign Language Translator will help physically challenged people in

- ✓ Usual efficient Communication.
- ✓ Job interviews.
- ✓ Deaf and Dumb people will be able to interact with each other.
- ✓ Emergency situations for asking help.
- ✓ Getting equal opportunities and treatment as normal people.
- ✓ Will help Hemiparesis people for communicating with other people

# CHAPTER 4

# RESULT

This report has presented a simple, convenient, cost-effective and efficient Sign language translator glove which is a user-friendly product, which will enhance and make the life of differently abled people easy and comfortable.




# CHAPTER 5

# CONCLUSION AND FUTURE SCOPE

## Conclusion:

The sign language translator device will improve the life of differently abled people. The lack of communication which they were facing will be removed from their lives so they get an equal chance to stand and work with normal people.

### Future Scope

- ✓ In future the product will be updated.The SLT glove will be created for both the hands and the sign of both the hands will be linked.
- ✓ The product will be made more compact and stylish.
- ✓ Gyroscope sensor will be added to the product which will even detect the motion of hands.

# APPENDIX

```
#include<LiquidCrystal.h>
const int flexPin1 = A0;
const int flexPin2 = A1;
const int flexPin3 = A2;
const int flexPin4 = A3;
const int flexPin5 = A4;
const int rs = 12, en = 11, d4 = 5, d5 = 4, d6 = 3, d7 = 2;
LiquidCrystal lcd(rs, en, d4, d5, d6, d7);
void setup()
{
  pinMode(A0, INPUT);
  pinMode(A1, INPUT);
  pinMode(A2, INPUT);
  pinMode(A3, INPUT);
  pinMode(A4, INPUT);
  lcd.begin(16, 2);
  Serial.begin(9600);
}
void loop()
{
int flexPin1 = analogRead(A0);
int flexPin2 = analogRead(A1);
int flexPin3 = analogRead(A2);
int flexPin4 = analogRead(A3);
int flexPin5 = analogRead(A4);


if((flexPin1>620)&&(flexPin2<490)&&(flexPin3<490)&&(flexPin4<5
00)&&(flexPin5<500))
{
Serial.println("I need water");
lcd.clear();
lcd.setCursor(2,0);
lcd.print("I NEED WATER");
}
else
if((flexPin1<590)&&(flexPin2>600)&&(flexPin3<470)&&(flexPin4>6
00)&&(flexPin5>600))
{
Serial.println("Thank you");
lcd.clear();
lcd.setCursor(3,0);
lcd.print("Thank you");
delay(500);
}
else
if((flexPin1<590)&&(flexPin2>600)&&(flexPin3<480)&&(flexPin4<5
50)&&(flexPin5>600))
{
Serial.println("I am feeling hungry");
```

```
lcd.clear();
lcd.setCursor(0,0);
lcd.print("I am feeling");
lcd.setCursor(0,1);
lcd.print("Hungry");
}
else
if((flexPin1>610)&&(flexPin2>590)&&(flexPin3>590)&&(flexPin4<6
00)&&(flexPin5<600))
{
Serial.println("How are you");
lcd.clear();
lcd.setCursor(2,0);
lcd.print("How are you");
}
else
if((flexPin1<590)&&(flexPin2>590)&&(flexPin3<500)&&(flexPin4<5
00)&&(flexPin5<500))
{
Serial.println("I want that");
lcd.clear();
lcd.setCursor(2,0);
lcd.print("I want that");
}
else
if((flexPin1<590)&&(flexPin2>590)&&(flexPin3>590)&&(flexPin4<4
80)&&(flexPin5>600))
{
Serial.println("I want to sleep");
lcd.clear();
lcd.setCursor(0,0);
lcd.print("I want to sleep");
}
else
if((flexPin1<570)&&(flexPin2>590)&&(flexPin3>590)&&(flexPin4>5
90)&&(flexPin5>600))
{
Serial.println("My name is Ajay Poddar");
lcd.clear();
lcd.setCursor(0,0);
lcd.print("My name is Ajay");
lcd.setCursor(0,1);
lcd.print("Poddar");
}
else
if((flexPin1<600)&&(flexPin2<470)&&(flexPin3<470)&&(flexPin4<4
99)&&(flexPin5<520))
{
Serial.println("I am feeling Difficult");
lcd.clear();
lcd.setCursor(0,0);
lcd.print("I am feeling");
```

```
lcd.setCursor(0,1);
lcd.print("Difficult");
}
else
if((flexPin1<590)&&(flexPin2<480)&&(flexPin3<500)&&(flexPin4<5
40)&&(flexPin5>600))
{
Serial.println("I want to go Restroom");
lcd.clear();
lcd.setCursor(0,0);
lcd.print("I want to go");
lcd.setCursor(0,1);
lcd.print("Restroom");
}
else if (flexPin1>500 && flexPin1<600)
{
if(flexPin2>420 && flexPin2<490)
{
if(flexPin3>590)
{
if(flexPin4>600)
{
if(flexPin5>600)
{
Serial.println("Wow, Nice") ;
lcd.clear();
lcd.setCursor(0,0);
lcd.print("Wow, Nice");
} } } } }
else
if((flexPin1<500)&&(flexPin2>590)&&(flexPin3>580)&&(flexPin4<5
90)&&(flexPin5<590))
{
Serial.println("I am Fine");
lcd.clear();
lcd.setCursor(0,0);
lcd.print("I am Fine");
}
else
if((flexPin1>620)&&(flexPin2>600)&&(flexPin3>600)&&(flexPin4>6
00)&&(flexPin5>600))
{
Serial.println("Excuse Me");
lcd.clear();
lcd.setCursor(3,0);
lcd.print("Excuse Me");
}
  delay(1900);
}
```

# REFERENCES:


- Hand Gesture Techniques for Sign Language Recognition from International Journal of Technical Research & Science by Ms Kamal Preet Kour, Dr. (Mrs) Lini Mathew Department of Electrical Engineering, NITTTR, Chandigarh

- Flex Sensor Data Sheet https://www.sparkfun.com/datasheets/Sensors/Flex/flex22.pdf

- Indian Sign language http://www.typoday.in/2016/spk_papers/Nakul_Singal_TypographyDay-2.pdf