ELECTRONIC PRODUCT ENGINEERING WORKSHOP

(ECP 307)

SIGN LANGUAGE CONVERTER

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AIM:

To create a sign language converter which will help speech impaired people to communicate with other normal people and to make a PCB for the system.

COMPONENTS:

1) Atmega 8a (8 bit microcontroller)
2) Resistors (4.7k were used)
3) Capacitors (22pF)
4) 28 pin ic base
5) Voltage regulator (7805)
6) Battery (9V)
7) LCD display
8) Wires
9) Crystal oscillator (12 MHz)

LITERATURE STUDY:

The basic idea of the project was to create such a system which would display on screen what a speech impaired person wants to say. The project will help a lot of speech impaired people and this project is for social cause.Sign language is a visual language that is used by deaf and dumb people as their mother tongue. Unlike acoustically conveyed sound patterns, sign language uses body language and manual communication to fluidly convey the thoughts of a person. It is achieved by simultaneously combining hand shapes, orientation and movement of the hands, arms or body, and facial expressions. It can be used by a person who has difficulties in speaking or by a person who can hear but could not speak and by normal people to communicate with hearing disabled people. As far as a deaf person is concerned, having access to a sign language is very important for their social, emotional and linguistic growth. Sign language should be recognized as the first language of deaf people and their education can be proceeded bilingually in the national sign language as well as national written or spoken language. Indian Sign Language is used by deaf, dumb and hard of hearing people for communication by showing signs using different

parts of body. All around the world there are different communities of deaf and dumb people and thus the language of these communities will be different. The Sign Language used in USA is American Sign Language (ASL); British Sign Language (BSL) is used in Britain; and Indian Sign Language (ISL) is used in India for expressing thoughts and communicating with each other. The “Indian Sign Language (ISL)” uses manual communication and body language (non-manual communication) to convey thoughts, ideas or feelings. ISL signs can be generally classified into three classes: One handed, two handed, and non-manual signs. One handed signs and two handed signs are also called manual signs where the signer uses his/her hands to make the signs for conveying the information. Non Manual signs are generated by changing the body posture and facial expressions. This system is to help hearing impaired people in India interact with others as it translates English text to Sign language.

PCB:

A PCB or Printed Circuit Board is a board that contains several electrical components that are connected using conductive electrical tracks. A PCB provides physical support for mounting the electronic components and also the electrical connections between them.

Procedure for printing a PCB board:

1) Designing schematic of the design

A new schematic window will open with a blank work space. This is called the Schematic Editor, where you can draw schematics of your design. Save the schematic file with extension .sch.After this, we have to add the necessary components which we are going to use in our schematic. But, before that, we need to adjust the grid size of the schematic. Select the Grid option and set the size to 1mm.

2) Connecting Components in Schematic

Next step is to connect these components. You have to use the net option from the side tool bar and start making the connections.After making all the connections, the final schematic will look something like the circuit in the following image.

3) PCB Layout Design

After completing the schematic, we have to proceed with the design of the PCB layout. Select the switch to board option from the top tool bar. You can create the board fie from the schematic.A new window opens which is the PCB layout editor. The black space is the board area and all the components are at the outside bottom left of the board area. Now, using the group option from the side tool bar, select all the components and using move option move all the components and populate the board area.Using the move option, place the components on the board as per the position you want the component to be on the board.

4) Printing of PCB board

The mirror image of the layout is taken and then it is sent for printing on the copper plate.

5) Etching

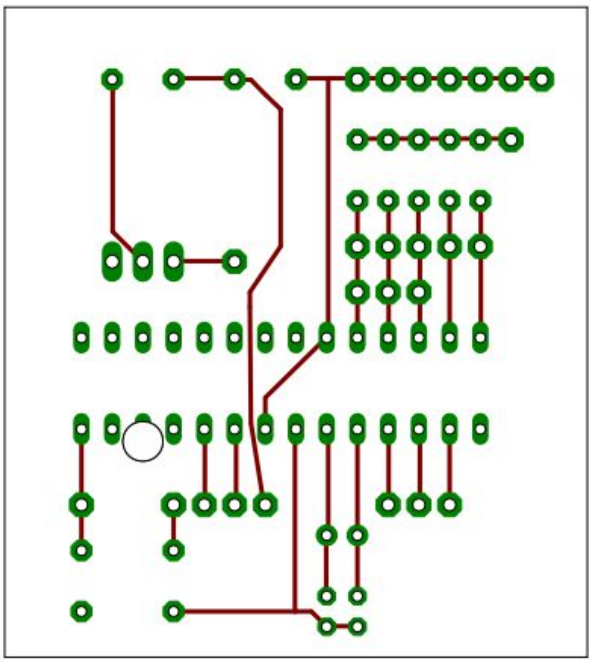
The process of etching involves the addition of ferric chloride and removal of the unused copper from the copper plate so that only the tracks or connections remain.

6) Soldering

The process of soldering is the process by which we solder the components on the printed circuit board and with the help of tracks the connections are completed.

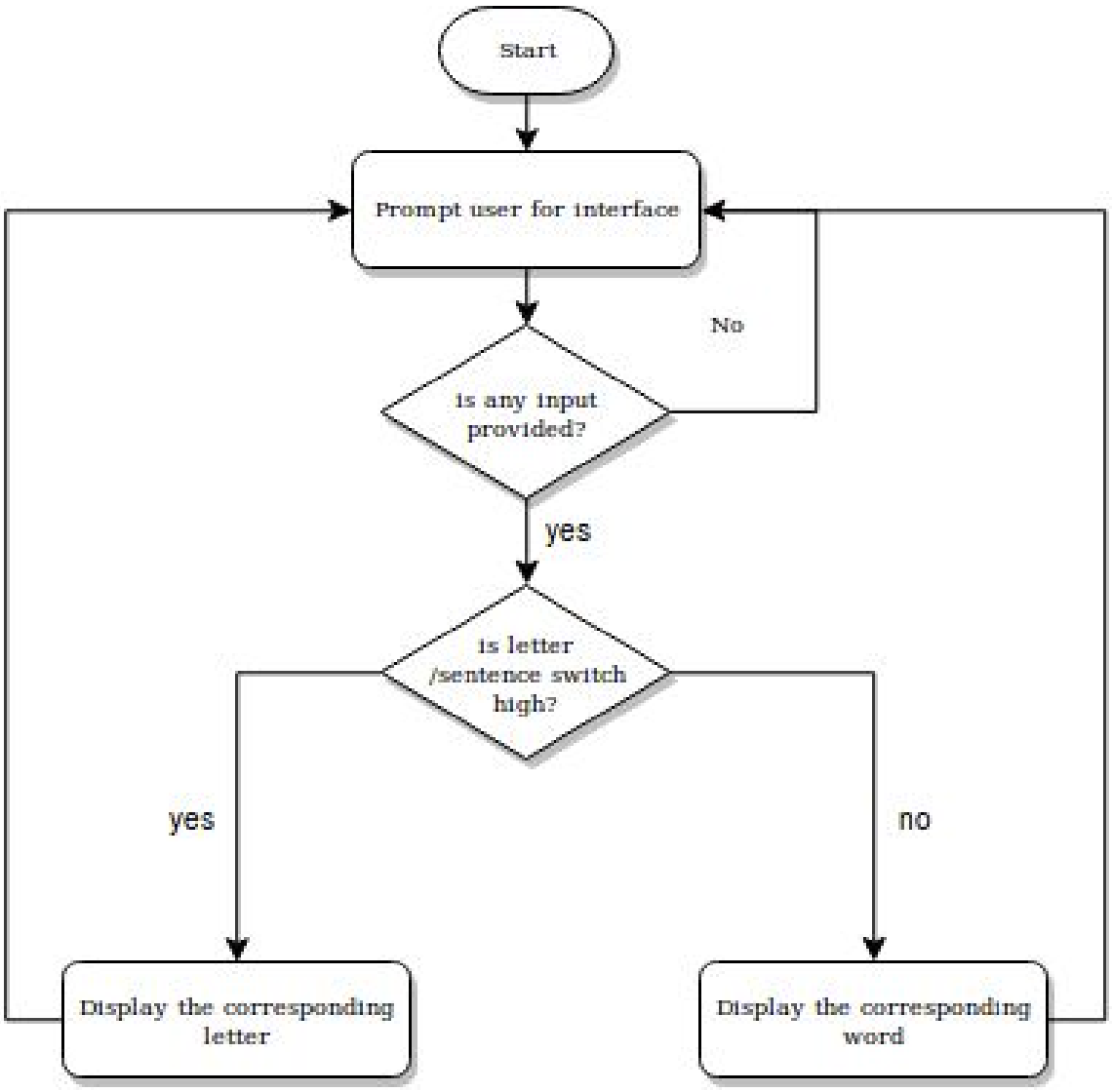
Using Eagle software, the PCB layout of system circuit was generated.It was printed on copper plate and required soldering was done. Thus, PCB for sign language converter was fabricated.

CIRCUIT DIAGRAM:



ALGORITHM:

1) Using all the four fingers and thumb a total of 32 combinations are possible. These 32 combinations can indicate word,numbers or sentences.
2) A seperate switch is used which helps to select the mode of displaying letters or sentences.
3) The 5 switches on the fingers are made on or off and depending on the combination the case gets executed which was written in the code.
4) The case which gets executed is displayed on the lcd screen.
5) A switch is also kept which will decide the mode of display.



CODE:

```
#include <PCD8544.h>

static PCD8544 lcd;

const int f_0 = 9;          //Declare input pins
const int f_1 = 10;
const int f_2 = 11;
const int f_3 = 12;
```

```
const int f_4 = 13;
int curr = 0;
int temp = 0;
int flag = 0;

//Function to display string on lcd
void write_lcd(String wor)
{
  lcd.clear();
  lcd.setCursor(0, 0);
  lcd.print("Detected Word:");
  lcd.setCursor(0, 1);
  lcd.print(wor);
  lcd.write(' ');
}
//Initializations of microcontroller
void setup() {
  pinMode(f_0,INPUT);            //Declare pins for input
  pinMode(f_1,INPUT);
  pinMode(f_2,INPUT);
  pinMode(f_3,INPUT);
  pinMode(f_4,INPUT);
  pinMode(2,INPUT);
  lcd.begin(84, 48);
  lcd.setContrast(95);
  lcd.clear();
  lcd.setCursor(0, 0);
  lcd.print("Sign Language detector");
  lcd.write(' ');
  delay(1500);
}
void loop()
{
  curr = 0;
  delay(500);
  if(digitalRead(2))
     flag = !flag;
  digitalWrite(8,HIGH);
   if(digitalRead(f_0))
        curr = curr | 1
  if(digitalRead(f_1))
       curr = curr | 2;
  if(digitalRead(f_2))
```

```
     curr = curr | 4;

if(digitalRead(f_3))
    curr = curr | 8;
if(digitalRead(f_4))
   curr = curr | 16;

delay(500);

if(flag)
{
   if(curr == 25)
        write_lcd("z");
   if(curr == 0)
        write_lcd("a");
   if(curr == 1)
        write_lcd("b");
   if(curr == 2)
        write_lcd("c");
   if(curr == 3)
        write_lcd("d");
   if(curr == 4)
        write_lcd("e");
   if(curr == 5)
        write_lcd("f");
   if(curr == 6)
        write_lcd("g");
   if(curr == 7)
        write_lcd("h");
   if(curr == 8)
        write_lcd("i");
   if(curr == 9)
        write_lcd("j");
   if(curr == 10)
        write_lcd("k");
   if(curr == 11)
        write_lcd("l");
   if(curr == 12)
        write_lcd("m");
   if(curr == 13)
        write_lcd("n");
   if(curr == 14)
        write_lcd("o");
```

```
    if(curr == 15)
         write_lcd("p");
    if(curr == 16)
         write_lcd("q");
    if(curr == 17)
         write_lcd("r");
    if(curr == 18)
         write_lcd("s");
    if(curr == 19)
         write_lcd("t");
    if(curr == 20)
         write_lcd("u");
    if(curr == 21)
         write_lcd("v");
    if(curr == 22)
         write_lcd("w");
    if(curr == 23)
         write_lcd("x");
    if(curr == 24)
         write_lcd("y");
    if(curr == 31)
         write_lcd("1");
    if(curr == 26)
         write_lcd("2");
    if(curr == 27)
         write_lcd("3");
    if(curr == 28)
         write_lcd("4");
    if(curr == 29)
         write_lcd("5");
    if(curr == 30)
         write_lcd("6");
 }

else
{
    if(curr == 25)
         write_lcd("z");
    if(curr == 0)
         write_lcd("hello");
    if(curr == 1)
         write_lcd("hi");
    if(curr == 2)
```

```
     write_lcd("how are you");
if(curr == 3)
     write_lcd("what is your good name");
if(curr == 4)
     write_lcd("help");
if(curr == 5)
     write_lcd("water");
if(curr == 6)
     write_lcd("GM");
if(curr == 7)
     write_lcd("GN");
if(curr == 8)
     write_lcd("I am hungry");
if(curr == 9)
     write_lcd("lets go");
if(curr == 10)
     write_lcd("come here");
if(curr == 11)
     write_lcd("I am happy");
if(curr == 12)
     write_lcd("Are you busy");
if(curr == 13)
     write_lcd("Enjoy");
if(curr == 14)
     write_lcd("lets go to safe zone");
if(curr == 15)
     write_lcd("Mu-Prava");
if(curr == 16)
     write_lcd("Get in the car");
if(curr == 17)
     write_lcd("Hurry up");
if(curr == 18)
     write_lcd("Nice");
if(curr == 19)
     write_lcd("I wanna do that");
if(curr == 20)
     write_lcd("This is great");
if(curr == 21)
     write_lcd("Where are the keys");
if(curr == 22)
     write_lcd("i like you");
if(curr == 23)
     write_lcd("VNIT rocks");
```

```
    if(curr == 24)
         write_lcd("Enemies ahead");
    if(curr == 31)
         write_lcd("how you doing??");
    if(curr == 26)
         write_lcd("Please help");
    if(curr == 27)
         write_lcd("Hey brother!");
    if(curr == 28)
         write_lcd("please ring phone");
    if(curr == 29)
         write_lcd("How much do i owe you?");
    if(curr == 30)
         write_lcd("3");
}
     digitalWrite(8, LOW);
}
```

RESULTS:

The circuit was found to be operational and worked as per the algorithm and code entered in the microcontroller.

ADVANTAGES:

1) This system is useful for speech impaired people and this model can be used for a social cause.
2) Complete system is very cost effective.
3) The resources required for the project were readily available.
4) The system can be improvised by adding a speaker which would read out the sentences or words, thus increasing credibility of the system.

CONCLUSION:

Thus, a functional sign language converter was designed, printed on a PCB board and fabricated and the desired results were obtained.