EFFICIENT COMMUNICATION SYSTEM FOR DUMB PEOPLE

by

AKASH GOWDA K R - 19BEC1129

YESHWANTH REDDY P - 19BEC1412

SAI KUMAR K - 19BEC1073

SUMIT RAWAT- 19BEC1185

A project report submitted to

DR. SUCHETHA M

SCHOOL OF ELECTRONICS ENGINEERING

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Vandalur – Kelambakkam Road

Chennai – 600127

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DR. SUCHETHA M

School of Electronics Engineering (SENSE),

VIT University, Chennai

Chennai – 600 127.

ABSTRACT

The mute community around the globe has a hard time communicating with the rest of the world's population. This communication gap is there because a dumb person uses sign language which is not comprehensible by a normal person. This project mainly focuses on removing the barrier of communication between the mute community and the people not familiar with the concept of sign language so that the messages that a dumb person is trying to relay is understandable to a person with no knowledge of sign language. The design of the device is based on embedded systems. Flex sensors and Arduino are the key components.

The proposed method, the use of hand gesture reading system fitted with gestures and flex sensors linked to each finger and Linked as input to the RF Transmitter along with the speaker unit. This machine is operated by a battery-powered circuitry. Just run it. Also, this device will include various terms and phrases that will help mute people send simple messages. This is the Device reads the hand gesture of a stupid person for various differences in the movement of the hand. The processor is continuously receiving input Sensor values and then process them, then look for a corresponding message for a set of sensor values. Once it has been found in memory, an interfaced speaker retrieves the message and speaks it using text for speech processing.

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akash

AKASH GOWDA K R

Yeshwanth

YESHWANTH REDDY P

Sai kumar

SAI KUMAR K

sumit

SUMIT RAWAT

CHAPTER 1
INTRODUCTION

The main motivation is to design a flexible, compact and cost-effective system based on embedded systems. The key factors to consider in the designing are comfort of the user, generality, performance, compactness (simplicity) and cost-effectiveness. The principal idea of the design is to recognize hand movements and gestures and facilitate a medium of communication to the people who cannot communicate by talking. These hand movements should be recognized and should be converted into words and provide a natural way of communication just like talking. According to the world health organization, about 5%, approximately 70 million, of the world's population is deaf and mute. Sign language is the way through which they communicate with each other. It has been observed that impaired people find it very difficult to interact with society. Normal individuals aren't able to understand their sign language. To bridge this gap, this project is developed for the physically impaired people and would be beneficial as they can communicate with everyone. The system provides communication between dumb and normal people. It is also useful for mute people and paralyzed people are those who do not speak properly. This system eliminates the barrier in communication between the mute community and the normal people.

A person with speaking disability faces difficulty in communicating with the rest of the population. This device is developed to improve the lifestyle of a person who has speaking disability. This device converts the gesture to speech i.e., gives voice to a mute person. Speech is one of the important factors required for the humans to convey their messages. In this project, Flex sensors play the major role. They are stitched to the gloves. The output from the flex sensors is fed into the Arduino development board. Arduino converts the analog signal to digital by Using ADC pins and then the data is sent to LCD display and gives voice output where the speech output is obtained using a speaker.

Embedded system implementation

Introduction:

An embedded system is one kind of a computer system mainly designed to perform several tasks like to access, process, and store and also control the data in various electronics-based systems. Embedded systems are a combination of hardware and software where software is usually known as firmware that is embedded into the hardware. One of its most important characteristics of these systems is, it gives the o/p within the time limits. Embedded systems support to make the work more perfect and convenient. So, we frequently use embedded systems in simple and complex devices too. The applications of embedded systems mainly involve in our real life for several devices like microwave, calculators, TV remote control, home security and neighborhood traffic control systems, etc.

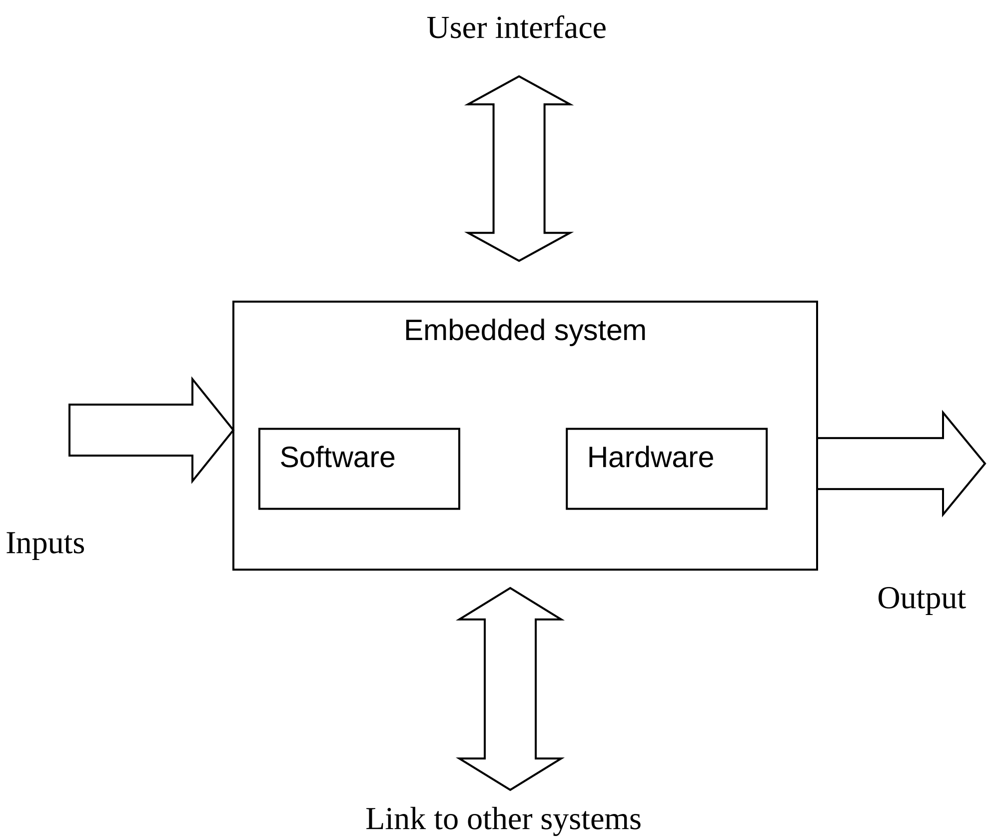
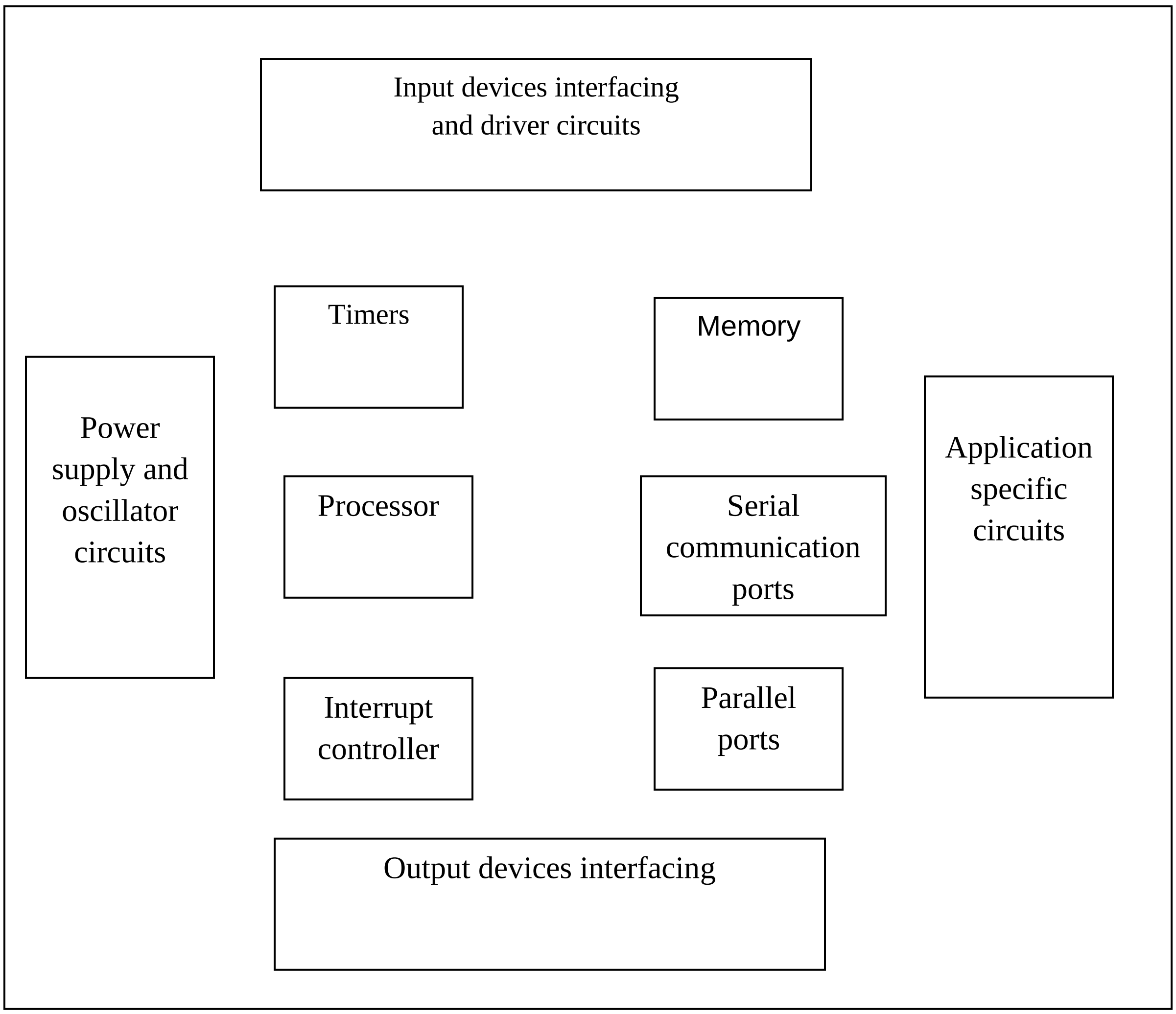


Fig: Overview of embedded system

Embedded system:

Embedded system includes mainly two sections, they are

1. Hardware
2. Software



Embedded System Hardware:

As with any electronic system, an embedded system requires a hardware platform on which it performs the operation. Embedded system hardware is built with a microprocessor or microcontroller. The embedded system hardware has elements like input output (I/O) interfaces, user interface, memory and the display. Usually, an embedded system consists of:

- Power Supply
- Processor
- Memory
- Timers
- Serial communication ports
- Output/Output circuits
- System application specific circuits

Embedded systems use different processors for its desired operation. some of the processors used are

1. Microprocessor

2. Microcontroller

3. Digital signal processor

Microprocessor vs. Microcontroller

Microprocessor

- **CPU** on a chip.
- We can attach required amount of ROM, RAM and I/O ports.
- Expensive due to external peripherals.
- Large in size
- general-purpose

Microcontroller

- **Computer** on a chip
- fixed amount of on-chip ROM, RAM, I/O ports
- Low cost.
- Compact in size.
- Specific –purpose

Embedded System Software:

The embedded system software is written to perform a specific function. It is typically written in a high-level format and then compiled down to provide code that can be lodged within a non-volatile memory within the hardware. An embedded system software is designed to keep in view of the three limits:

- Availability of system memory
- Availability of processor's speed
- When the system runs continuously, there is a need to limit power dissipation for events like stop, run and wake up.

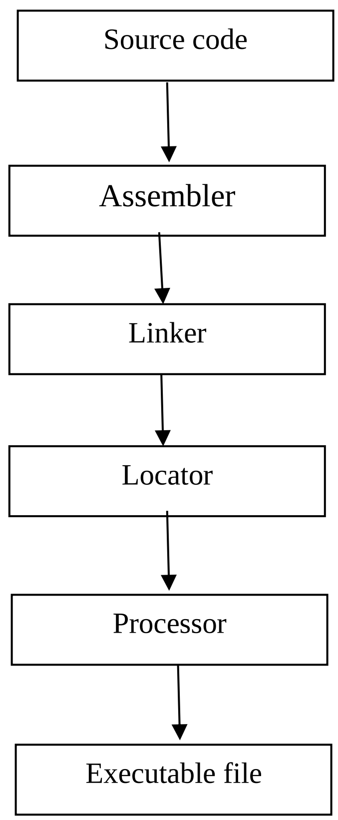
Bringing software and hardware together for embedded system:

To make software to work with embedded systems we need to bring software and hardware together. for this purpose, we need to burn our source code into microprocessor or microcontroller which is a hardware component and which takes care of all operations to be done by embedded system according to our code.

Generally, we write source codes for embedded systems in assembly language, but the processors run only executable files. The process of converting the source code representation of your embedded software into an executable binary image involves three distinct steps:

1. Each of the source files must be compiled or assembled into an object file.
2. All of the object files that result from the first step must be linked together to produce a single object file, called the re-locatable program.
3. Physical memory addresses must be assigned to the relative offsets within the re-locatable program in a process called relocation.

The result of the final step is a file containing an executable binary image that is ready to run on the embedded system.



Flow of burning source code to processor

Applications:

Embedded systems have different applications. A few select applications of embedded systems are smart cards, telecommunications, satellites, missiles, digital consumer electronics, computer networking, etc.

Embedded Systems in Automobiles

- Motor Control System
- Engine or Body Safety
- Robotics in Assembly Line
- Mobile and E-Com Access

Embedded systems in Telecommunications

- Mobile computing
- Networking
- Wireless Communications

Embedded Systems in Smart Cards

- Banking
- Telephone
- Security Systems

CHAPTER 2

LITERATURE SURVEY

In human communication, the use of voice and gestures is meticulously planned. As a result, we chose to make 'Hand Gesture' for communication between mute people and normal people this is our project's focus point.

In most cases, communication between disabled and non-disabled persons takes the form of synthesized speech, often known as sign language. Meghana A S et al. [1] presented a gadget that employs synthetic voice to allow speech impaired persons and normal people to communicate easily. Information is transformed into vocal commands using a flex sensor and an Arduino Mega 2560 Microcontroller, allowing a disabled individual to communicate with normal people. The microcontroller is programmed with pre-programmed motions and their associated messages. The microcontroller uses APR to match the signal motion to the recorded values in the database, resulting in a voice signal (Auto Playback Recorder). The system complexity rises in the proposed system, necessitating categorization.

The goal of the project established by Safayet Ahmed et al. [2] is to build an electronic speaking system to aid speech challenged communities. This system's main control unit is an Arduino. There are two methods to communicate with this electronic speaking system. The first is audio, which is delivered through the speaker, and the second is a written instruction shown on the LCD. Gloves with flex sensors are used to make gestures. The recorded voice instructions are first kept on the SD card. There is a separate audio and text command for certain motions. When the configuration parameters need to be changed, the Arduino must be programmed again.

B. G. Lee et al. [3] suggested a wearable hand glove-based sign language interpreting system. To distinguish the characters in the American Sign Language alphabet, this wearable device employs five flex-sensors, two pressure sensors, and a three-axis inertial motion sensor. A wearable device containing a sensor module, a processor module, and a display unit mobile application module make up the entire system. Android-based smartphones include a text-to-voice feature that turns incoming text into auditory output. With the aid of the built-in camera, motions are collected. These collected pictures are employed in subsequent procedures such as noise removal, image brightness and contrast adjustment, image cropping, image enhancement, segmentation, feature extraction, and so on.

Prabha et al. [4] created a flex sensor-based audio command using a gesture recognition module that effectively converts hand gestures into speech. This simplifies the communication process and eliminates the need for a human interpreter. Because the messages are taken from a database established following predictive analysis, the system may be adjusted to the individual's needs. Gloves featuring flex sensors across the length of each figure are known as wireless data gloves. The flex sensor is connected to the ATmega328 microcontroller's digital ports. Through Bluetooth connectivity, data from the ATmega328 microcontroller will be sent to the Raspberry Pi. The data will then be converted to speech.

The idea described by Ambar et al. [5] discusses the construction of a sign language translator that uses a wearable device to transform sign language into speech and text. The glove-based system can read a single arm's and five fingers' motions. Five flex sensors detect finger bending, and an accelerometer detects arm movements, in this gadget. The gadget can recognise any motions that match to words and phrases in American Sign Language (ASL) and convert them into speech via a speaker and text shown on an LCD screen using a combination of these sensors.

The reviewed literature suggests the usage of Arduino, Raspberry Pi, flex sensors. This project uses Arduino, flex sensors and the hardware part is connected with an app. The hand glove attached with flex sensors detect the hand gestures made by the user and convert into speech through Arduino. An android application has also been developed and through the app users can input the text and it will be converted into speech and the response from people will be converted into text. So this app can also be used by deaf people.

EXISTING METHOD

To Two traditional ways of communication between deaf person and hearing individuals who do not know sign language exist through interpreters or text writing. The interpreters are very expensive for daily conversations and their involvement will result in a loss of privacy and independence of a dumb person. Thus, a low-cost, more efficient way of enabling communication between normal person and dumb person is needed.

Drawbacks:

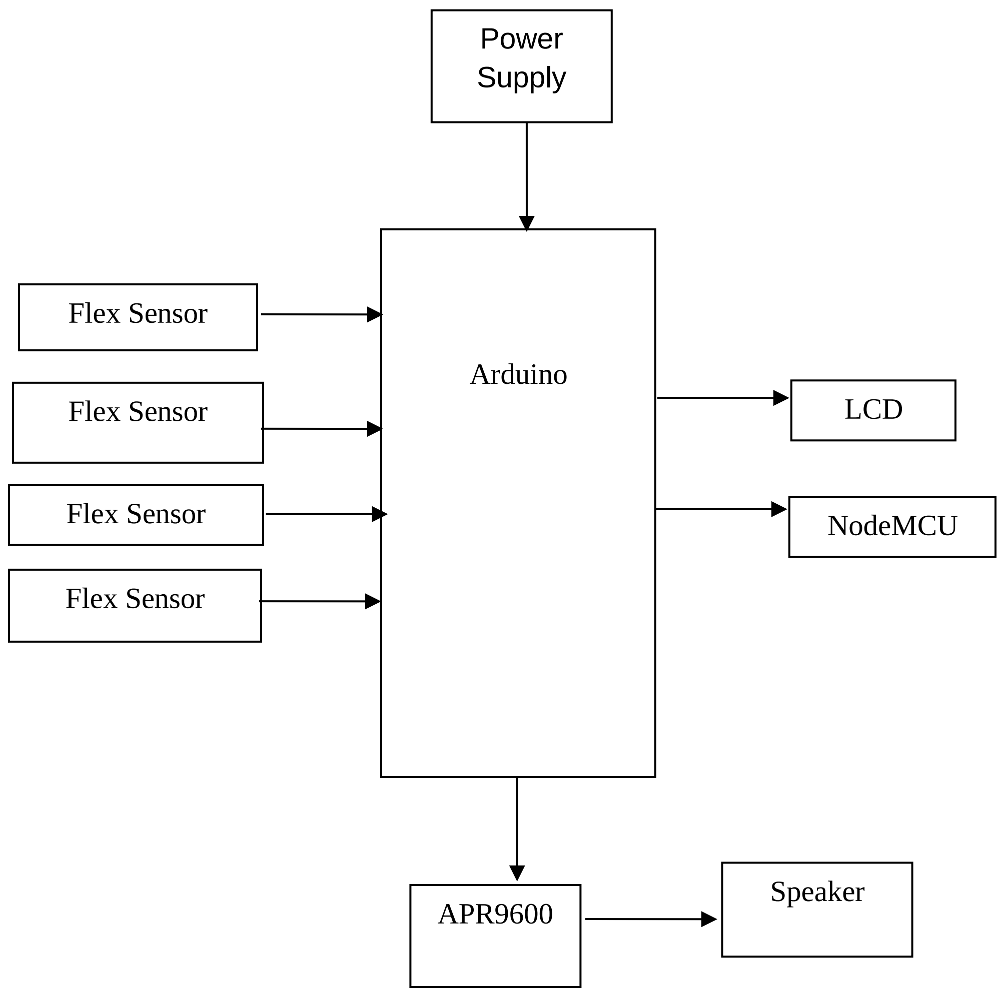
- Only writing on notes can convey the messages.
- No automatic sensing of gestures.
- Uncomfortable to understand if the other person doesn’t know the Sign Language.

CHAPTER 3

PROPOSED SYSTEM

In this proposed system flex sensor is implemented to capture the hand gestures of a user. The flex sensors output a stream of data that varies with degree of bend. This is given to Arduino and it will give output using Speaker. Here flex sensors are used to detect hand posture. Flex sensors are carbon resistive elements. When the sensor is bent, corresponding to the bend radius it produces the output resistance. Approximately from 10K to 30K ohm the resistance value is varied. When sensor is bent at 90 degree the resistance increases to 30K ohm and an unfixed sensor resistance is decreased to 10K ohm. So, by using this people can communicate.

BLOCK DIAGRAM:



Hardware requirements

ARDUINO

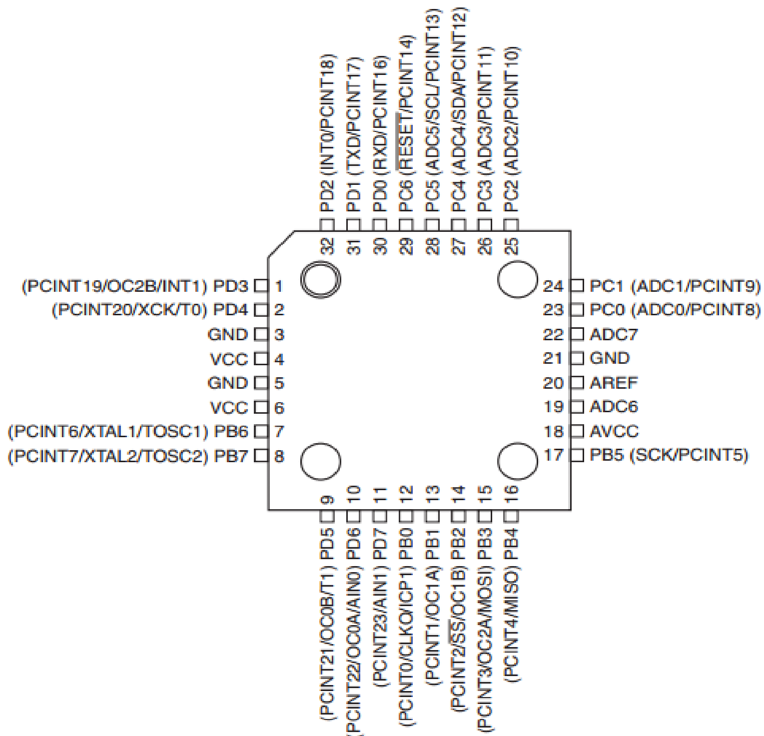
The Arduino microcontroller is an easy to use yet powerful single board computer that has gained considerable traction in the hobby and professional market. The Arduino is open-source, which means hardware is reasonably priced and development software is free. This guide is for students in ME 2011, or students anywhere who are confronting the Arduino for the first time. For advanced Arduino users, prowl the web; there are lots of resources.

This is what the Arduino board looks like.

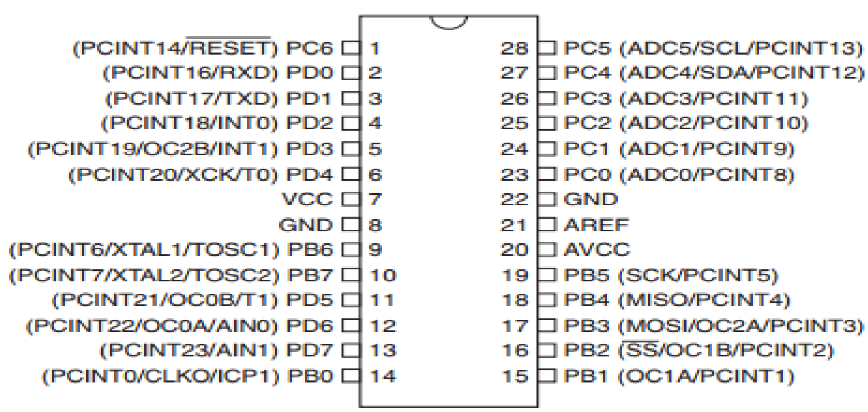
The Arduino programming language is a simplified version of C/C++. If you know C, programming the Arduino will be familiar. If you do not know C, no need to worry as only a few commands are needed to perform useful functions.

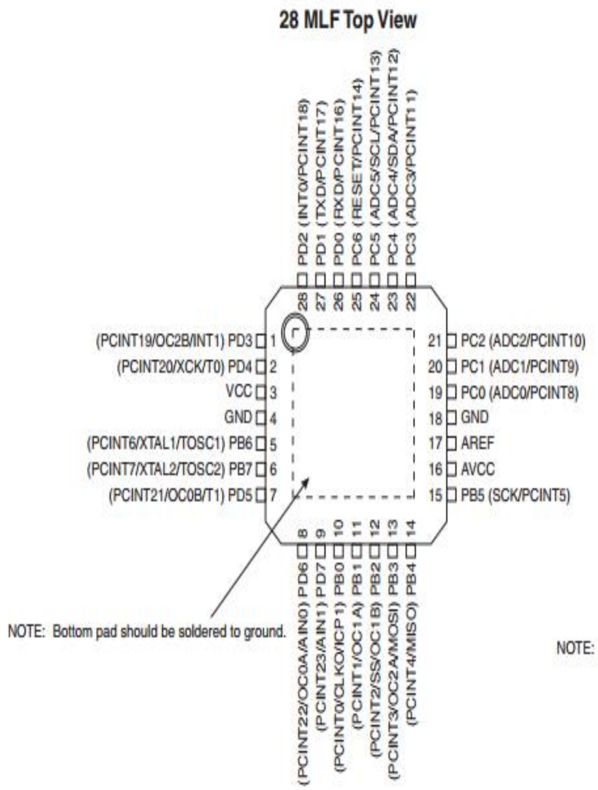
PIN CONFIGURATIONS

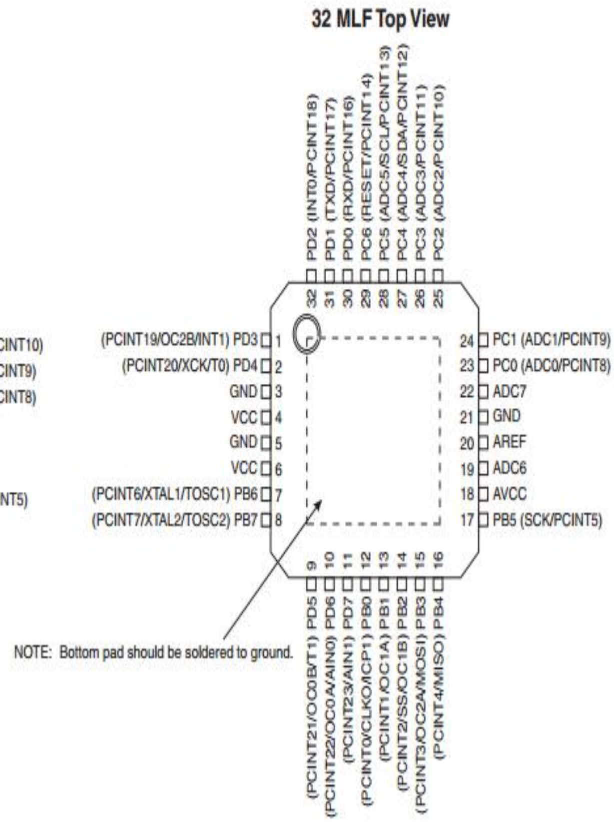
TQFP Top View



PDIP







The ATmega48PA/88PA/168PA/328P is a low-power CMOS 8-bit microcontroller based on the AVR enhanced RISC architecture. By executing powerful instructions in a single clock cycle, the ATmega48PA/88PA/168PA/328P achieves throughputs approaching 1 MIPS per MHz allowing the system designer to optimize power consumption versus processing speed.

The AVR core combines a rich instruction set with 32 general purpose working registers. All the 32 registers are directly connected to the Arithmetic Logic Unit (ALU), allowing two independent registers to be accessed in one single instruction executed in one clock cycle. The resulting architecture is more code efficient while achieving throughputs up to ten times faster than conventional CISC microcontrollers.

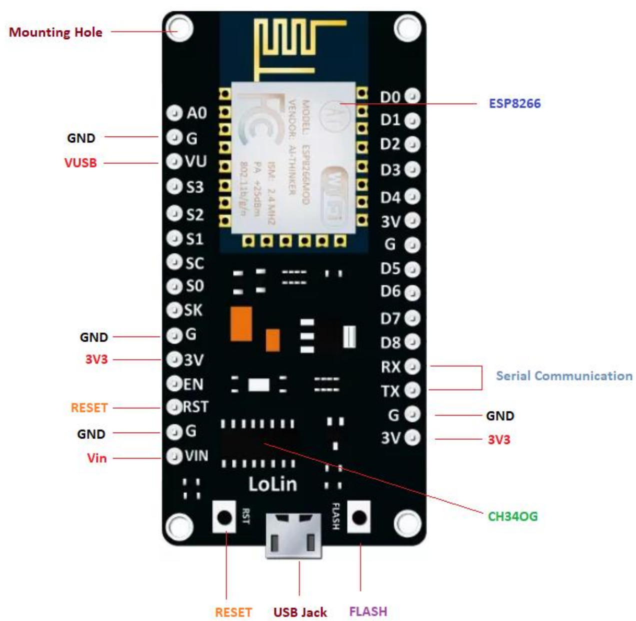
NodeMCU:

NodeMCU is an open-source firmware and development kit that plays a vital role in designing your own IoT product using a few Lua script lines.

Multiple GPIO pins on the board allow you to connect the board with other peripherals and are capable of generating PWM, I2C, SPI, and UART serial communications.

- The interface of the module is mainly divided into two parts including both Firmware and Hardware where former runs on the ESP8266 Wi-Fi SoC and later is based on the ESP-12 module.

The firmware is based on Lua – A scripting language that is easy to learn, giving a simple programming environment layered with a fast scripting language that connects you with a well-known developer community.



And open source firmware gives you the flexibility to edit, modify and rebuilt the existing module and keep changing the entire interface until you succeed in optimizing the module as per your requirements.

- USB to UART converter is added on the module that helps in converting USB data to UART data which mainly understands the language of serial communication.

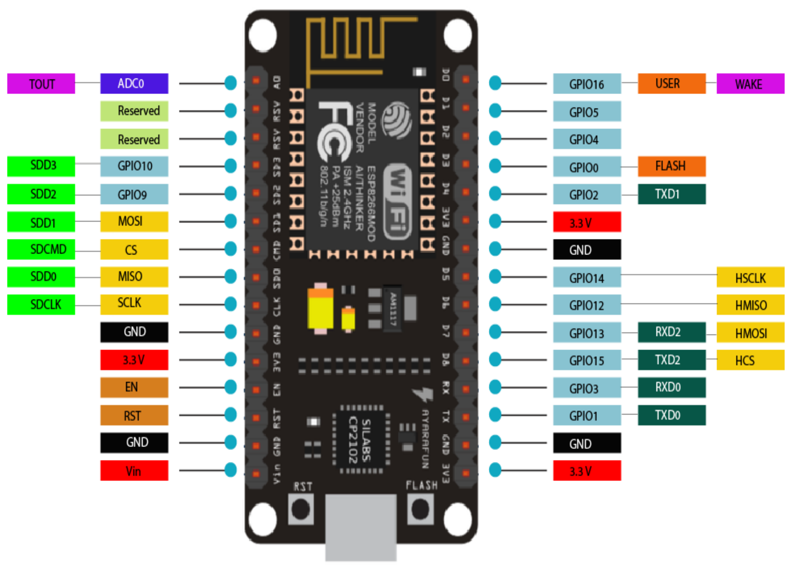
Instead of the regular USB port, MicroUSB port is included in the module that connects it with the computer for dual purposes: programming and powering up the board.

- The board incorporates status LED that blinks and turns off immediately, giving you the current status of the module if it is running properly when connected with the computer.

The ability of module to establish a flawless WiFi connection between two channels makes it an ideal choice for incorporating it with other embedded devices like Raspberry Pi.

NodeMCU Pinout:

NodeMCU comes with a number of GPIO Pins. Following figure shows the Pinout of the board.

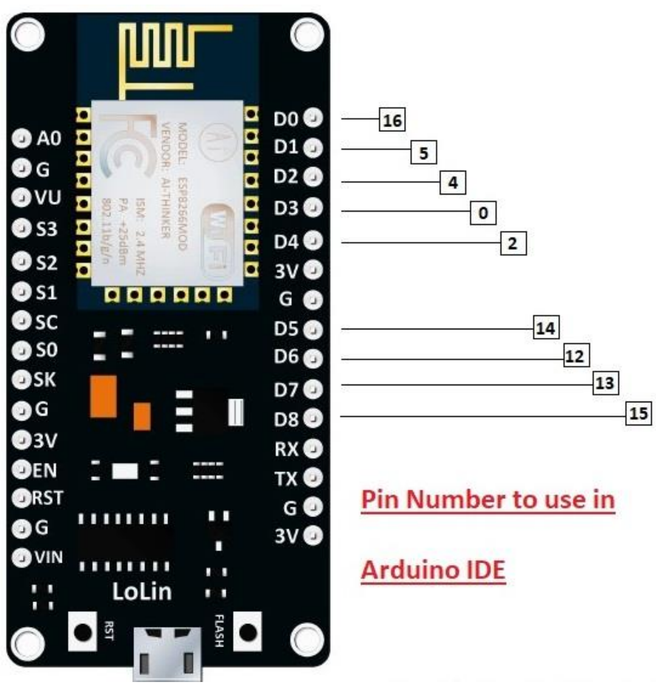


- There is a candid difference between VIN and VU where former is the regulated voltage that may stand somewhere between 7 to 12 V while later is the power voltage for USB that must be kept around 5 V.

Features:

- Open-source
- Arduino-like hardware
- Status LED
- MicroUSB port
- Reset/Flash buttons
- Interactive and Programmable
- Low cost
- ESP8266 with inbuilt wifi
- USB to UART converter
- GPIO pins

As mentioned above, a cable supporting micro USB port is used to connect the board. As you connect the board with a computer, LED will flash. You may need some drivers to be installed on your computer if it fails to detect the NodeMCU board. You can download the driver from this page.



Applications:

NodeMCU V3 is mainly used in the WiFi Applications which most of the other embedded modules fail to process unless incorporated with some external WiFi protocol. Following are some major applications used for NodeMCU V3.

- Internet Smoked Alarm
- VR Tracker
- Octopod
- Serial Port Monitor
- ESP Lamp
- Incubator Controller
- IoT home automation
- Security Alarms

Flex sensors:

Flex sensors are usually available in two sizes. One is 2.2 inch and another is 4.5 inch. Although the sizes are different the basic function remains the same. They are also divided based on resistance. There are LOW resistance, MEDIUM resistance and HIGH resistance types.

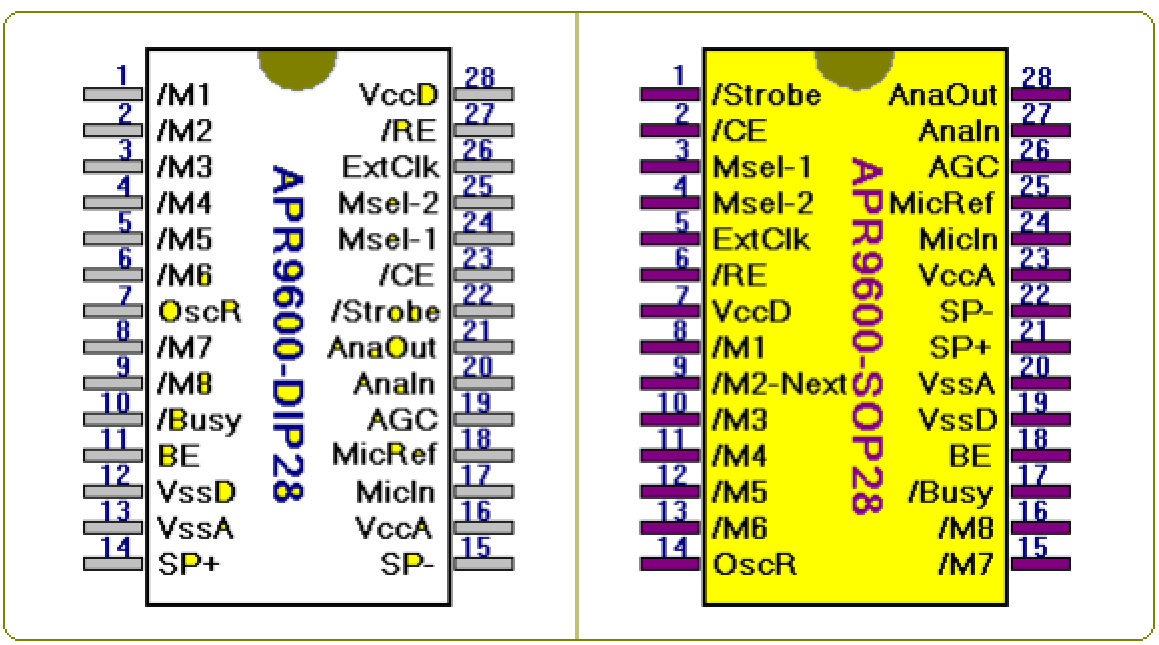
FLEX SENSOR Features and Specifications

- Operating voltage of FLEX SENSOR: 0-5V
- Can operate on LOW voltages
- Power rating : 0.5Watt (continuous), 1 Watt (peak)
- Life: 1 million
- Operating temperature: -45ºC to +80ºC
- Flat Resistance: 25K Ω

- Resistance Tolerance: ±30%
- Bend Resistance Range: 45K to 125K Ohms(depending on bend)

VOICE MODULE:

The APR9600 device offers true single-chip voice recording, non-volatile storage, and playback capability for 40 to 60 seconds. The device supports both random and sequential access of multiple messages. Sample rates are user-selectable, allowing designers to customize their design for unique quality and storage time needs. Integrated output amplifier, microphone amplifier, and AGC circuits greatly simplify system design. the device is ideal for use in portable voice recorders, toys, and many other consumer and industrial applications.
APLUS integrated achieves these high levels of storage capability by using its proprietary analog/multilevel storage technology implemented in an advanced Flash non-volatile memory process, where each memory cell can store 256 voltage levels. This technology enables the APR9600 device to reproduce voice signals in their natural form. It eliminates the need for encoding and compression, which often introduce distortion.



PS : The APR9600 DIP & SOP is not [PIN TO PIN]

APR9600 block diagram is included in order to describe the device's internal architecture. At the left hand side of the diagram are the analog inputs. A differential microphone amplifier, including integrated AGC, is included on-chip for applications requiring use.The amplified microphone signals fed into the device by connecting the ANA_OUT pin to the ANA_IN pin through an external DC blocking capacitor. Recording can be fed directly into the ANA_IN pin through a DC blocking capacitor, however, the connection between ANA_IN and ANA_OUT is still required for playback. The next block encountered by the input signal is the internal anti-aliasing filter. The filter automatically adjusts its response according to the sampling frequency selected so Shannon’s Sampling Theorem is satisfied. After anti-aliasing filtering is accomplished the signal is ready to be clocked into the memory array.

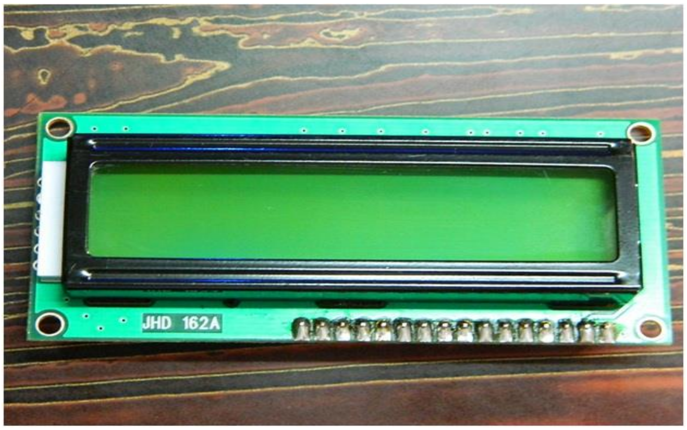
This storage is accomplished through a combination of the Sample and Hold circuit and the Analog Write/Read circuit. These circuits are clocked by either the Internal Oscillator or an external clock source. When playback is desired the previously stored recording is retrieved from memory, low pass filtered, and amplified as shown on the right-hand side of the diagram. The signal can be heard by connecting a speaker to the SP+ and SP- pins. Chip-wide management is accomplished through the device control block shown in the upper right-hand corner. Message management is provided through the message control block represented in the lower center of the block diagram. More detail on actual device application can be found in the Sample Application section. More detail on sampling control can be found in the Sample Rate and Voice Quality section. More detail on Message management and device control can be found in the Message Management section.

LCD:

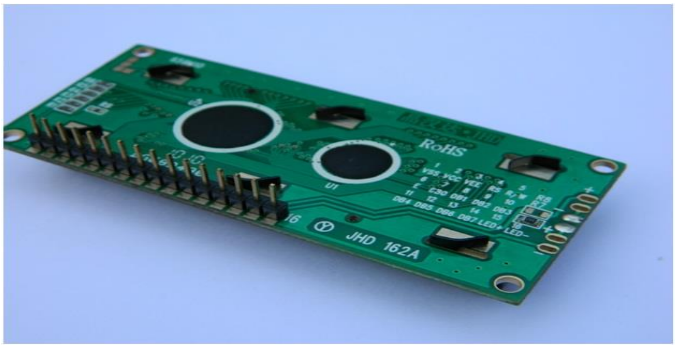
LCD (Liquid Crystal Display) is the innovation utilized in scratch pad shows and other littler PCs. Like innovation for light-producing diode (LED) and gas-plasma, LCDs permit presentations to be a lot more slender than innovation for cathode beam tube (CRT). LCDs expend considerably less power than LED shows and gas shows since they work as opposed to emanating it on the guideline of blocking light.

A LCD is either made with a uninvolved lattice or a showcase network for dynamic framework show. Likewise alluded to as a meager film transistor (TFT) show is the dynamic framework LCD. The uninvolved LCD lattice has a matrix of conductors at every crossing point of the network with pixels. Two conductors on the lattice send a current to control the light for any pixel. A functioning framework has a transistor situated at every pixel crossing point, requiring less current to control the luminance of a pixel. Some aloof network LCD's have double filtering, which implies they examine the matrix twice with current in the meantime as the first innovation took one sweep. Dynamic lattice, be that as it may, is as yet a higher innovation.

A 16x2 LCD show is an essential module that is generally utilized in various gadgets and circuits. These modules more than seven sections and other multi fragment LEDs are liked. The reasons being: LCDs are affordable; effectively programmable; have no restriction of showing exceptional and even custom characters (not at all like in seven fragments), movements, etc. A 16x2 LCD implies 16 characters can be shown per line and 2 such lines exist. Each character is shown in a lattice of 5x7 pixels in this LCD. There are two registers in this LCD, in particular Command and Data.

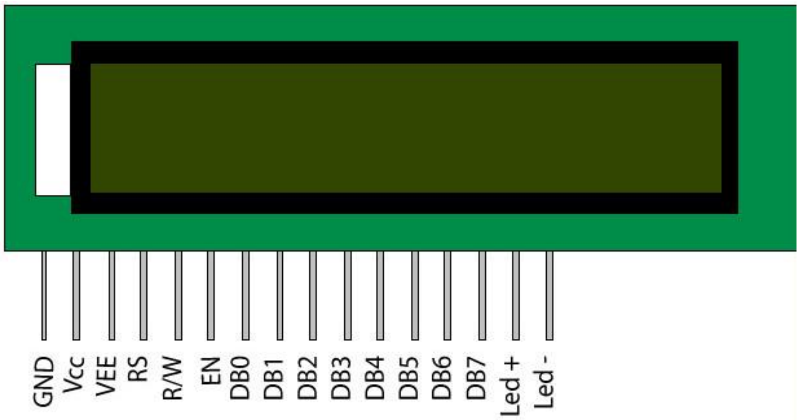


LCD – Front View



LCD – Back View

Pin Diagram:



Software requirements

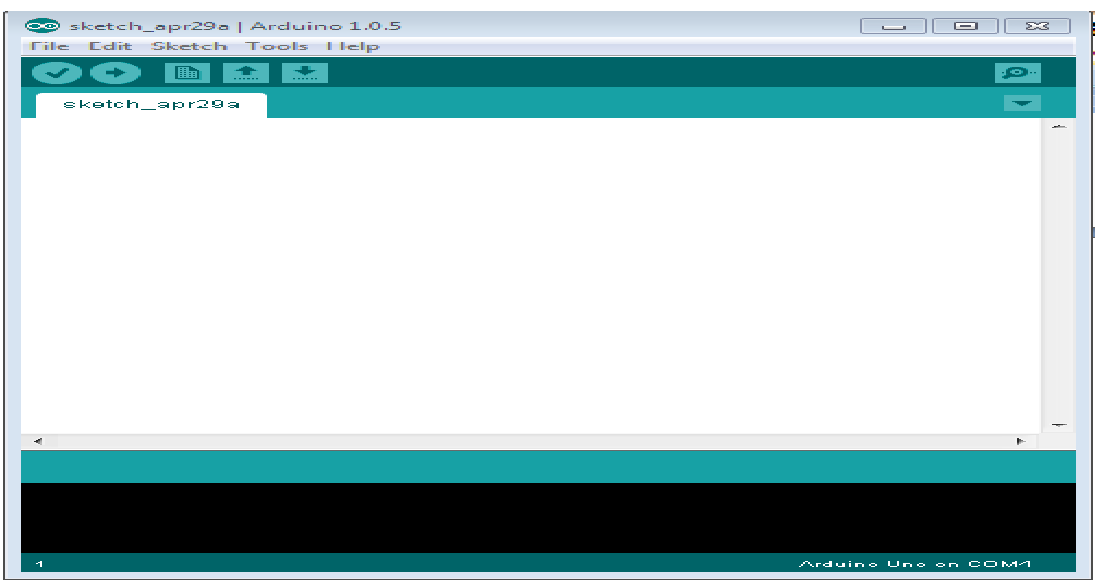
EMBEDDED C

Implanted C makes use of KEIL IDE programming. The framework program written in implanted C can be placed away in Microcontroller. The accompanying is a portion of the actual motives behind composing applications in C as opposed to get collectively. It is much less disturbing and much less tedious to write down in C then amassing. C is less traumatic to trade and refresh. You can utilize code available in capacity libraries. C code is compact to different microcontrollers with subsequent to 0 alteration. Genuine, installed C programming need nonstandard expansions to the C driver with a view to bolster charming components, as an example, settled point range catching, numerous unmistakable reminiscence banks, and fundamental I/O operations.

In 2008, the C Standards Committee prolonged the C data to deal with these problems via giving a normal wellknown to all executions to purchaser to contains numerous additives not handy in standard C, for example, settled factor wide variety catching, named address spaces, and vital I/O equipment tending to. Installed C utilize the greater part of the grammar and semantics of wellknown C, e.G., number one() paintings, variable definition, facts type statement, contingent proclamations (if, switch. Case), circles (even as, for), capacities, exhibits and strings, structures and union, piece operations, macros, unions, and so on.

Arduino IDE:

The Arduino IDE software is a open source software, where we can have the example codes for the beginners. In the Present world there are lot of version in the Arduino IDE in which present usage is Version1.0.5. It is very easy to connect the PC with Arduino Board.



Advantages:

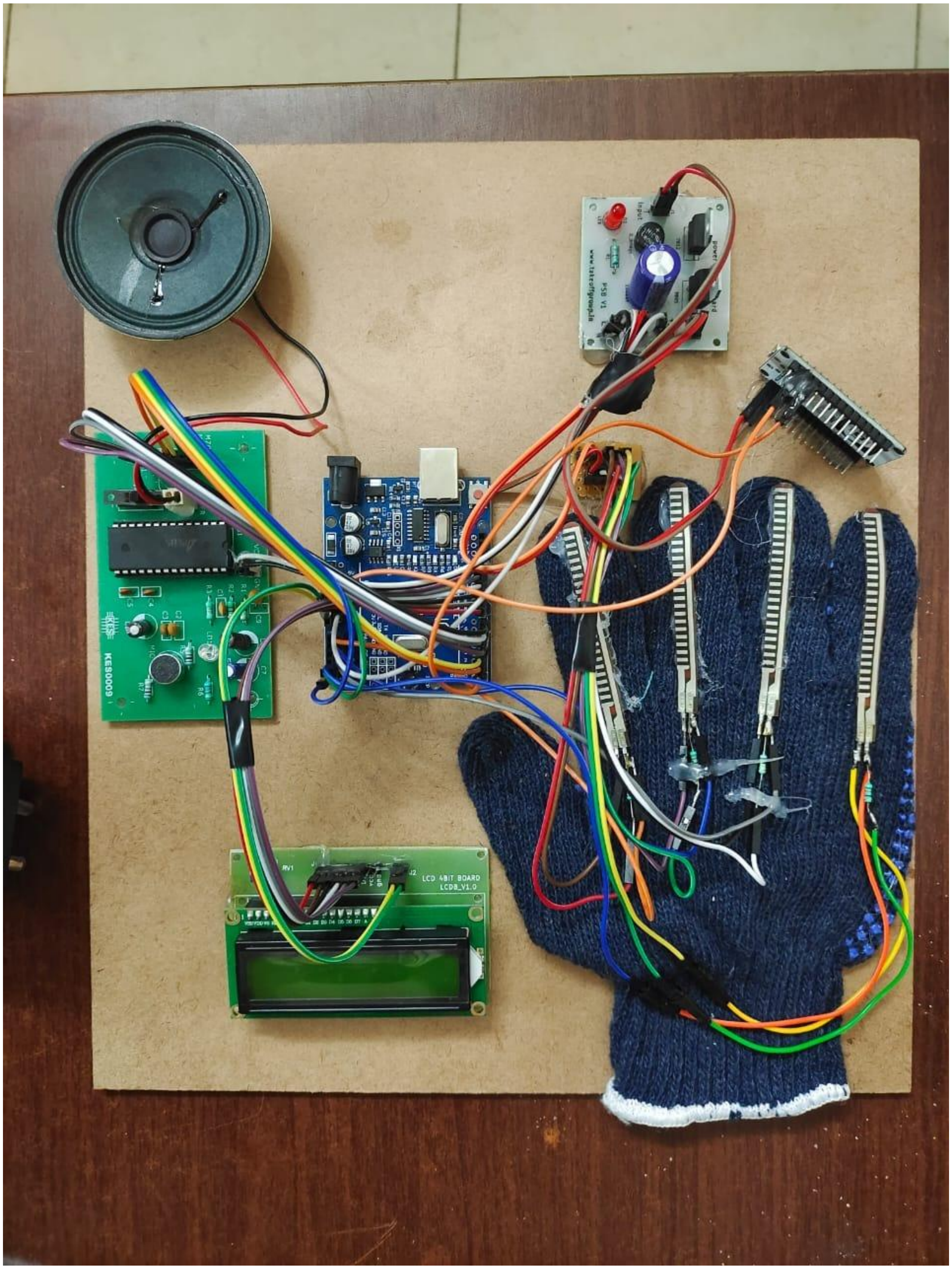
- Low cost Compact systems
- Flexible to users
- It takes less power to operate system

Applications:

- Gesture recognition and conversion.
- As a translating device for Mute people.
- It can be used for Mobiles for SMS sending.
- Translation of sign language in many regional languages.

CHAPTER 4

IMPLEMENTATION AND OUTPUTS



The user wears a glove that has flex sensors on it. Now when the user wants to say something, he/she makes gestures by bending the fingers. So, different combinations are made with the bending of the flex sensors creating different resistance combinations for the output pin of the Arduino to exhibit different entity. Arduino is connected to Voice Module; which is further connected to speaker. The flex sensor will give input to Arduino with the bending of the fingers of the person resulting in the change of the angles of the flex sensor hence changing the resistance will trigger the Arduino to give the relevant output as per the code we have written i.e., which combination of resistances will give which entity as our output. Further, when we will have the output, the speaker which is connected to the Voice module will give the speech signal as our output.

CODE:

```
#include<LiquidCrystal.h>

LiquidCrystal lcd(8,9,10,11,12,13);// rs = 13, en = 12, d4 = 11, d5 = 10, d6 = 9, d7 = 8;

#define flexPin_1 A0      // Pin connected to voltage divider output

#define flexPin_2 A1      // Pin connected to voltage divider output

#define flexPin_3 A2      // Pin connected to voltage divider output

#define flexPin_4 A3      // Pin connected to voltage divider output

// Change these constants according to your project's design

const float VCC = 5;      // voltage at Ardunio 5V line

const float R_DIV_1 = 100000.0;  // resistor used to create a voltage divider

const float flatResistance_1 = 50000.0; // resistance when flat

const float bendResistance_1 = 170000.0;  // resistance at 180 deg //
```

```
const float R_DIV_2 = 220000.0;  // resistor used to create a voltage divider

const float flatResistance_2 = 160000.0; // resistance when flat

const float bendResistance_2 = 320000.0;  // resistance at 180 deg //

int M0=4;

int M1=5;

int M2=6;

int M3=7;

int M4=2;

int M5=3;

int M6=A4;

int M7=A5;

String str1;

int a=0;

int b=0;

void setup()

{

   Serial.begin(9600);                                  // begin serial port with baud rate 9600bps

    //defining Flux sensors as inputs

  pinMode(flexPin_1, INPUT);

  pinMode(flexPin_2, INPUT);
```

```
pinMode(flexPin_3, INPUT);
pinMode(flexPin_4, INPUT);
lcd.begin(16,2);
 pinMode(M0,OUTPUT);
 pinMode(M1,OUTPUT);
 pinMode(M2,OUTPUT);
 pinMode(M3,OUTPUT);
 pinMode(M4,OUTPUT);
 pinMode(M5,OUTPUT);
 pinMode(M6,OUTPUT);
 pinMode(M7,OUTPUT);
 digitalWrite(M0,HIGH);
 digitalWrite(M1,HIGH);
 digitalWrite(M2,HIGH);
 digitalWrite(M3,HIGH);
  digitalWrite(M4,HIGH);
 digitalWrite(M5,HIGH);
 digitalWrite(M6,HIGH);
 digitalWrite(M7,HIGH);
 lcd.clear();
```

```
lcd.setCursor(0,0);
lcd.print("SPEAKING SYS");
lcd.setCursor(0,1);
lcd.print("FOR MUTE");
delay(2000);


}


void loop()
{


   // Read the ADC, and calculate voltage and resistance from it
  int ADCflex_1 = analogRead(flexPin_1);
  int ADCflex_2 = analogRead(flexPin_2);
   int ADCflex_3 = analogRead(flexPin_3);
  int ADCflex_4 = analogRead(flexPin_4);
   lcd.clear();
   lcd.setCursor(0,0);
lcd.print("fx1:");
lcd.setCursor(4,0);
```

```
lcd.print(ADCflex_1);
lcd.setCursor(8,0);
lcd.print("fx2:");
lcd.setCursor(12,0);
lcd.print(ADCflex_2);
 lcd.setCursor(0,1);
lcd.print("fx3:");
lcd.setCursor(4,1);
lcd.print(ADCflex_3);
lcd.setCursor(8,1);
lcd.print("fx4:");
lcd.setCursor(12,1);
lcd.print(ADCflex_4);
  delay(2000);


    delay(3000);
    if(a==0)
    {
  if(ADCflex_1>=630&&ADCflex_1<=650)
```

```
{


      lcd.clear();

  lcd.setCursor(0,0);

lcd.print("WAY TO GROCERY");

   digitalWrite(M0,LOW);

      delay(2000);

      digitalWrite(M0,HIGH);

  delay(3000);

 // str1 =String(ADCflex_1);

   Serial.println("111");


  }

   }

  if(ADCflex_1>680)

  {


      lcd.clear();

  lcd.setCursor(0,0);

lcd.print("WAY TO RAILSTATION");
```

```
 digitalWrite(M5,LOW);
     delay(2000);
      digitalWrite(M5,HIGH);
 delay(3000);
// str1 =String(ADCflex_1);
 Serial.println("555");
 a=1;
 if(ADCflex_1<620)
 {
   a=0;
 }


}
 if(ADCflex_2<1022)
{
 lcd.clear();
lcd.setCursor(0,0);
lcd.print("REST ROOM");
 digitalWrite(M1,LOW);
     delay(2000);
```

```
        digitalWrite(M1,HIGH);

        delay(3000);

        // str1 =String(ADCflex_2);

   Serial.println("222");

  }

  if(b==0)

  {

  if(ADCflex_3>=800&&ADCflex_3<840) //OR 1001

  {

   lcd.clear();

  lcd.setCursor(0,0);

lcd.print("HOSPITAL");

   digitalWrite(M2,LOW);

       delay(2000);

        digitalWrite(M2,HIGH);

        delay(3000);

        // str1 =String(ADCflex_3);

   Serial.println("666");

  }

  }
```

```
 if(ADCflex_3>=840) //OR 1001
{
 lcd.clear();
lcd.setCursor(0,0);
lcd.print("PHARMACY");
 digitalWrite(M6,LOW);
    delay(2000);
     digitalWrite(M6,HIGH);
     delay(3000);
     // str1 =String(ADCflex_3);
Serial.println("333");
b=1;
if(ADCflex_3<800)
{
 b=0;
}


}
if(ADCflex_4<1022
```

```
  )
  {
   lcd.clear();
  lcd.setCursor(0,0);
lcd.print("BUS STOP");
   digitalWrite(M3,LOW);
       delay(2000);
        digitalWrite(M3,HIGH);
        delay(3000);
        // str1 =String(ADCflex_4);
   Serial.println("444");
  }
  else
  {
    lcd.clear();
  lcd.setCursor(0,0);
lcd.print("NORMAL");
    delay(500);
  }
 }
```

Threshold Sensor Values for each gesture

- Grocery: 630 <= Flex1 <= 650
- Railway station: Flex1 >= 680
- Rest room: Flex2 <= 1022
- Hospital: 800 <= Flex3 < 840
- Pharmacy: Flex3 >= 840
- Bus Stop: Flex4 <= 1022
- Else normal condition

<u>OUTPUT:</u>

- **NORMAL CONDITION**

- **RAILWAY STATION**

- **HOSPITAL**

- **PHARMACY**

- **GROCERY**

- **REST ROOM**

- **BUS STOP**

CHAPTER 5

CONCLUSION AND FUTURE WORK

In this project work, the signing are additional helpful for the benefit of communication between the mute people and traditional folks. The project in the main aims at reducing the gap of communication between the mute people and traditional folks. Here the methodology intercepts the mute signs into speech. during this system it overcomes the difficulties long-faced by mute folks and helps them in improving their manner. The projected system is extremely simple to carry to any places in comparison to existing systems. To help the mute folks, the language gets born-again into text kind and on the display screen it'll be displayed. World Health Organization cannot communicate with traditional folks i.e. deaf and dumb folks the system is extremely a lot of useful. The primary feature of the project is that the one which is able to be applied in common places that the recognizer of the gestures is also a standalone system.

CHAPTER 6

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BIODATA

Name – Akash Gowda K R
Mobile Number – 8971985647
E-mail – akashgowda.kr2019@vitstudent.ac.in
Permanent Address – Bengaluru, Karnataka

Name – P Yeshwanth Reddy
Mobile Number – 8688994860
E-mail – pidapayeshwanth.reddy2019@vitstudent.ac.in
Permanent Address – Ananthapur, Andhra Pradesh

Name – K Sai Kumar
Mobile Number – 7989978116
E-mail – saikumar.2019@vitstudent.ac.in
Permanent Address – Tirupathi, Andhra Pradesh

Name – Sumit Rawat
Mobile Number – 8306578523
E-mail – sumit.2019@vitstudent.ac.in
Permanent Address – Jaipur, Rajasthan