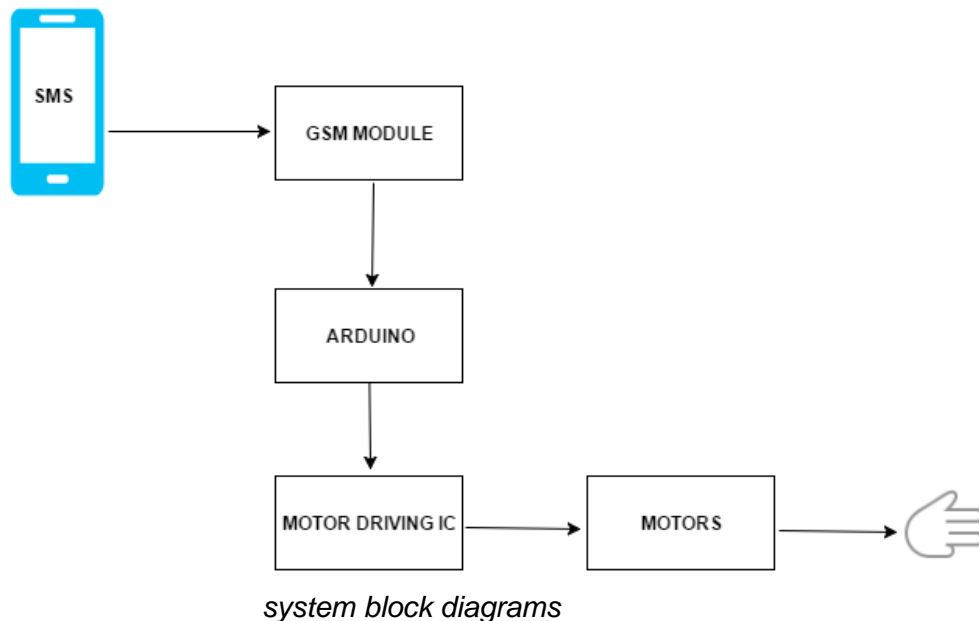


## **SMART GLOVES FOR BLIND**

The project is based on translation of English language message to Braille language which is understood by blind people. The sender sends a SMS which will be translated using Arduino. Arduino will then run 6 vibrating motors. Each alphabet in the SMS will run corresponding vibrating motors according to the grammar of Braille language.



### **Components**

This device is implemented using following components.

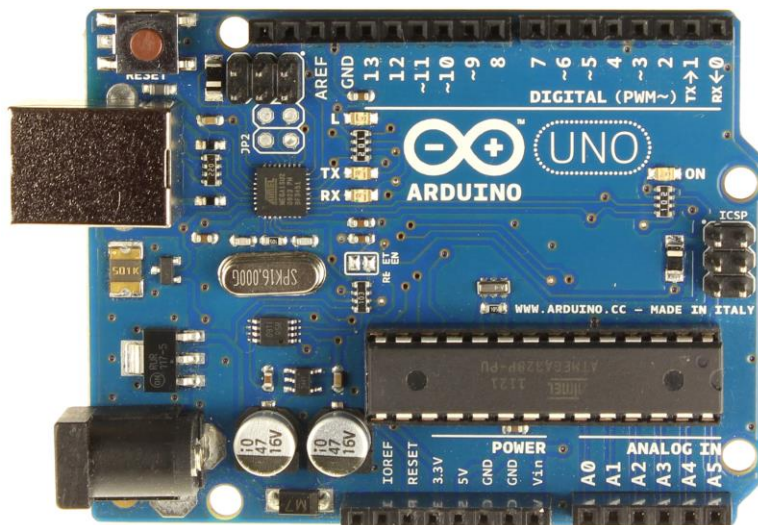
1. Arduino UNO R3
2. GSM module SIM900
3. Vibrating coin flat DC motors.
4. L293d motor driving IC.

#### **• Arduino UNO R3**

Arduino UNO is a micro-controller that can be used to sense and control other devices. We have used Arduino UNO because it provides a low cost and easy way to devices that can be interfaced to interact with sensors and actuators. It uses ATmega16U2 chip from which more memory and faster data transfer rate is achieved. Upon this, system also provides analog and digital pins that are used for input/output as well as extending the system with different shields and boards. Programming is done on a language called PROCESSING in integrated development environment (IDE) which supports C and C++ languages as well.

Arduino UNO R3 specifications are as follows:-

Microcontroller	ATmega328P
Operating Voltage	5V
Input Voltage (recommended)	7-12V
Input Voltage (limit)	6-20V
Digital I/O Pins	14 (6 are PWM output)
PWM Digital I/O Pins	6
Analog Input Pins	6
DC Current for all I/O Pin	20 mA
Flash Memory	32 KB (ATmega328P) of which 0.5 KB used by bootloader
SRAM	2 KB (ATmega328P)
EEPROM	1 KB (ATmega328P)
Clock Speed	16 MHz
LED BUILT IN	13
Length	68.6 mm
Width	53.4 mm
Weight	25 g

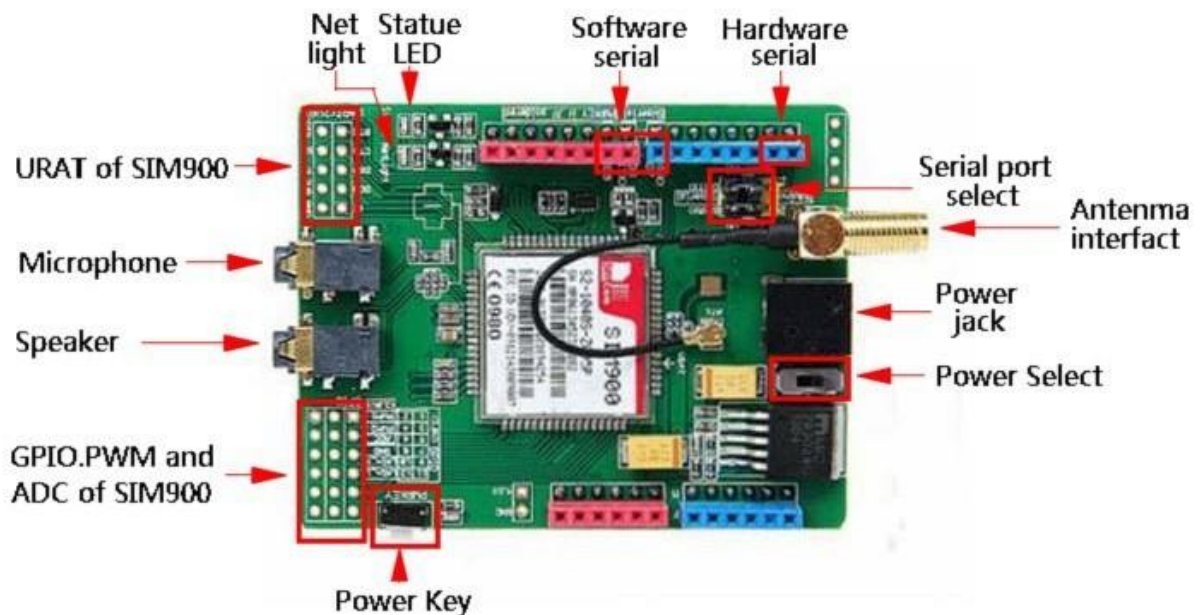


- **GSM module SIM900**

GSM technology is used for communication between two users. SIM900 module can be used for many purposes such as short message service (SMS), calls and GPRS service. Main advantage of using GSM technology is there is no range limitation i.e. two users don't need to be close to each other. The module comprises of antenna, SIM card holder and RS232 based serial port for communication. The Quad-band supported by SIM900 works in all countries across the world. It needs an external power supply, around 1.5mA. This module can be interfaced and controlled by its USART with AT commands. Every command line starts with "AT" (AT abbreviation of Attention) and hence called AT Commands.

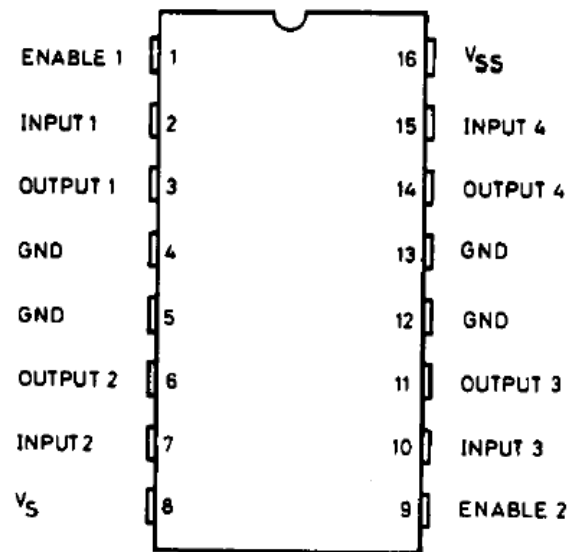
Specifications of SIM900 are as follows:-

Item	Min	Typical	Max	Unit
Voltage	4.8	5.0	5.2	VDC
Current	/	50	450	mA
Dimension(with antenna)	110x58x19			mm
Net Weight	76±2			g



- **L293d motor driving IC**

The output current generated by Arduino is not enough to drive the motors, hence we need some interface. L293d is the standard motor driving IC. This IC is built on a dual H-bridge driver circuit. It behaves as a current amplifier as it takes a low current signal and provide a higher current signal. A signal L293 D can drive 2 motors simultaneously, both clockwise and anti-clockwise. It has an Enable pin which when kept high output become active and work according to the inputs supplied. And when the Enable pin is low the driver is in high impedance state hence outputs are off.

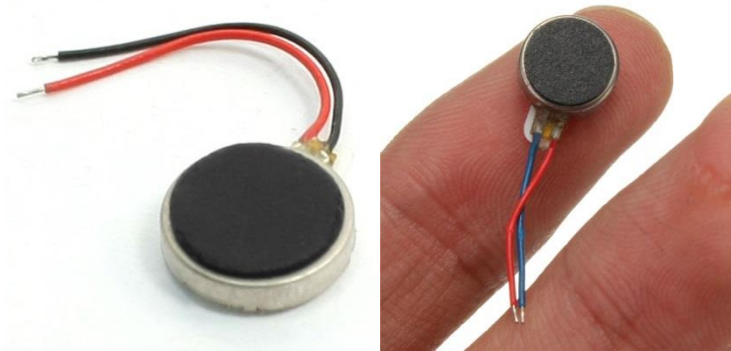


- **Vibrating DC motors**

Vibrating Motors are used to only to make the blind person feel. These motors would be kept on the fingers of blind, hence it should be small and compact. Here we have used coin flat dc motor, generally used in mobile phones and micro-controllers.

Specifications of dc motor are as follows:-

Voltage:	3V-4.5V
Current:	0.06A
Speed:	9000±2000RPM
Size:	About 10*3mm / 0.39*0.12"
Material:	Metal
Net Weight:	1g



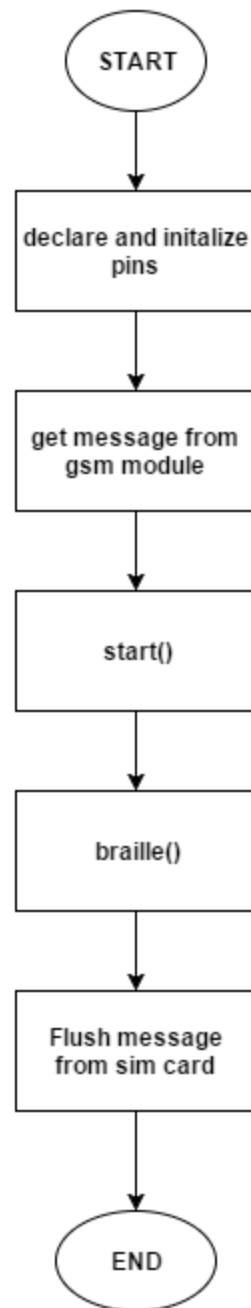
### **Advantages over present application**

The proposed system is simple, efficient and cost effective. The existing systems provides text to speech conversion, which speaks out the text loud enough not only receiver to hear but everyone else nearby too. Hence privacy cannot be achieved. This device fulfills this problem as in this case only the receiver wearing the gloves would get the message in the form of vibration. Plus, these text to speech applications are only available in smartphones running on Android, iOS, etc. But this proposed system can be used even without a phone, what we need is just a sim card at the receiving end. Also the present system works on GSM Technology which has no range limitation and also it is not dependent on Internet connectivity. Unlike in case of message transmitted using internet, in GSM there is no such thing like message being stored at a centralized server, which makes it safe from hackers.

### **Challenges faced**

The main challenge in developing this project was the interfacing of L293 D motor driving IC with Arduino. In addition to this other problem faced was to retrieve or mine the message from SIM Card and transfer it to Arduino for processing.

## Flow Chart



## Code Fragments

### 1. Gsm initialization

```
#include<GSM.h>
#define PINNUMBER "123"
GSM gsmAccess;
GSM_SMS sms;
```

```

char text[200];
char senderNumber[20];
void setup () {
  Serial.begin(9600);
  while(!Serial)
  {
    ;
  }
  boolean notConnected = true;

  // Start GSM connection
  while (notConnected) {
    if (gsmAccess.begin(PINNUMBER) == GSM_READY) {
      notConnected = false;
    } else {
      //Serial.println("Not connected");
      delay(1000);
    }
  }
}

```

## 2. To run motors

```

void a(){
  digitalWrite(ledPin1,HIGH);
  delay(timer);
  digitalWrite(ledPin1,LOW);
  delay(timer/2);
}

```

## 3. Braille Function

```

void braille(byte letter) {      // time to transmit

if (letter == 'a') {a();}
if (letter == 'b') {b();}
if (letter == 'c') {c();}
if (letter == 'd') {d();}

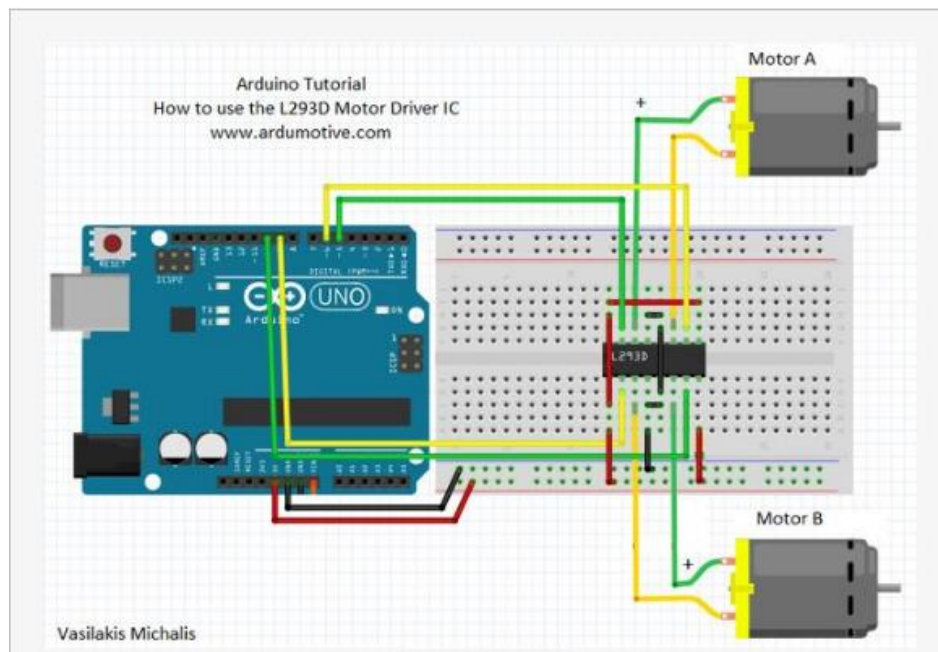
if (letter == 'A') {digitalWrite(ledPin6,HIGH);delay(timer/2);digitalWrite(ledPin6,LOW);a();}
if (letter == 'B') {digitalWrite(ledPin6,HIGH);delay(timer/2);digitalWrite(ledPin6,LOW);b();}
if (letter == 'C') {digitalWrite(ledPin6,HIGH);delay(timer/2);digitalWrite(ledPin6,LOW);c();}
if (letter == 'D') {digitalWrite(ledPin6,HIGH);delay(timer/2);digitalWrite(ledPin6,LOW);d();}

if (letter == '1')
{digitalWrite(ledPin2,HIGH);digitalWrite(ledPin4,HIGH);digitalWrite(ledPin5,HIGH);digitalWrite(ledPin6,HIGH);
delay(timer/2);digitalWrite(ledPin2,LOW);digitalWrite(ledPin4,LOW);digitalWrite(ledPin5,LOW);digitalWrite(ledPin6,LOW);a();}

```

#### 4. Loop Function

```
void loop () {  
  if(sms.available())  
  {  
    i=0;  
    sms.remoteNumber(senderNumber,20);  
    while(c = sms.read())  
    {  
      text[i] = c;  
      i = i+1;  
    }  
    j=i;  
    for(i = 0; i < j; i++)  
      braile(text[i]);  
    if(i==j)  
      memset(text,0,sizeof(text)); //clears array  
    sms.flush();  
  }  
  delay(2000);  
}
```



Connection Diagram

#### References

1. [www.google.com](http://www.google.com)
2. [www.wikipedia.com](http://www.wikipedia.com)
3. [www.draw.io](http://www.draw.io)
4. [www.instrucables.com](http://www.instrucables.com)
5. [www.arduino.cc](http://www.arduino.cc)