# Speaking System for Speech Impaired People

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***Abstract-****Sign language is employed by speech impaired individuals to interact with others. However it is troublesome for the conventional people to grasp their language. This creates a communication barrier between the normal and the impaired people. The projected system is useful to unravel this drawback. The hand gestures shown by the impaired people will be converted into text message which is further reworked into speech. The MEMS measuring device and flex sensors are used to find motion and gesture of hand in all directions. Based on the gesture the voice output is generated through mobile application. In addition, GPS and GSM are incorporated for tracking the user's location and sending message respectively to the concerned people in SOS condition.*

***Keywords-*** *MEMS measuring device, flex sensor, mobile applications, gesture recognition, GSM, GPS, SOS condition.*

## I. INTRODUCTION

In all around the world about 9.1 billion people and in our country 2.8% of people are speech impaired. In the present world, it is very difficult for these people to talk with ordinary people. In their daily life they face a plenty of problems on their communication. Mute people can simply tilt message by sign language. Sign language is a non-verbal form of communication method which is found among all deaf communities in the world. It is employed for communication among normal people and handicapped people.
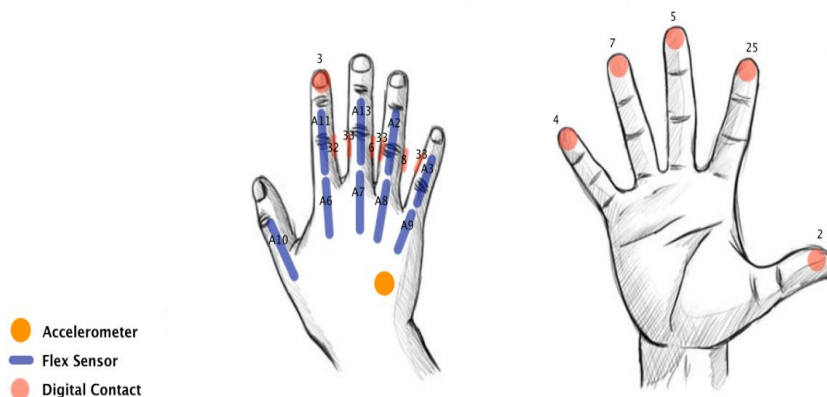


*1.1 Wired Glove*

According to recent survey, American Sign Language (ASL) is one of the most popular sign language (SL) in the world.ASL is a difficult language that usages signs made by the actions of fingers and hands which indicates the postures of the body and expressions of the face.. ASL is seen as precise and genuine language. ASL is an outstanding form of interaction and favourable to an enormous portion of the speech impairment population. ASL provides26 gesture signs named as an American Manual Alphabet. It can be cast-off to spell out many English words that are available. The 19 various hand shapes of ASL are cast-off to make 26 American Manual Alphabets and also offers a set of 10 numeric gestures to sign numbers '0' to '9'.

Since the sign language couldn't be understood by everybody unless and till the normal people like us learn the sign language for the purpose of communication. The sign language of mute is quite difficult to learn. So every person cannot come and share their thoughts with physically impaired person. To overcome this several researches have been done so far to convert the sign language into a understandable message. Hand gestures are a powerful, natural means of communication between human being. These gestures which are the representation of ideas using unique hand shapes or finger orientation, it has potential to interface with computer

system. Nowadays we always hear about new technology that improves our lifestyle, that makes our life easier. Technology has revolutionized the human mankind. Human race has put a gear in technology and they are not in a mood to move the pedals away from this gear. There is huge research on various technology sector such as Artificial Intelligence, Smart phones and many more. This topic has get less attention as compared to other sectors. The Main challenges that this special person facing is the communication gap between -special person and normal person. Deaf and Dumb people always find difficulties to communicate with normal person. Because of miss communication Deaf and Dumb people feel not to communicate and hence they never able to express their feelings. Gesture control smart system (GCSS) localizes and track the hand gesture of the deaf and dumb people in order to maintain a communication channel with the other people.

In our planned model, the smart glove is internally equipped with flex sensors and MEMS measuring device for getting the orientation of the hand. In addition to the above mentioned sensors, we have GSM and GPS modules for sending messages and tracking the patient's location in SOS condition. The gloves has two switches, one is for the sign recognition process and the another is for emergency condition. Supported the orientation of the fingers the voice output is generated through the mobile application.

## II.    OBJECTIVE

The objective of this project is to reduce the communication barrier between the disabled people and the normal people. The device is a portable one and it has the ability to remove the difficulties faced by them for communicating with a normal one. The voice output is delivered through the mobile application, thus making the user more convenient to use

## III.    EXISTING METHOD
**SAYRE GLOVE**

One of the realization which qualifies as data glove is the Sayre Glove, developed at Chicago. It is rudimentary nowadays because light travelling from fixed sources into flexible tubes are receive at the other ends of the tube with an attenuation positively correlated with the finger flexion. A straight tube will let pass all light from the source, but as the tube is flexed, lesser light will reach the receiving end. No position or motion capture system was integrated. They did not use their invention to make a full-fledged gesture recognition device,but only as a multiple slider control, one for each finger.

**P5 GLOVE**

As much as a joystick can be used as a game controller, a wired glove can also be used for gaming purposes. The P5 glove, was claimedto be at the time an innovative device able to control a player's virtual environment, such as grasping a sword or hitting with one's fist. It is not exactly a glove, since there is no piece of cloth; rather, it is a simple piece of plastic sitting on top of the hand, and maintains five flex sensors aligned with the finger. The glove supports hand tracking in all three linear and all three angular axes, as the Cyber Glove II, which is achieved thanks to an optical tracking technology. Also, because this glove is targeted at desktop PC users, it also supports a mouse compatibilty mode, in which the user becomes able to control the on-screen cursor.

**5 TH GLOVE**

It is possible to use the glove with a wire using USB or possibly a serial protocol, but more   more interestingly, there is an additional option to use it wirelessly. Consequently, users gain the ability to move almost freely in their environment, provided they stay within adequate wireless range. Price is quite affordable for such a glove, as the 5-finger version is below a thousand US dollars and it is expensive for consumers.

## IV.    METHODOLOGY

This system consist of Flex sensor, ADXL 345, Switch, Bluetooth module, GSM module, GPS module and Mobile application. According to dumb people for every motion they have a meaning. That message is kept in a data base. Likewise all templates are get in a data base. In real time the template data base is fed into ARDUINO Micro controller and all the sensors are fixed in their hand.
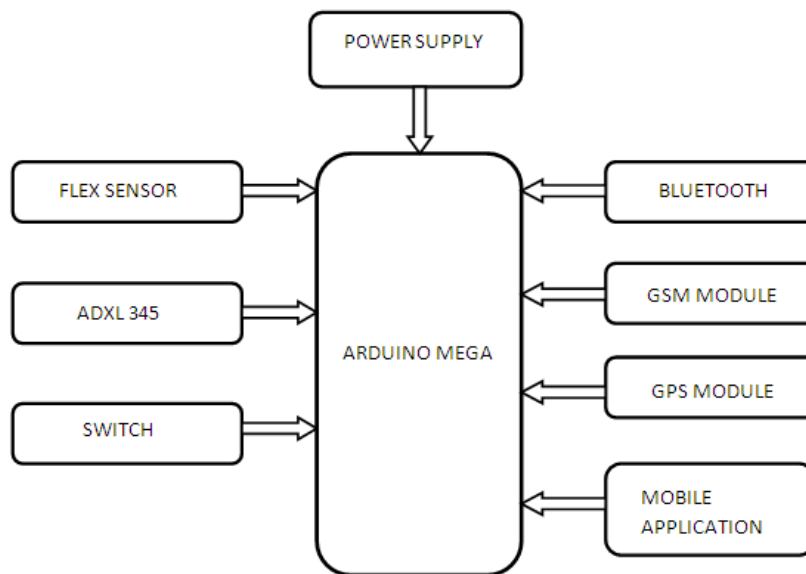
*4.1 Block diagram of proposed model*

For every action the SENSOR get accelerated and give the signal to the Microcontroller. If the fingers are bended then their position is captured by the flex sensors and the orientations of the hands are detected by the accelerometer. Based on the position and orientation of the hand their output will be varied .The MC matches the motion with the data base and this command signal is send to the Bluetooth and transmitted to the mobile phone using Bluetooth wireless transmitter. The output of the system is using the speaker of the mobile phone using android APP. By properly updating the data base the dumb will speak like a normal person using the artificial mouth. In case if they face any emergency, their location will be tracked and sent to their caretaker.

## V.     DESCRIPTION OF THE SYSTEM

***A.     Flex sensor:***
Flex sensor is a two terminal device. The sensor doesn't have polarized terminals like diodes.
*Features of flex sensor and specification:*
i.        In operating voltage – 0-5V
ii.       Power rating – 0.5 Watt (continuous)
iii.      In operating temperature –-45ºC to +80ºC
iv.      Flat Resistance: 25K Ohms
v.       Resistance Tolerance: ±30%



*5.1        Flex sensor*

***B.     IMU sensor:***
The invensense MPU-6050, a mix of 3-axis accelerometer , 3-axisgyro and 3-axis magnetometerserves as IMU sensor. The MPU-6050 features three 16 bit ADCs for digitizing the gyro outputs, three 16 bit ADCs for digitizing the accelerometer outputs, and three 13 bit ADCs for digitizing the magnetometer outputs.

*5.2      IMU sensor*

**C.      Microcontroller:**

The Mega 2560 is a microcontroller board supported by the ATmega2560. Atmega2560 has 54 digital input/output pins from which 15 are used as PWM outputs , a 16 MHz crystal oscillator,4 UARTs (hardware serial ports),16 analog inputs, a USB connection, a power jack, an ICSP header, and a push. It contains the thing which are required to support the microcontroller; using a USB cable connect it to a computer or power it with batter or an AC to Dc adapter to induce started.



*5.3  Arduino board (microcontroller)*

**D.      HC-05 Bluetooth module:**

HC-05 Bluetooth module can receive or transmit data by using switch mode between a master and slave mode.
*HC-05 Technical Specifications:*
i.       Serial Bluetooth module for Arduino
ii.      In operating Voltage: 4V to 6V (Typically +5V)
iii.     In operating Current: 30Ma
iv.      Range: <100m
v.       Works with Serial communication (USART) and TTL compatible
vi.      Follows IEEE 802.15.1 standardized protocol
vii.     Uses Frequency-Hopping Spread spectrum (FHSS)
viii.    Will operate in Master, Slave or Master/Slave mode
ix.      Are often interfaced with Laptop or Mobile phones with Bluetooth
x.       Supported baud rate: 9600,19200,38400,57600,115200,230400,460800.



*5.4  Bluetooth module*

**E.      SIM800 GSM module:**

SIM800 is a quad-band GSM/GPRS module.It usually works on  thefrequencies 850MHz GSM, 900MHz EGSM,and 1900MHz PCS.
 *Features of the GSM module:*
i.       It has one UART port. It additionally has one USB port that may be used for updating firmware and for debugging which has one SIM card interface.
ii.      It integrates TCP/IP protocol.

iii.    SIM800 can be controlled/configured using simple AT commands. Using the UART interface, it can control the SIM800 by sending an AT commands through a host microcontroller.
iv.    It usually operates on a supply range of 3.4 to 4.4V.
*v.*    It can be used for several applications such as sending/receiving messages, making calls,and sending/receiving data over the internet.
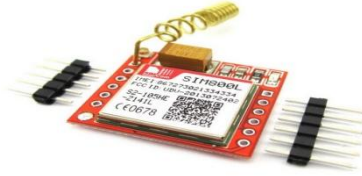


*5.5    GSM module*

*F.    NEO-6M GPS module:*
The NEO-6M GPS module is a complete GPS receiver. It has a built-in 25 x 25 x 4mm ceramic antenna, which provides robust satellite search capability.
*Features:*
i.    A complete GPS module with an active antenna integrated, and also has a built-in EEPROM to save configuration parameter data.
ii.    Built-in 25 x 25 x 4mm ceramic active antenna that provides strong satellite search capability.
iii.    It is equipped with power and signal indicator lights and data backup battery.
iv.    Power supply: 3-5V; Default baud rate: 9600bps.
*v.*    Interface: RS232 TTL
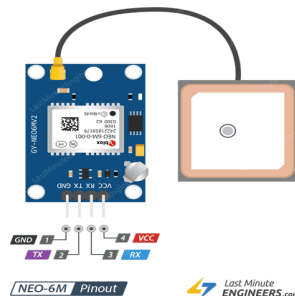


*5.6    GPS module*

## VI.    RESULT& DISCUSSION

In this system, the user performs a sign and it is recognised faster by the arduino atmega. It has the ability to recognise the signs more quickly and will produce the output in voice and text format. Hence it is a low time consuming approach. Further more real time recognition ratio of nearly 90% can be easily achieved.

**1.    Setup of the system**



*6.1 Whole System Setup*



*6.2 Output of the system in mobile application*

**2.      Advantages**
- Low cost
- Flexible to users
- It takes less power to operate
- Portable system
- Easy interpretation.
- Good means of communication to normal people to Differently abled persons Used for communicating at long distances.

**3.      Applications**

- Physically challenged persons
- Conveying information related operation

## VII.      CONCLUSION

Sign language is the only way for the deaf-dumb community to convey their message with the normal people who lack the knowledge of this language. In this paper we have explained about the gesture recognition system for deaf-dumb people. This system has the ability to overcome the difficulties faced by the deaf-dumb community.  Here the sign language will be converted into text and voice message. Flex sensor and accelerometer captures the position of the hand and it will be processed by arduino atmega and through the Bluetooth module the text and voice message is received through the mobile application. The another advantage of this paper is when the user is in emergency their location can be tracked and will be sent to their caretakers. Thus, the hand gestures can be automatically converted into understandable form to the normal person with help of this system.

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