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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.***
Keywords: MEMS measuring device, flex sensor, mobile applications, gesture recognition.

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.

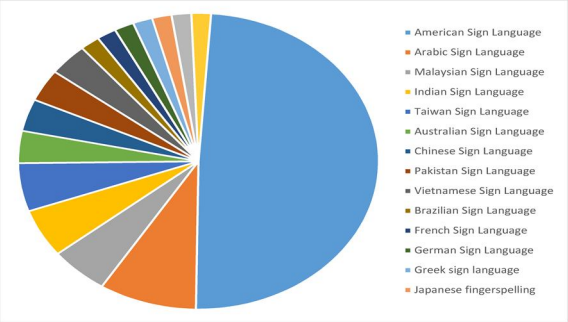


Figure 1.1: Survey on sign language

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 genuinelanguage. ASL is an outstanding form of interaction and favourable to an enormous portion of the speech impairment population. ASL provides 26 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 and it is impractical for everyone to be told that language. 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 gesture is a powerful, natural means of communication between human being. These gestures which is the representation of ideas using unique hand shapes or finger orientation, it has potential to interface with computer system.

In our planned model, the smart glove is internally equipped with flex sensors and MEMS measuring device for getting the orientation of the hand. Supported the orientation of the fingers the voice output is generated through the mobile application.

Numbers '0' to '9'. ASL doesn't comprises built-in ASL equivalents signs for accurate nouns and technical term

II. OBJECTIVE

The objective of this project is to scale back the communication barrier between the disabled population and the normal population. The device is moveable, thus communication of hearing and speech impaired individual is easier. The output of the gestures is going to be delivered in speech kind to the conventional individuals.

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III. EXISTING SYSTEM

Within existing system, the glove is incorporated with flex detectors whose resistance values changes consistent with the gestures and MEMS sensor for locating the motion of the hand specified by the user. The output of the system is displayed within the liquid crystal display and a voice output is generated through speaker.

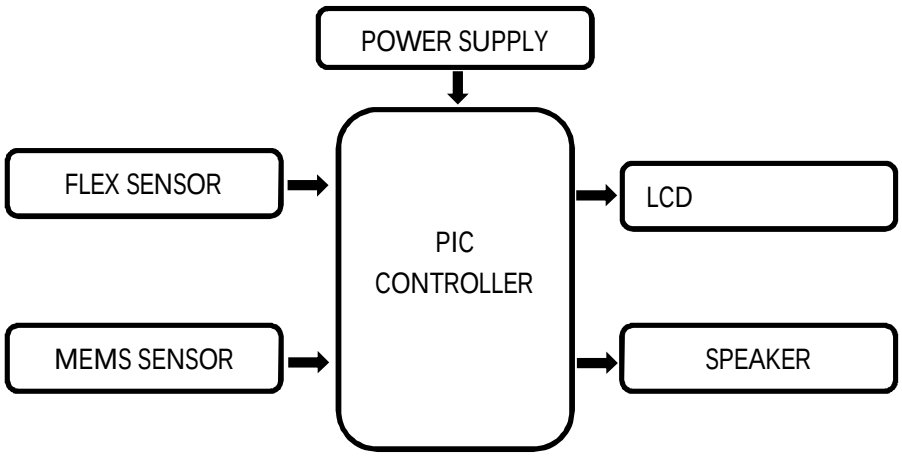


Figure 3.1: Existing diagram

IV. PROPOSED SYSTEM

The proposed model is a smart glove which is internally equipped with flex detectors and accelerometer. For every specific gestures, the flex sensor produces a specific value for resistance and measures the orientation of the hand. The accelerometer is additionally accustomed to find the motion of the hand in all direction. This gesture info is processed by ARDUINO MEGA 2560 microcontroller and also the corresponding voice output is given through the mobile application. Just in case of emergency, the user can be tracked through GPS and a message is distributed to the guardian through GSM.

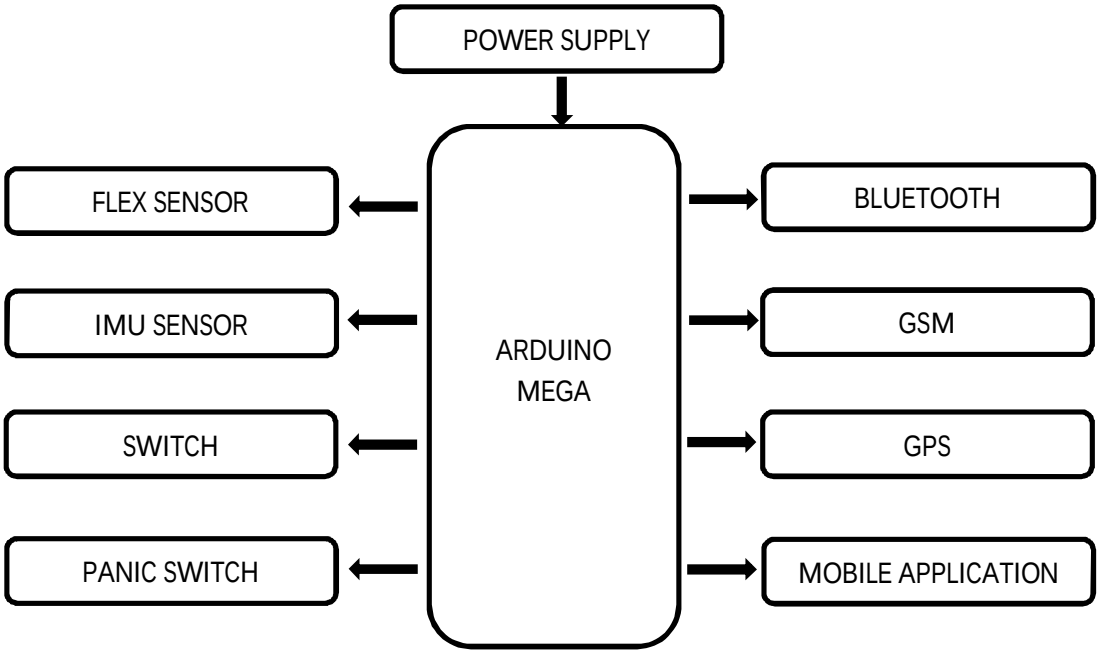


Figure 4.1: Proposed diagram

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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

1) In operating voltage – 0-5V
2) Power rating – 0.5 Watt (continuous)
3) In operating temperature –-45ºC to +80ºC
4) Flat Resistance: 25K Ohms
5) Resistance Tolerance: ±30%
6) Bend Resistance Range: 45K to 125K Ohms.



Figure 5.1: Flex sensor

B. IMU Sensor

The invensense MPU-6050, a mix of 3-axis accelerometer, 3-axisgyro and 3-axis magnetometer serves 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.



Figure 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.



Figure 5.3: Arduino board (microcontroller)

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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:

1) Serial Bluetooth module for Arduino
2) In operating Voltage: 4V to 6V (Typically +5V)
3) In operating Current: 30Ma
4) Range: <100m
5) Works with Serial communication (USART) and TTL compatible
6) Follows IEEE 802.15.1 standardized protocol
7) Uses Frequency-Hopping Spread spectrum (FHSS)
8) Will operate in Master, Slave or Master/Slave mode
9) Are often interfaced with Laptop or Mobile phones with Bluetooth
10) Supported baud rate: 9600,19200,38400,57600,115200,230400,460800.

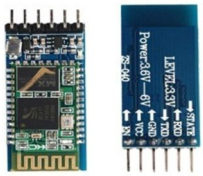


Figure 5.4: Bluetooth module

E. SIM800 GSM Module

SIM800 is a quad-band GSM/GPRS module.It usually works on the frequencies 850MHz GSM, 900MHz EGSM,and 1900MHz PCS.

Features of the GSM module

1) 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.
2) It integrates TCP/IP protocol.
3) 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.
4) It usually operates on a supply range of 3.4 to 4.4V.
5) It can be used for several applications such as sending/receiving messages, making calls, and sending/receiving data over the internet.



Figure 5.5: GSM module

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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

1) A complete GPS module with an active antenna integrated, and also has a built-in EEPROM to save configuration parameter data.
2) Built-in 25 x 25 x 4mm ceramic active antenna that provides strong satellite search capability.
3) It is equipped with power and signal indicator lights and data backup battery.
4) Power supply: 3-5V; Default baud rate: 9600bps.
5) Interface: RS232 TTL

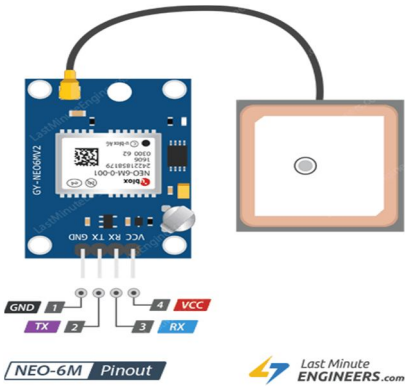


Figure 5.6: GPS module

VI. OVERVIEW OF THE SYSTEM

When the system is switched on, the device is connected with the mobile application. It first checks whether the panic switch is active or not. In case if the switch is active, it indicates the SOS condition, thus the location of the user is instantly tracked and an emergency message is send to the caretaker. On the other hand, if the panic switch is inactive, then gesture performed by the user is detected by the input sensors (flex sensor and accelerometer). If the received and stored data matches then the corresponding voice output is delivered through the mobile application. Finally, the device and the application is disconnected.

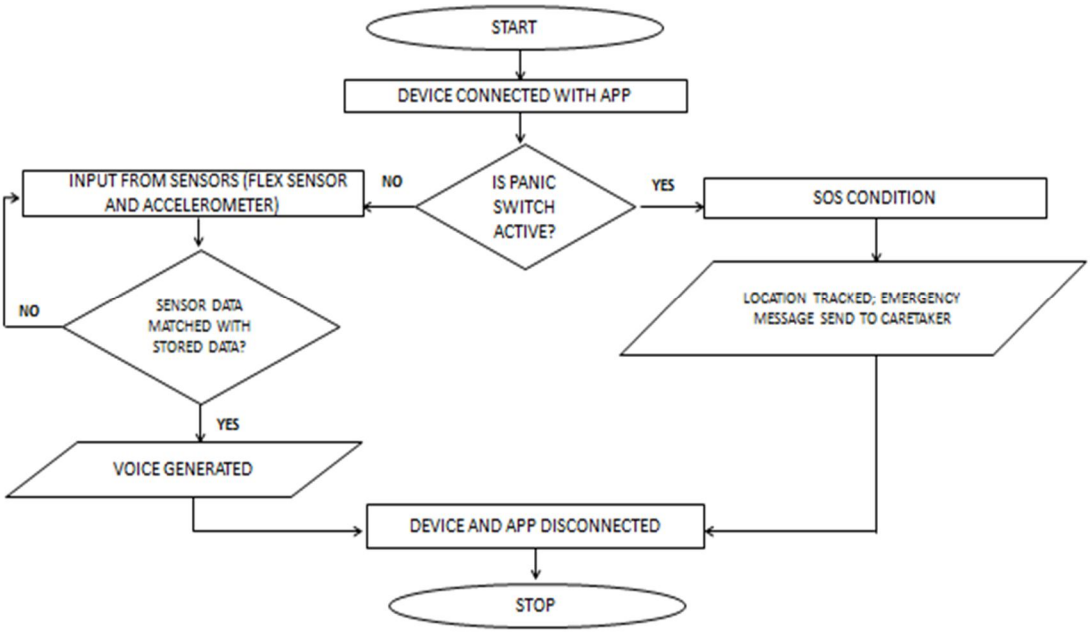


Figure 6.1: Overview of the system

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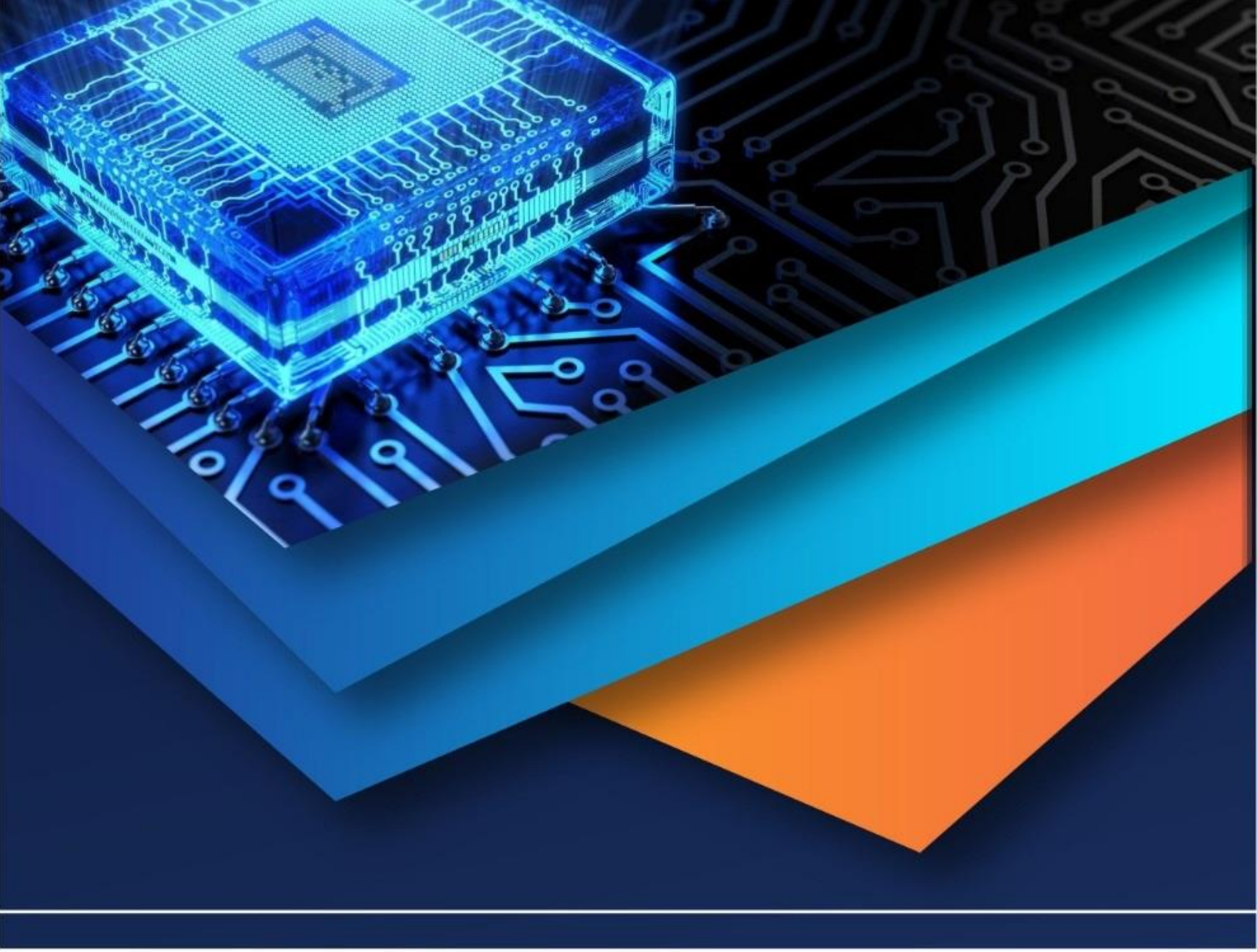
VII. CONCLUSION

This wearable device helps the speech impaired people to deliver their needs and requirements in the form of normal speech to every individual and can use it as a part of their daily habit. The proposed system breaks the communication barrier between the disabled and normal population. It is time economical and replaces the requirement of a translator for the speech impaired to speak with the world. The target of this project is to convert the recognised gestures into speech output that is delivered through mobile application.

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