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Sign Language Translator And Tracking For Speech And Hearing Impaired Person With Cloud Storage

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Abstract

Normally deaf-dumb people use sign language for communication, but they can't normally interact with others . Due to which communications between mute-deaf and a standard person have always been a challenging task. This project is proposed to develop a device which will convert the hand gestures of a deaf-mute person into text which is displayed within the LCD module and a text message are going to be stored in cloud which will be accessed from anywhere through their android mobile . This technology provides a design for developing a digital wireless glove that's fitted with Accelerometer. These sensors sense the gestures of a someone within the kind of tilt of the hand . The system includes a LCD module to display the text , a IOT(wi-fi) module to access the message everywhere, a GPS to track the placement, Emergency button for his or her safety ,Signal Conditioning Unit(SCU) to spice the signal from low frequency to higher frequency , Arduino UNO and Android app for receiving and transmitting the message . The text display being in English which may be understand by a normal person. So this device acts as a communicator further as a translator further as tracking device providing more flexibility in communication. This project aimed to developing the electronic web which will translate sign language into text so as to create the communication happen between the mute communities with the overall public.

Keywords *- Accelerometer , GPS ,IOT , Arduino UNO , Android App ,Emergency Button , LCD module, Hand Gloves.*

1. Introduction

Humans communicate with each other by conveying their thoughts, ideas and experiences to the people around them. There are some ways to attain this and so the most effective one in every of all is that gift of "Speech". The sole way of communication for deaf and dumb people is that the "Sign Language". It might be injustice if we ignore those who deprieved of this invaluable gift. Deaf- Dumb person have to communicate with normal people for his or her daily routine. There are certain difficulties after they bump into certain areas like banking, hospital. India constitutes 2.5 million of Deaf and Dumb population. Those people lack the amenities which a normal person should own a survey analysis. These decreasing ratio of Literate and Employed Deaf and Dumb population could also be a results of the physical disability of hearing for deaf people and disability of speaking for dumb people therefore it produce minimizing the communication between standard person and hearing impaired and muted Person. It actually becomes the similar problem of two persons which knows two different language, nobody of them knows any common language so its becomes an difficulty to talk with one another so they requires a translator physically which might not be always convenient to rearrange and this same reasonably problem occurs in between the Normal Person and therefore the dumb person. To resolve this problem, we introduce a completely unique application. Our application system could also be a desirable Interpreter which translate communication. Gesture recognition is particularly categorized into Haptic-based approach and vision-based approach. The vision based approach captures movement of the signer's hand using cameras, on the alternative hand, haptic-based approach deals with the instrumented gloves affixed with measurement devices which track hand movements. Due to the massive data and complex computation involved in vision-based approach, this paper specifically deals with Haptic-based approach. The Sayre Glove who was the one initiated the gesture based recognition system in 1977 . These sensors track the hand movements accurately, and pass the info to Arduino UNO placed within each sub-system. A gesture in an language may be a specific movement of hands with a particular shape made out of them.

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An sign language usually provides sign for whole words. It should also provide the sign for letters to perform words that don't have corresponding words therein language. During this project Accelerometer Sensor plays the most role, Accelerometer sensors are sensors that change in resistance wishing on the quantity of tilt on the sensor.

2. Problem Definition

The communications between mute-deaf and a standard person have always been a challenging task. The normal or traditional doesn't understand what does the mute-deaf people coming to convey,and so they can't able to fulfil their needs.Only the nearby people can fulfil, if they're at longer distance they can't communicate.In emergency situation also they're at lack of help, These problems can be solved by storing the text messages which translated by hand gestures in the Cloud and hence we they can access from anywhere through android mobile. Emergency button and GPS is also fitted ,so that they can be easily track their location in any emergency situation.

3. Existing Method

Laura Dipietro et al. proposed a glove approaches system during which sensor devices used for capturing hand motion and position.In this approach, detection of hand is eliminated by sensors on the hand and it can easily provide exact coordinates of palm and finger's location and orientation, and also the hand configurations.However using the information gloves become a better approach than camera because the user has the flexibleness of moving the hand around freely, unlike the camera where the user must stay in the position before the camera. Electric , light or magnetic fields or other disturbance doesn't affect the performance of the glove. Xu Zhang et al. developed the framework for hand gesture recognition which might be be utilized in both SLR and gesture based control. The three-axis accelerometer and multichannel EMG sensors are combined to give the data to attain hand gesture recognition. Kamalpreet Sharma et al. . reviewed various methods and techniques which are provided by different authors for the recognition of hand gestures. Hand gesture recognition is dispensed by the methods like pixel by pixel comparison, edge method, using orientation histogram & thinning method. Nowadays, recognizing gestures are classified into vision based, , colored marker approaches and Data Based. Thad Starner et al. proposed real-time hidden Markov model systems for recognizing the sentence-level continuous American linguistic Language employing a single camera to trace the user's unadorned hands. Shoaib Ahmed .V et al. proposed the Prototype version, during the system the user performs an sign and then it holds for 2 seconds to confirm the recognition.

4. Proposed Method

A. Block diagram of proposed system:

Fig 1 refers the proposing system of this gesture communication; This shows the components of these system and the devices with one another are connected. The following are the major components system is having : Accelerometer Sensor,LCD display,SCU,Emergency Button,GPS,IOT(wi-fi),Android app.

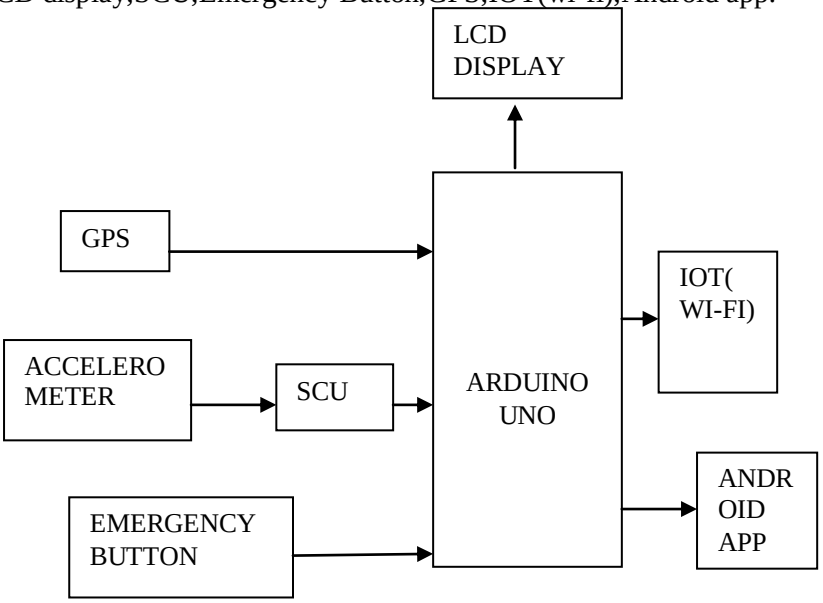

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Fig 1: Block diagram of proposed system

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B. Description of proposed system:

In the electronic support system accelerometer Sensor is implemented to capture the hand gestures of the user. Accelerometer sensors are the sensors which change in resistance depending on the amount of tilt of the finger on the sensor.The data glove is fitted with accelerometer sensor along the hand.Accelerometer Sensor capture the angle of the tilt of the fingers.Then the signal from the accelerometer sensor will be low frequency signal ,hence the signal Conditioning Unit(SCU) is used to boost the signal to high frequency signal.The output of the GPS,Emergency button,SCU is given to Arduino UNO.GPS is used to track the location of the speech and hearing impaired person.Emergency button is provided for the safety of the person.IOT(wi-fi) is used to store the text message in cloud and so it can be accessed from anywhere.Android app is also developed for receiving and sending the text messages.LCD display is used for displaying the text message .

C. Sign language:

Sign language is the language which is used by deaf and mute people for communication. In our system we are using American sign language that is commonly used. User performs various signs and the sensor generated data is used for correlating these with specific signs and mapping them to a database. This system stores sensor data in memory. When it matches with these set of values associated with a sign system recognizes that sign and particular output it as text.

a.American Sign Language (ASL)

American Sign Language (ASL) is a one of the sign language which is used by dumb and deaf people for communication. Fig 2 and 3 shows the gestures for English letters and number used in American Sign Language.

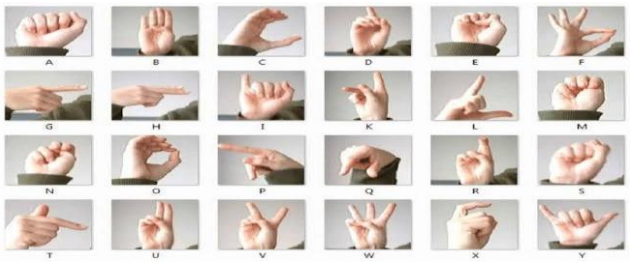

Fig 2: Gesture for the American Sign Language (ASL) for A-Z letter

Fig 3: Gesture for American Sign Language (ASL) for 0-9 number

D.Accelerometer Sensor:

An accelerometer is the device that measures proper acceleration, the acceleration experienced relative to freefall. Multi- and single-axis models are available to detect the magnitude and direction of the acceleration as a vector quantity, and can be used to sense the orientation, acceleration, vibration shock, and falling. Micro machined accelerometers are increasingly present in the portable electronic devices and video game controllers, to detect the position of the device or provide for game input.The accelerometer sensor is used to sense tilt of the fingers.

E.GPS:

Of all the applications of GPS, vehicle tracking and navigational systems have brought these technology to the day-to-day life of the common people. Today GPS fitted cars; fleets , ambulance and police vehicles are common sights on the roads of developed countries. Known by many names such as Vehicle Tracking and Information System (VTIS), Automatic Vehicle Locating System (AVLS), Mobile Asset Management System (MAMS), these systems offer an effective tool for improving the operational efficiency and the utilization of vehicles.

F.IOT:

The Internet of things (IOT) is the network of physical devices, home appliances, vehicles, and other items embedded with the electronics, software, actuators, sensors and connectivity which enables the things to connect, collect and exchange data.

G.LCD DISPLAY:

A **liquid crystal display** (**LCD**) is a thin, flat electronic visual display that uses the light modulating properties of the liquid crystals (LCs). LCs do not emit the light directly.They are used in a wide range of applications including: computer monitors, instrument panels, television, signage, aircraft cockpit displays, etc. They are common in consumer devices such as gaming devices, video players , clocks, watches, telephones and calculators. LCDs have displaced cathode ray tube(CRT) displays in most of the applications.

H.ARDUINO UNO:

Arduino Uno is the microcontroller board based on the ATmega328P . It has 6 analog inputs, 14 digital input/output pins (of which 6 can be used as PWM outputs), a 16 MHz quartz crystal,a power jack, an ICSP header and a reset button, a USB connection. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.You can tinker with your UNO without worrying too much about the doing something wrong, worst case scenario you can replace this chip for a few dollars and start over again.

I.WI-FI:

A Wi-Fi-enabled device, such as a video game console, a personal computer , Smartphone or digital audio player, can connect to the Internet when within range of a wireless network connected to Internet.

5. Algorithm Used

```
//#include "HX711.h"
#include <LiquidCrystal.h>
```

```
LiquidCrystal lcd(13,12,11,10,9,8);
//HX711 scale(3, 2); //HX711 scale(6, 5);
#include <SoftwareSerial.h>

#define rf1 A0
#define rf2 A1
#define rf3 A2
#define rf4 A3
#define emg A4

unsigned char val[5],xx;
void setup()
{
 pinMode(rf1, INPUT_PULLUP);
 pinMode(rf2, INPUT_PULLUP);
 pinMode(rf3, INPUT_PULLUP);
 pinMode(rf4, INPUT_PULLUP);
 pinMode(emg, INPUT_PULLUP);
 Serial.begin(9600);

     lcd.begin(16, 2);
     lcd.setCursor(0,0);lcd.print("----------------");
     lcd.setCursor(0,1);lcd.print("----------------");
     delay(2000);
   lcd.clear();
  }

void loop()
{

  while (Serial.available())
  {
    char inchar = Serial.read();
    val[xx] = inchar;

      if (val[0] == '*') {
        xx++;}

      else {
        xx = 0;
      }
    }


if (xx >1)
{
  xx = 0;
  if (val[1] == '1')
  {lcd.setCursor(0,1);lcd.print("  MESSAGE 1  ");}
  if (val[1] == '2')
  {lcd.setCursor(0,1);lcd.print("  MESSAGE 2 ");}
```

```
  if (val[1] == '3')
  {lcd.setCursor(0,1);lcd.print("  MESSAGE 3  ");}

}

if(digitalRead(rf1)==LOW)
  {
  Serial.println("MESSAGE 1");delay(500);

  }
  if(digitalRead(rf2)==LOW)
  {
  Serial.println("MESSAGE 2");delay(500);

  }
  if(digitalRead(rf3)==LOW)
  {
  Serial.println("MESSAGE 3");delay(500);

  }
  if(digitalRead(rf4)==LOW)
  {
  Serial.println("MESSAGE 4");delay(500);

  }
  if(digitalRead(emg)==LOW)
  {
  Serial.println("EMERGENGY MESSAGE");
  Serial.println("GPS LOCATION:7808.1245,1140.455155");delay(500);
   }

 }
```

6. Result

This system is capable of recognizing signs more quickly than these existing system. In this system by using translator the sign language is translated into text message and stored in the cloud storage and so it can be accessed through android phone and they are able to track their location in case of emergency.

7. Conclusion

In this effective way we are designing a sign language translator and Tracking for deaf and dumb people. The main feature of this project is based on IOT technology. Using these technology we can monitoring a deaf and dumb people anywhere in the world. Using android app we can monitoring a deaf and dumb people in Real time**.** Sign language being the only communication means for deaf-dumb community hampers their interaction with the normal people who lack the knowledge of sign language. This paper has the potential of minimizing this communication barrier by working as an automated translator and converting sign language directly into textual format for the understanding of normal people using accelerometer sensor, Arduino UNO,IOT(WI-FI),GPS,Emergency button.The input data glove detects the hand gesture done by the deaf-dumb person wearing it and provides the analog input to the microcontroller for further interpretation according to the database and the final output is observed on

the LCD display . Thus, hand gesture can be automatically converted with the help of this system into understandable form for the normal person.

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