Assistive Sign Language Interpreter

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Abstract— The main goal of this project is to create a glove system that can continuously identify sign language gestures and translate that into spoken words. In real time the template database of hand gesture messages are fed into a microcontroller and the magnetometer and flex sensors are fixed in the hand glove. After each movement of fingers the motion sensors get accelerated and give the signal to the microcontroller. The microcontroller compares the action with the database and creates the speech signal. The audio signal is delivered by speaker. This device can also monitor the surrounding temperature and location of that person and send it through WIFI.

Keywords: Accelerometer, Flex Sensor, Golve System, LCD Display, Raspberry Pi Microcontroller, Speaker, Temperature Sensor

I. INTRODUCTION

Communication is fundamental to the existence and survival of humans. Some of us are blessed to speak and communicate with each other while some aren't. Earlier people used to make fun of someone who can't speak. This made them feel inferior. They started communicating by sign language i.e. hand gestures. But to understand sign language it takes time. With growing technology, there were many devices invented .We have proposed a device called Assistive Sign Language Interpreter. This device consists of glove system that can continuously identify sign language gestures and translate them into spoken words. A database of hand gesture messages is created and fed into a microcontroller and the magnetometer. Flex sensors are fixed in the hand glove. After every movement of fingers the motion sensors get accelerated and give signal to the microcontroller. The microcontroller compares the action with the database and creates speech signal. The audio signal is delivered by speaker. We can add new gestures into the preset gesture library. This device can also monitor surrounding temperature and location of that person and send it through WIFI.

II. HARDWARE AND SOFTWARE SPECIFICATIONS

A. Hardware Specifications

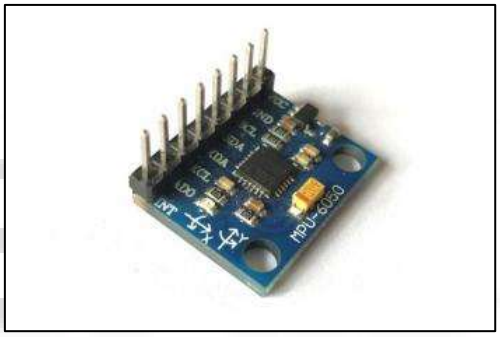
Raspberry Pi Microcontroller is used here.

The gesture library is dumped into the microcontroller. Analog outputs from the sensors are fed to microcontroller. The microcontroller processes the signals and perform analog to digital conversion. the gesture is recognized and corresponding information is identified. The output is given to the speaker in analog form.

1) 16*2 LCD Display

LCD (Liquid Crystal Display) is used to display the output message on LCD and later speech output is given by the speaker.

2) *ADXL328 accelerometer*



Accelerometer sensor measures the vibration or acceleration of motion of fingers. Along with flex sensors, accelerometer sensors will help us to measure even the vibrations. The benefit of using this sensor is when a person is in danger or panicked we can get to know through the vibrations of fingers.

3) *Flex Sensors*

Flex sensor is a flexible device which is attached along the length of fingers. It measures the bending movement of the fingers. According to the degree of bend,there is a output of stream data that varies. The output of flex is recognized by the microcontroller and matched with the gestures in gestures library.

4) DHT11 Sensor

DHT11 is a digital sensor for sensing temperature and humidity. This sensor is interfaced with the microcontroller to measure the temperature of the surrounding. This helps to keep a track on temperature favourable for the person with disabilities.

5) GPS Module

A GPS module is to get track with the location of a person. Using WIFI we can track the location.

B. Software Specifications

1) Python Programming

Python is an interpreted high-level and general purpose programming language. Python uses object oriented approach to write clear, logical and dynamic code. Python is dynamically typed and garbage collected. It supports multiple programming paradigms including structured (procedural),object oriented and functional programming. Python is typically described as a "batteries included" language because of its comprehensive standard library.

2) Python IDE

IDE stands for integrated development environment.Python is a text editor in which you can write your python coding and run it.

3) Rasobian OS

Raspbian may be a free OS supported Debian optimized for the Raspberry Pi hardware. An OS is that the set of basic programs and utilities that make your Raspberry Pi run. However, Raspbian provides quite a pure OS: it comes with over 35,000 packages, pre-compiled software bundled during a nice format for straightforward installation on your Raspberry Pi. Raspbian OS is one of the official Operating systems available for free of charge of charge to download and use. during this case the Pi. Debian is extremely lightweight and makes a superb choice for the Pi. The Raspbian can be used to browse python programs and GUI desktop.

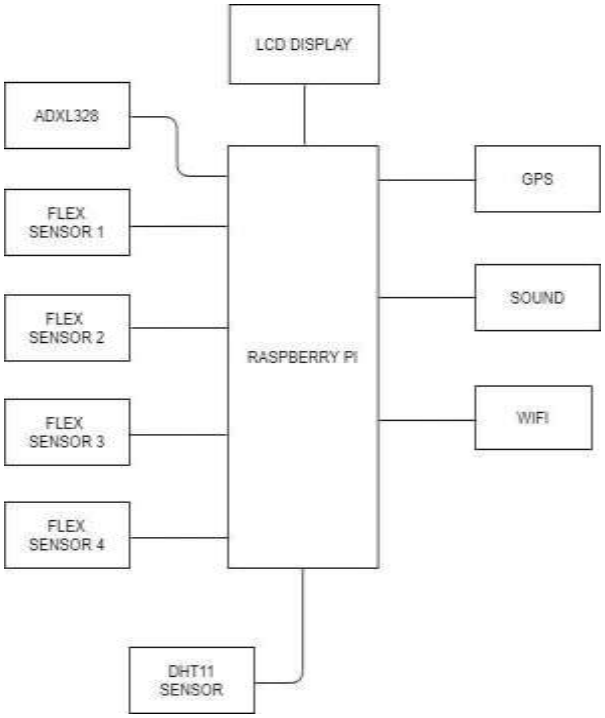
III. METHODOLOGY

It was difficult to communicate for people who can't speak but later sign language came into picture. For the people who can communicate through speech, sign language was consuming more time to understand and reciprocate. Hence, an intermediate system must be there to make it easier to understand the gestures. In this device we have flex sensors attached along the length of each finger. The flex sensors gives an output according to the degree of bend. The analog output is fed to the microcontroller which in turn identifies the gestures and gives us the voice signal as output.

IV. WORKING

In this project we are using four flex sensor and one accelerometer sensor which will help us define sign language and covert it into voice signals. Using temperature sensor we are measuring surrounding temperature. GPS module is also attached to track the location after fixed interval and send it through WIFI server and monitor the activity.

V. BLOCK DIAGRAM



VI. CONCLUSION

Human evolution took place on the core idea of making life easier and better for one's own self and for their fellow humans. Centuries of our history and our ancestors contributed into making our lives easier thus we live the easy life.

Inspired by this thought, we it as our core responsibility to make atleast one life live easier. Considering that, we found people with disabilities more important as taking a responsibility of.

Their disability should not be a barrier for them to not have a easy life. We can try making it utmost easy for them as much as we can with our limitations.

For that we have come up with this project which converts the sign language i.e. gestures into voice signal. It is more like giving voice to the people who can't speak.

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