Sign Language Recognition for Physically Challenged People

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***Abstract*- The advancement in embedded system, provide a space to design and develop a sign language translator system to assist the dumb people. This paper mainly addresses to facilitate dumb person's lifestyle. Dumb people throughout the world use sign language to communicate with others, this possible for those who has undergone special trainings. Common people also face difficult to understand the gesture language. To overcome these real time issues, this system is developed. Whenever the proposed system senses any sign language, it plays corresponding recorded voice. This reduces the communication gap between dumb and ordinary people. This proposed model consist of four modules they are sensing unit, processing unit, voice storage unit and wireless communication unit. It is achieved by integrating flux sensor with PIC16F877A. The flux sensor are placed n gloves, which respond to gesture. This system offers high reliability and response**

I.INTRODUCTION

Sign language is an expressive and natural way for communication between normal and dumb people. The intension of the sign language translation system is to translate the normal sign language into speech and to make easy contact with the dumb people. In order to improve the life style of the dumb people the proposed system is developed. Sign language uses both physical and non-physical communication. Data are directly obtained from each sensor depends upon finger flexures and computer analysis sensor data with static data to produce sentences. It using neural network to improve the performance of the system. The main advantage of this approach less computational time and fast response in real time applications. Its portable device and cost of the device also low. The Physical gesture communication consist of hand gestures that convey respective meaning, the nonphysical is head movement, facial appearance, body orientation and position. Research in the sign language system has two well-known approaches are Image processing and Data glove. The image processing technique using the camera to capture the image/video.

Analysis the data with static images and recognize the image using algorithms and produce sentences in the display, vision based sign language recognition system mainly follows the algorithms are the Hidden Markov Mode , Artificial Neural Networks and Sum of Absolute Difference algorithm use to extract the image and eliminate the unwanted background noise.

The Proposed model will be consisting of combination of hardware and software. Hardware part will include flex sensors on each finger, microcontroller, power supply, and android phone and Bluetooth module. Software part will include programming for android phone application. Hardware part will be consisting of flex sensors to take input from different gestures through gloves, microcontroller to convert input analogue data to digital data and for further processing, power supply to provide voltage to specific units and finally Bluetooth module to send the data from controller to android mobile.

II. MATERIALS AND METHODS

A. FLUX SENSOR

Flexion sensors, (from Latin flectere, 'to bend') also called bend sensors, measure the amount of deflection caused by bending the sensor. There are various ways of sensing deflection, from strain-gauges to hall-effect sensors. The three most common types of flexion sensors are:

- Conductive ink-based
- Fibre-optic
- Conductive fabric/thread/polymer based

A property of bend sensors worth noting is that bending the sensor at one point to a prescribed angle is not the most effective use of the sensor. As well, bending the sensor at one point to more than 90˚ may permanently damage the sensor. Instead, bend the sensor around a radius of curvature. The smaller the radius of curvature and the whole length of the sensor is involved in the deflection, the greater the resistance will be (which will be much greater than the resistance achieved if the sensor is fixed at one end and bent sharply to a high degree). In fact, Infusion Systems define the sensing parameter as flex angle multiplied by radius.

Fig. Flux sensor

B. BEND DETECTION

The bend detection module is the most important and the core part of the paper. This module is based on a microcontroller-controlled circuitry. Flexion sensors typically consist of two layers of conductive material with a layer of resistive material in between. It is mostly sandwiched in between layers of more rugged material, e.g. Neoprene. As pressure is applied (directly or by bending) the two layers of conductive material get pushed closer together and the resistance of the sensor decreases. This sensing mechanism is similar to force-sensitive resistors. These types of sensors are pressure sensors which also sense deflection (pressure as a function of deflection): bending the sensor across an angle of a rigid structure results in stretch of the sensor material which exerts pressure onto the sensor. It is this pressure that is measured. In this module one microcontroller is used and three ports of this microcontroller are in use. Port zero takes the input from the five bend sensors, which is to be processed. The port one takes data from the tilt detection module and the port three gives final data, which represents some meaningful gesture to the speech synthesis module. At first the microcontroller takes input of the five-bend sensor at its port zero. . Output of the five bend sensors is given at the separate pin. Microcontroller deals with the bend sensors one by one. First of all the microcontroller checks the output of the first bend sensor, and calculates its pulse width, after the calculation of the pulse width of the first bend sensor the microcontroller saves its output, and then moves towards the second bend sensor and calculates its pulse width in the similar manner, and keeps on calculating the pulse width of the bend sensors one by one, having calculated the pulse width of the outputs of the five bend sensors, the microcontroller moves towards

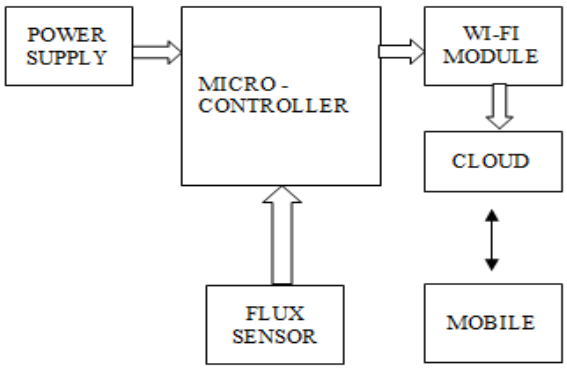


Fig. Block Diagram

C. WI-FI MODULE

The ESP8266 is a low cost Wi-Fi microchip with full TCP/IP stack and microcontroller capability produced by manufacturer Express if system in Shanghai, Chennai.

This small module allows microcontrollers to connect to a Wi-Fi network and make simple TCP/IP connections using Hayes-style commands. However, at first there was almost no English-language documentation on the chip and the commands it accepted. The very low price and the fact that there were very few external components on the module, which suggested that it could eventually be very inexpensive in volume, attracted many hackers to explore the module, chip, and the software on it, as well as to translate the Chinese documentation.

The ESP8285 is an ESP8266 with 1 MB of built-in flash, allowing for single-chip devices capable of connecting to Wi-Fi.

Fig. Wi-Fi module

There are two types in Wi-Fi module. They are Private cloud and Public cloud.

D. HARDWARE MODEL

The actual Hardware model of the system consist of Arduino UNO board with three flux sensors and Wi-Fi module to connect Arduino with Wi-Fi module.

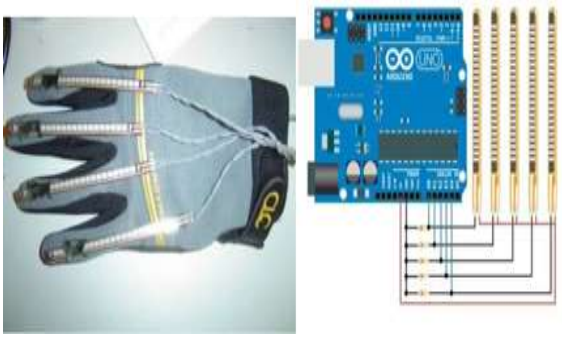


Fig. Ardunio UNO with flux sensor

We build an android app to display the conversion of sign language to text.

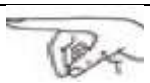
S.NO	SIGN LANGUAGE	TEXT CONVERSION
1.		Hello
2.		How are you
3.		I am fine
4.		Where are you
5.		What are you doing

Fig. Sign to Text Conversion

Rather than taking a single letter, we have created a package of 32 sentences, five of which are shown above.

The main advantage by using it is very user friendly, deaf people are free to communicate. It's compact and cost effective.

It is used in hospitals, deaf and dumb school and at home for elder and illness people.

III.CONCLUSION

The Proposed method translates sign language to speech automatically and satisfy them by conveying thoughts on their own. The system overcomes the real time difficulties of dumb people and improve their lifestyle. System efficiency is improved with the help of PIC microcontroller, also integrates with wireless transmission is help in long distance communication. By implementing this system speaking dream of dumb people becomes true. Compared with existing system its possible to carry to any places currently. We have developed more reliable and flexible system. Which manufacture at low cost sign language translator for commercial purpose In future work of the proposed system supporting more no of sign and Different language mode.

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