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A design of a prototypic Hand-Talk Assistive Technology for the Dumb

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Abstract: **Glove-based systems represent one of the most important efforts aimed at acquiring hand movement data. Generally dumb people use sign language for communication but they find difficulty in communicating with others who do not understand sign language. It is based on the need of developing an electronic device that can translate sign language into speech in order to make the communication take place between the mute communities with the general public possible, a Wireless data gloves is used which normal cloth is driving gloves fitted with flex sensors along the length of each finger and the thumb. Mute people can use the gloves to perform hand gesture and it will be converted into speech so that normal people can understand their expression. This paper provides the map for developing such a digital glove. It also analyzes the characteristics of the device and discusses future wok. A foremost goal of this paper is to provide readers with a basis for understanding glove system technology used in biomedical science.**

Keywords: **Glove-based system, microcontroller chip.**

1. INTRODUCTION

The development of the most popular devices for hand movement acquisition, glove-based systems, started about 30 years ago and continues to engage a growing number of researchers. Communication involves the exchange of information, and this can only occur effectively if all participants use a common language. Sign language is the language used by deaf and mute people and It is a communication skill that uses gestures instead of sound to convey meaning simultaneously combining hand shapes, orientations and movement of the hands, arms or body and facial expressions to express fluidly a speaker's thoughts. Signs are used to communicate words and sentences to audience. A gesture in a sign language is a particular movement of the hands with a specific shape made out of them. A sign language usually provides sign for whole words. It can also provide sign for letters to perform words that don't have corresponding sign in that sign language. In this device Flex Sensor plays the major role, Flex sensors are sensors that change in resistance depending on the amount of bend on the sensor. This digital glove aims to lower this barrier in communication**.** It is electronic device that can translate Sign language into speech in order to make the communication take place between the mute communities with the general public possible. It can also provide sign for letters to perform words that don't have corresponding Sign in that sign language. Sensor gloves technology has been used in a variety of application areas, which demands accurate tracking and interpretation of sign language. The paper explains the designing requirements, factors of digital gloves. This paper contains the map to develop a pair of gesture vocalize gloves. It gives the related works, explains the system architecture, characteristics and operation of each component in the system architecture. Provides the future works, advantages and disadvantages of this device.

2. OBJECTIVE

The goal of this project is to design a useful and fully functional real-world product that efficiently translates the movement of the fingers into the American Sign Language.

3. SUMMARY

Our motivation is two-fold. Aside from helping deaf people communicate more easily, the SLC also teaches people to learn the ASL. Our product, a sign language coach (SLC), has two modes of operation: Teach and Learn. The SLC uses a glove to recognize the hand positions and outputs the ASL onto an LCD. The glove detects the positions of each finger by monitoring the bending of the flex sensor. Below is a summary of what we did and why:

1) Build flex sensor circuit for each finger. Sew flex sensors and accelerometer onto glove to more accurately detect the bending and movement of thecomponents.

2) Send sensor circuit output to MCU A/D converter to parse the finger positions.

3) Implement Teach mode. In Teach mode, the user "teaches" the MCU ASL using hand gestures. To prevent data corruption, A/D converter output and the associated user specified alphabet are saved to eeprom, which can only be reset by reprogramming the chip.

4) Implement LEARN mode. In Learn mode, the MCU randomly chooses a letter it has been taught and teaches it to the user. The user"learns" by matching his hand positions to that which the MCU associated with the letter. Using the LCD, he can adjust his finger positions appropriately. The

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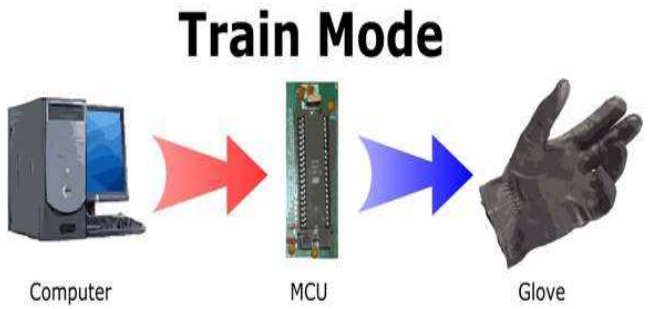
finger positions are matched to the appropriate ASL using an efficient matching algorithm.

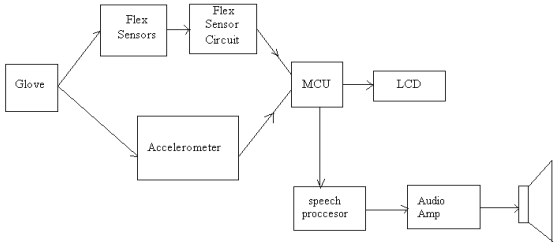
4. LOGICAL STRUCTURE

Our glove is similar to the other gloves that have been researched and developed. We have created a glove that learns different signs and saves these signs into the EEPROM of the microcontroller. Our implementation of the glove only deals with the 26 letters of the English alphabet that can be directly translated into American Sign Language (ASL).The part of our project that is different from other gloves is that after programming these letters into the microcontroller, letters are chosen at random for the student to practice and learn.The LCD display is used as a reference for how much more or less you need to bend each finger to correctly sign a letter.The student must then adjust their hand position to match the prompted letter within some specified range in order to be able to move on to the next letter.

In order to use our product, the user must connect the Atmel 32 Microcontroller to the computer and use Hyper Terminal to program in the different hand positions of the alphabet.There is a black flip switch that should be turned on in order to signify TRAIN mode. A yellow LED will light up in order to signify that the student is in the right mode.In order to input the position, a letter must be pressed on the keyboard followed by the ENTER key.Following that, the position of the letter must be held for approximately 10 seconds.The user is expected not to know ASL and can use a table of sign language letters for reference (thereby only having to use the computer once) or call in an American Sign Language expert to help the student perfect the letters of the alphabet.



After all the letters are programmed in, the black switch can be flipped and the yellow LED will be off thereby putting the microcontroller into PRACTICE mode. At this point in time, the microcontroller can be removed from the computer, and the unit can be taken anywhere. The user can then start practicing positions by looking at the LCD display as a reference.Using the LCD, the user will be able to adjust his or her fingers in order to try to match the letter that appears on the screen. Once the position of the hand matches the letter on the screen, "MATCH!will appear on the LCD and the next letter will appear on the LCD.



5. ADVANTAGES:

- Low cost
- Compact systems
- Flexible to users
- It takes less power to operate system
- Our device converts hand movements directly to the audio/voice data.
- It uses only accelerometers and sew-flex sensors, which are easily available and are cost effective.
- LCD'S are used to verify the audio along with text message that appears on LCD.

6. APPLICATIONS:

- Physically challenged persons
- Conveying information related Operations

7. CONCLUSION:

Sign language is a useful tool to ease the communication between the deaf or mute community and the normal people. Yet there is a communication barrier between these communities with normal people. This project aims to lower the communication gap between the deaf or mute community and the normal world. This project was meant to be a prototype to check the feasibility of recognizing sign language using sensor gloves. With this project the deaf or mute people can use the gloves to perform sign language and it will be converted in to speech so that normal people can easily understand.

8. REFERENCES:

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