Gesture Glove for American Sign Language Representation

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Abstract — In this paper, different approaches of gesture recognition are discussed, design of a hand glove for gesture recognition into speech is proposed and the development phases of a complete, independent prototype of sensory glove are elaborated. Although some data gloves are available in the market but they are used for gaming and other virtual reality applications and there is no such complete system available in the market for the translation of American Sign Language gestures into speech. However, research is being made to devise some portable, efficient and highly accurate system for the translation of standard sign language gestures through a hand glove.

Keywords—Sign Language, ATMEGA microcontroller, Hand Gesture

INTRODUCTION

Sign language is the language used by deaf and mute people and it is 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. 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 project Flex Sensor Plays the major role, Flex sensors are sensors that changes its resistance depending on the amount of bend.

The deaf/mute people make up 72 million of the world’s population according to a report published by the World Federation of the Deaf. These people learn sign language to communicate. Unfortunately, most of the average people don’t understand their gestures and thus are unable to identify what they are trying to say. This paper is concerned with the solution to help those people having speech disability to have normal conversations in their daily lives.

II. BLOCK DIAGRAM

![Figure 1 Gesture Glove for ASLR](image_url)
2.1. Power supply:

Power Supply/Power Adapter: Power supply is the source of electrical power. Normally we use +5V DC power for regular working of almost any electronic circuit. User can directly built +5V DC power supply using 4 diodes, filter capacitors and regulator IC - 7805 (Integrated Circuit) or can directly purchase a +5V DC power adopter from the local market linear regulated power supply of (0-12V).

2.2. ATMEGA 8A-PU:

2.2.1. Features:

- High-performance,
- Low-power
- Advanced RISC Architecture
- Operating Voltage – 2.7 - 5.5V , 0 - 16MHz
- Power Consumption at 4MHz, 3V, 25°C
  - Active: 3.6mA
  - Idle Mode: 1.0mA
- Operating Temperature -55°C to +125°C “Absolute
- Storage Temperature..... -65°C to +150°C
- Voltage on any Pin except RESET
- With respect to Ground.....-0.5V to VCC+0.5V
- Voltage on RESET with respect to Ground.......-0.5V to +13.0V
- Maximum Operating Voltage ...... 6.0V
- DC Current per I/O Pin ............... 40.0mA
- DC Current VCC and GND Pins.....300.0mA

2.2.2. Analog-to-Digital Converter:

- Features:
  - 10-bit Resolution
  - 0.5LSB Integral Non-linearity
  - ± 2LSB Absolute Accuracy
  - 13 - 260µs Conversion Time
  - Up to 15kSPS at Maximum Resolution

5. LCD (16X2):

One of the most common devices attached to an Microcontroller is an LCD display. Some of the most common LCDs connected to the ATMEGA- are 16x2 and 20x2 displays. This means 16 characters per line by 2 lines and 20 characters per line by 2 lines, respectively. In recent years the LCD is finding widespread use replacing LED’s.

4. Voice processor: (IC APRA33):

The aPR33A series are powerful audio processor along with high performance audio analog-to-digital converters (ADCs) and digital-to-analog converters (DACs). The aPR33A series are a fully integrated solution offering high performance and unparalleled integration with analog input, digital processing and analog output functionality.
2.4.1. Features

- Operating Voltage Range: 3V ~ 6.5V
- Single Chip, High Quality Audio/Voice Recording & Playback Solution
- No External ICs Required
- Minimum External Components
- User Friendly, Easy to Use Operation
- Programming & Development Systems Not Required
- 170/680 sec. Voice Recording Length in aPR33A1/aPR33A3

5. Flex sensors:

The Flex Sensor patented technology is based on resistive carbon thick elements. As a variable printed resistor, the Flex Sensor achieves great form-factor on a thin flexible substrate. When the substrate is bent, the sensor produces a resistance output correlated to the bend radius—the smaller the radius, the higher the resistance value. Flex sensors are normally attached to the glove using needle and thread. They require a 5-volt input and output between 0 and 5 V, the resistivity varying with the sensor’s degree of bend and the voltage output changing accordingly. The sensors connect to the device via three pin connectors (ground, live, and output). The device can activate the sensors from sleep mode, enabling them to power down when not in use and greatly decreasing power consumption. The flex sensor pictured below changes resistance when bent. It will only change, the resistance increases to 30-40 kilo ohms at 90 degrees. The sensor measures ¼ inch wide, 4-1/2 inches long and 0.19 inches.

5.1 Working of flex Sensor

![Resistance Vs Bending](image1)

![Voltage Vs Resistance](image2)

Figure 2 Resistance Vs Bending  
Voltage Vs Resistance
III. Flowchart of the proposed System
IV. RESULTS AND CONCLUSION

Fig 4. Working model of Magic Gloves

We have focused on designing a Gesture glove which has display and voice output facility and which is also affordable for the customers the above figure describes the best result after designing.

V. ACKNOWLEDGEMENT

We take this opportunity to express our gratitude to the support and encouragement extended by our project guide without whom this project would never have been possible. We are grateful to our project guide Mrs. Meghna M. Deshpande for valuable suggestions during all the stages of the work. She has always extended a helping hand at every moment. We are thankful to her for all her efforts to bring professionalism to this into project.
REFERENCES


