

Article

Hand Gesticulation Recognition Based Speech Renovation

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A B S T R A C T

In our country around 2.78 percent of peoples are not able to speak (dumb). Mostly deaf-dumb people use sign language for communication, but they find difficulty in communicating with others who don't understand sign language. Due to which communication between deaf-mute and a normal person have always been a challenging task. We suggest to advance a device which can convert the hand gestures of a deaf-mute person into speech. This new technique called artificial speaking mouth for dumb people. It will be very help-full to them for conveying their thoughts to others. This methodology affords a map for emerging a Digital wireless glove which is formfitting with Flex sensors. These sensors sense the gestures of a person in the form of bend of fingers and tilt of the hand fist. This system includes a voice playback IC to give the real time speech output in regional language as well as an LCD module to display the text. The text display being in English, the voice output of this device will be in regional language (if necessary, or else English). So, this device acts as a communicator as well as a translator providing more flexibility in communication.

Keywords: Gesture Recognition, Sign Language, Flex Sensors, Regional Language

Introduction

The growth of the greatest general devices for hand movement attainment, glove-based systems ongoing about 30 years ago and lasts to engage a growing number of researchers. Communication comprises the conversation of info, and this can only occur efficiently if all participants use a common language. Sign language is the language used by deaf and mute people that uses gestures in its place of sound to transport or to fast fluidly a speaker's thoughts. A gesture in a sign language is a precise drive of the hands with a specific shape made out of them. The main aim of this paper is to present a system that can efficiently translate Sign Language gestures to both auditory voice and text. Several languages are being spoken all around the world. So, this system aims to give the voice output in various regional languages.

Motivation

Approaching across the numerous spheres of life where this wearable skill can be practical, our main drive for this project came from one such need. Amongst us, there are some people who could not use a part of their limbs. Our idea was to create a device which might help them control their paralyzed limbs using nerve signals from their own brain. This skill can also be used to help the speechless people speak. The sign language can in a straight line be converted to voice and thus enabling them to connect verbally. This project is most basic version of what the vision was. However, every single step counts.

Literature Survey

Hand Gesture Recognition System for Dumb People Authors obtainable the static hand gesture recognition system using

digital image processing. For hand gesture feature vector SIFT algorithm is hand-me-down. The SIFT features have been calculated at the edges which are invariant to scaling, rotation, addition of noise.¹

Sign Pro-An Application Suite for Deaf and Dumb: Author obtainable submission that benefits the deaf and dumb person to connect with the rest of the world using sign language. The important feature in this scheme is the real time gesture to text conversion. The dispensation steps include: gesture extraction, gesture matching and conversion to speech. Gesture extraction includes use of various image processing methods such as histogram matching, bounding box computation, skin colour segmentation and region growing. Methods appropriate for Gesture matching include feature point matching and correlation-based matching. The other features in the application comprise voicing out of text and text to gesture conversion.²

Analysis and Design Approach

The system architecture includes of two primary sections: Transmitter and Receiver section. The transmitter section is in control for recognizing the hand gestures of a person. This is complete by exhausting the gloves which are fitted with flex sensors each of 4.5" on the 4 fingers of the glove whereas the thumb is fitted with a 2.2" flex sensor. The output of flex sensors is in the form of variate ion in resistance in agreement to the bend of fingers. Also, along with this an accelerator is mounted on the palm side of the glove to sense the tilts of the hand. The outputs of the flex sensors and the accelerator are unswervingly given to the ADC channels of the micro controller. The ADC output of each channel is handled and a specified value is allocated to each gesture. To each detailed value of the gesture, a digital value is fed to the encoder which converts the parallel data to serial and transmits it through the RF transmitter. Once the serial data is received at the RF receiver this data is converted to parallel form by the decoder and given to the micro controller. In accordance with the digital value received the micro controller gives designated SPI commands to the voice playback IC. This voice playback IC goods the per-recorded voice outputs complete the speaker. In this way the hand gestures of a person are converted to the speech form where the speech output is in the form of regional language. The block figure of the system is shown in Fig. 1 and Fig. 2.

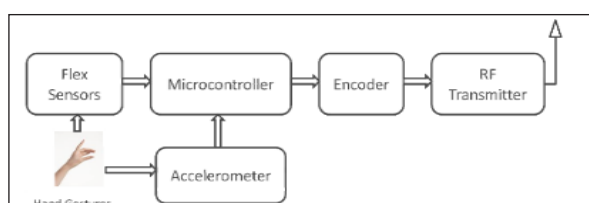


Figure 1.block diagram implementation of transmitter section

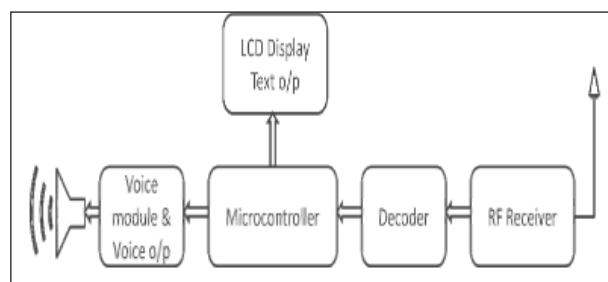


Figure 2.Block diagram implementation of receiver section

Flex Sensor : Flex Sensor is essentially a VARIABLE RESISTOR whose terminal resistance intensifications when the sensor is bent. So this sensor resistance increases depends on surface linearity. So it is typically used to sense the variations in linearity. As shown above figure, when the surface of FLEX SENSOR is completely linear it will be having its nominal resistance. When it is bent 45 angle the FLEX Sensor resistance intensifications to twice as before. And when the bent is 90 the resistance could go as high as four times the nominal resistance. So the resistance across the terminals rises linearly with bent angle. So in a sense the FLEX sensor converts flex angle to RESISTANCE parameter. For suitability we convert this RESISTANCE parameter to VOLTAGE parameter. For that we are efficacious to use VOLTAGE DIVIDER circuit.

Microcontroller (ATmega328): ATmega328 is essentially an Advanced Virtual RISC (AVR) micro-controller. It provisions the data up to eight bits. ATmega328 has 32KB internal built-in memory. It is a programmable device which takes decision and delivers command to further circuitry conferring to the input condition.

Features

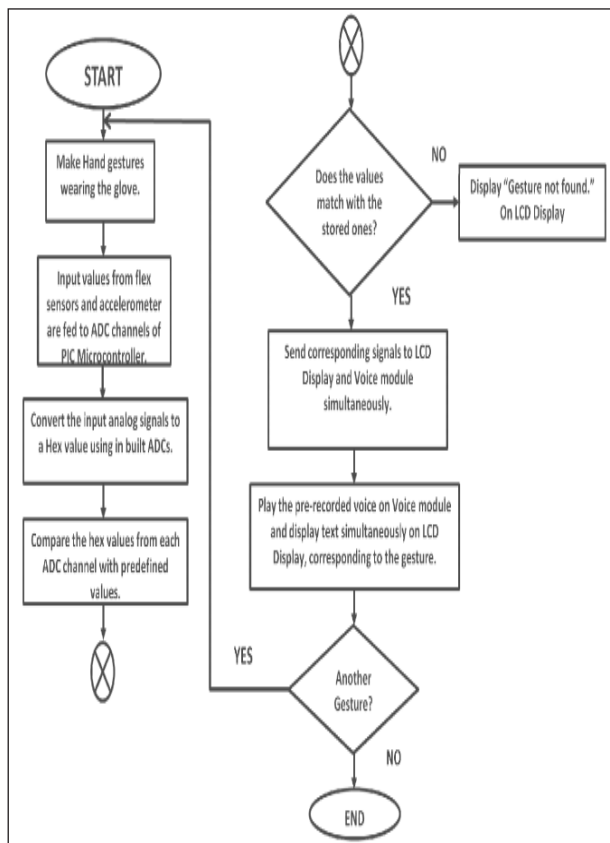
1. ATmega328 is an eight (8) bit microcontroller
2. Built in internal memory is around 32KB
3. ATmega328 has 1KB Electrically Erasable Programmable Read Only Memory (EEPROM)
4. ATmega328 has 2KB Static Random Access Memory (SRAM).
5. It operates ranging from 3.3V to 5V
6. The cost efficiency
7. Low power dissipation
8. Programming lock for security purposes
9. Real timer counter with separate oscillator

Transmitter and Receiver : A transmitter or radio transmitter is an electronic device which produces radio waves with an antenna. The transmitter himself produces a radio frequency alternating current, which is practical to the antenna. When excited by this alternating current, the antenna radiates radio waves. Transmitters are essential component parts of all electronic devices that connect by radio, such as radio and television broadcasting stations,

cell phones, walkie-talkies, wireless computer networks, Bluetooth enabled devices, garage door openers, two-way radios in aircraft, ships, spacecraft, radar sets and navigational beacons. The term transmitter is usually limited to equipment that generates radio waves for announcement purposes; or radiolocation, such as radar and navigational transmitters.

The info fashioned by the receiver may be in the form of sound, moving images (television), or data. A radio receiver may be a separate piece of electronic equipment, or an electronic circuit within additional device. Radio receivers are actual expansively used in modern skill, as components of communications, broadcasting, remote control, and wireless networking systems. In consumer electronics, the terms radio and radio receiver are frequently used specifically for receivers intended to replicate sound transmitted by radio broadcasting stations, historically the first mass-market commercial radio submission.

System Flow



Advantages

- As equate to other electronic devices which are used by additional physical handicap peoples the cost of the project is very less.
- Due to usage of battery this circuit is portable.
- The weight of the project is very less.

- Using Flex sensor, the flexibility of finger can be easily detected with high correctness as likened to other sensors like IR.

Application

- This project is not only useful for dumb peoples but also for the normal human beings who migrate to different place where language problem is the major issue, then we can save the different language command in this module.
- The project is very useful for dumb peoples.
- Also to those peoples who cannot speak very well.

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