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EARLESS AND VOICELESS BACKEDUP WITH AN ADVISEMENT GLOVE

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ABSTRACT

Predominantly the physically challenged persons (deaf and dumb) make their communication through sign languages. Regardless , for those of the common people who are heedless with these sign languages, there is always said to be a void found with that of the deaf and dumb people and themselves . Pointing to the situation ,I develop an advisement innovative system that helps in providing speech to speechless and hearing-impaired persons. Over and above, some renowned gaming data gloves and additional virtual reality applications are found to have gained fit in the markets. However, any other system that is guiding in providing the translation of sign language to speech is not made completely available . To make this possibility , I have used the number of flex sensors those are individually fitted with the glove. These sensors relevantly senses the finger movements to measure the physical interaction with its environment. Correspondingly the output said to get generated from the flex sensor, ATmega328 will reveal its corresponding message over LCD display . The built-in ADC converter converts the analog signal into the digital signal. The propagated text messages are then reformed into speech using the speak jet phrase editor. The generated voice is then heard with the help of a speaker with boosted amplifier. As a deduction making the possibility in attaining speech for speechless persons.

Keywords : Flex sensor,ATmega328,ADC converter,Speakjet.

I. INTRODUCTION

The hand movement acquisition, glove-based systems and other developmental systems started about 30 years ago and it continues to emerge. In the Present days, speech-disabled and hearing-impaired victims are rapidly rising. This might be due to several reasons like by birth, oral diseases, accidents, etc… A need for Electronic Assistive Technology (EST) increases among physically impaired persons to meet their common needs. Deaf and mute people are said to be using the sign languages, as this pays a vital role in aiding communication skill. These languages uses the gestures rather than that of sound to channel their corresponding messages. Here I putforward a gesture recognition approach by means of a sign language that is understandable. Rather than that of any key typings or a touch screen tappings, a motion sensor consequently perceives and interprets the arising movements as a data input. This hand gesture appreciation shows the voice generation and message display. Both speech-impaired and hearing-impaired patients could get benefited by means of this advisement smart glove. This system provides compactness, flexibility and less power consumption to operate.Thus, making its use more reliable. The objective of this work includes

1) To design a portable embedded system.

2) Developing an economical and simple solution for the detection of gestures.

3) Cost effective, reliable data acquiring method and signal conditioning.

II. LITERATURE SURVEY

The need for the inventing a system such as communicating hand glove has made the impaired people to live their life comfortably with us. A Crafty Communicating Hand Glove is a portable device which can be easily handled anywhere.

Author N. P. Bhatti B. S . Chowdhry , presented design of Electronic hand glove for Speech impaired and Paralyzed patients. Speech and Hearing impaired people generally use hand sign language to communicate. The main idea is to translate this sign language into speech. In this system RVM 01 is a parallel Mode based voice recording and playback chip is used. It supports 32 Voice groups with a total of 1800 minutes recording. Sampling is done at 10K sample rate and the voice is record in the internal memory. No external MEMORY is required for storing the voice data. Its voice storage capacity is more therefore this system is more efficient .

Author T. H. Speeter , presented implementation of electronic speaking glove for speechless patient. This system is designed to facilitate an easy communication through synthesized speech using Forward Positional Transformation(**FPT**) technique for the benefit of speechless patients. In this author used Smart Phone with various gestures can be made on touch screen. These can be convert to sound by various inbuilt software. This is not convenient as user must be educated which is not possible all the time. Therefore this system is less efficient than others.

Author Jan Fizza Bukhari, named their prototype as Sign Speak which translated Indian Sign Language into text and speech. The various part of module were glove design, data acquisition, wireless link and android application. In glove design module, selection of appropriate sensors and their location was finalized with the contact of two finger . To detect a contact, connected to the input voltage through pull-up resistors were used. Whenever any conductive plate connected to ground was touched to positive plate, a contact was detected. Therefore, whenever one finger was in contact with the other, value of contact sensors for that particular fingers became 0. To detect and measure the acceleration of hand ADXL 345 was used in I2C mode. By placing all these sensors on a glove at appropriate location, the data glove as an input device to our main controller. A Data Acquisition (DAQ) system was setup, which was a able to capture data from the flex and contact sensor.

Author Abjhijt Auti, D. K. Sarji ,described design of speaking gloves for speechless persons. The main aim of this approach is to develop electronic speaking glove which is designed to easy communication through synthesized speech for the benefit of speechless patients using Mechanomyogram (**MMG**) . A speechless person communicate through sign language which is not understood by the any normal people. The proposed system is designed to solve this problem. In this system used a IVR341N as a 8-bit MCU based Voice chip . It can store 341sec voice message with 4-bit ADPCM compression at 6KHz sampling rate and it required external memory for voice storing.

III. METHODOLOGY

3.1 BLOCK DIAGRAM OF SYSTEM

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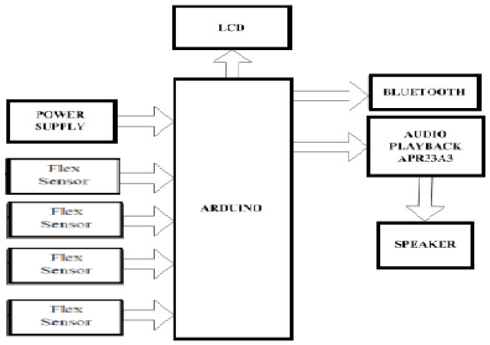

Fig 1. BLOCK DIAGRAM

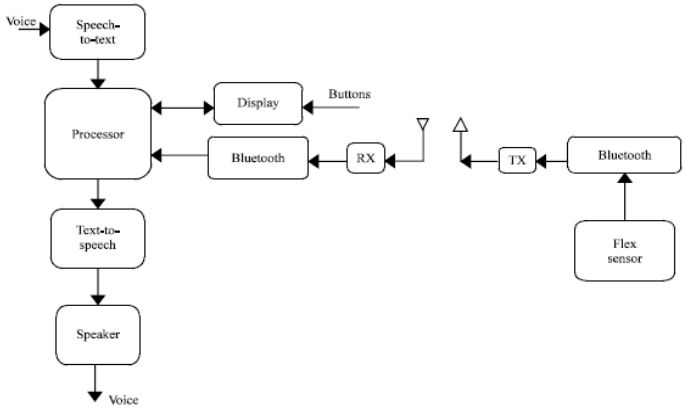

Fig 2. SYSTEM DESIGN WITH BLUETOOTH MODULE

3.2 ARDUINO BOARD

The arduino board is a high performance microcontroller which is a small circuit that contains a whole computer on a small chip of ATmega328 developed by Atmel family. It is said to be the heart of the board with high-performance .It is a 8-bit AVR RISC-based microcontroller that combines 32KB ISP flash memory with read-while-write capabilities. 1KB EEPROM, 2KB SRAM, 23 general purpose I/O lines, 32 general purpose working registers are integrated with it. It can send and receive data through radio waves. The corresponding memory organization and its working are as stated as follows

3.2.1 MEMORY ORGANIZATION

There are three pools of memory in the microcontroller used on AVR-based Arduino boards : (1)Flash memory (program space), is where the Arduino sketch is stored. (2) SRAM (static random access memory) is where the sketch creates and manipulates variables when it runs. (3) EEPROM is memory space that programmers can use to store long-term information. The ATmega328 chip found on the Uno has the following amounts of memory:

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- **Serial: 0 (RX) and 1 (TX).** Used to receive (RX) and transmit (TX) TTL serial data. These pins are connected to the corresponding pins of the ATmega8U2 USB-to-TTL Serial chip.
- **External Interrupts: 2 and 3.** These pins can be configured to trigger an interrupt on a low value, a rising or falling edge, or a change in values.
- **PWM: 3, 5, 6, 9, 10, and 11.** Provide 8-bit PWM output with the analogWrite() function.
- **SPI: 10 (SS), 11 (MOSI), 12 (MISO), 13 (SCK).** These pins support SPI communication using the SPI library.

3.2.2 WORKING

It provides serial TTL interface for easy and direct interface to microcontrollers. The standard AT commands are used to control the working of microcontroller. It also facilitates the usage in GSM based voice communications , SMS, GPRS, Bluetooth UART. A Power Supply of about 5 volt that is maximum is given to the Atmega328 microcontroller. The supplied power is then used to operate the flex sensor that has 10ohms resistors that are in parallel with that sensor. The Component that is used to make the power supply is LM7805 and Electrolytic capacitor. This series of fixed-voltage integrated-circuit voltage regulators is designed for a wide range of applications. Here electrolyte capacitor are used to smooth the power fluctuations and ripple from power supply.The Flex Sensor used for hand gesture recognition is the patented technology based on resistive carbon elements. 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. It will only change resistance in one direction. However an unflexed sensor has a resistance of about 10,000 ohms. As the flex sensor is bent, the resistance increases to 30-40 kilo ohms at 90 degrees.By using this resistance value, the hand gestures made by the user are recognized.

IV. DESCRIPTION OF THE PROPOSED SYSTEM

4.1 DATA FLOW DIAGRAM

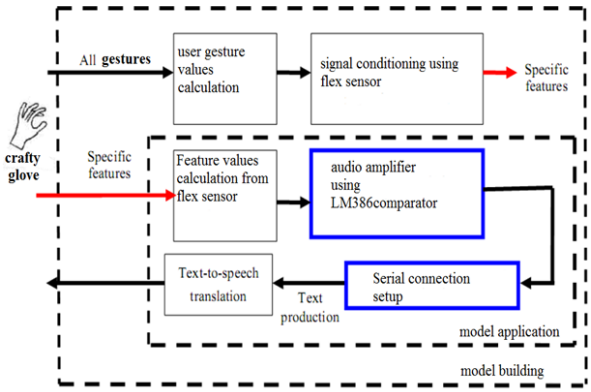

Fig 3. WORKFLOW OF HAND GESTURE RECOGNITION

The work flow of hand gesture recognition is described as follows. First, the hand region is detected from the original images from the input devices. Then, some kinds of features are extracted to describe hand gestures. Last, the recognition of hand gestures is accomplished by measuring the similarity of the feature data. The input devices providing the original image information includes

normal camera, stereo camera, and ToF (time of flight) camera. A Power Supply of about 5 volt that is maximum is given to the microcontroller. The supplied power is then used to operate the flex sensor that has 10ohms resistors that are in parallel with that sensor. Component used to make power supply is LM7805. This series of fixed-voltage integrated-circuit voltage regulators is designed for a wide range of applications. An easy way to remember the voltage output by a LM78XX series of voltage regulators is the last two digits of the number. A LM7805 ends with **"05"**; thus, it outputs 5 volts. The **"78"** part is just the convention that the chip makers use to denote the series of regulators.

Fig 4. Flex sensor

4.2 SPEAK JET PHRASE EDITOR

Writing software for the "basic" version of the SpeakJet Shield is a bit more difficult than for the TTS version. The TTS version of the shield has a processor with an internal program that does text-to-speech translation. The SpeakJet Shield Basic version does not have this processor, therefore we must put codes in our software that tell the SpeakJet what sounds to make. This is not especially hard to do but for a beginning programmer might find this a bit of challenging.

4.3AUDIORECORD AND VOICE PLAYBACK

Audio playback board using APR33A3 IC for 8 channels of recording are given with the total 11 minutes of recording time each channel (M0 to M7) having 1.3minutes of recording time. It is defined to be a Single chip, high quality voice recording and playback solution. Non-Volatile flash memory technology is implemented in which no battery backup required. Audio output to drive a speaker or audio out for public address system. The voice gets recorded with the help of on-board.

4.3.1 STEPS TO RECORD THE VOICE

- Using 8 channels (M0 TO M7) each channel having 1.3minutes recording. Onboard MIC will automatically be used for recording.
- Supply voltage: 12v AC/DC.
- Switch on the board power LED (LD1) will on.
- Put the jumper in the board JP1 (REC)Section.
- While in record mode select J5 (M0-M7) to select a channel to record the message.
- Now Whatever we Speak will be captured by MIC and recorded, status LED (LD2) Will on in record mode indicating that chip is currently recording. Once duration is full the LED (LD2) Will off means that segment is full. Now you can disconnect the GND Connection from M0,if before the duration is this connection is removed, then that many seconds are recorded and rest duration is kept empty.

4.3.2 PLAYBACK RECORDED MESSAGE

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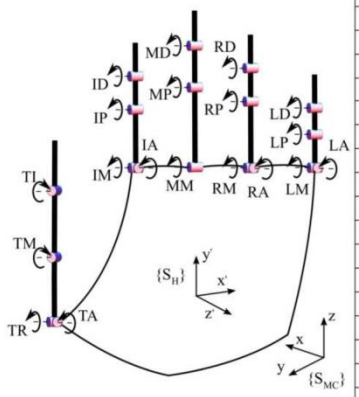
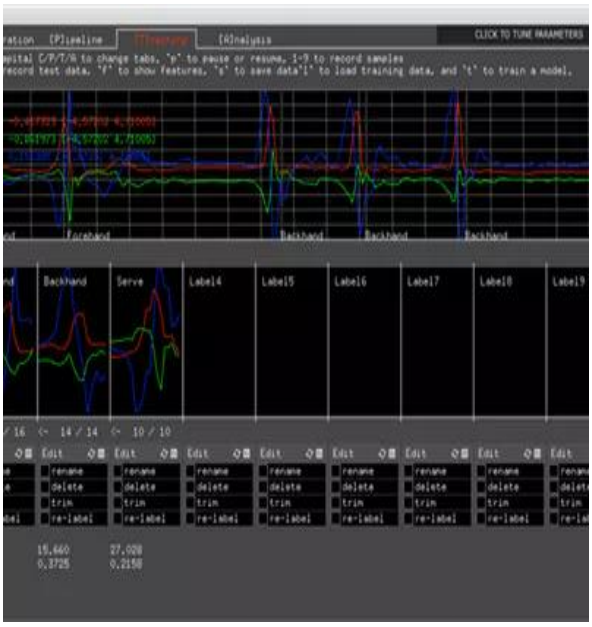
- Connect the speaker to the board J4 Speaker section.
- Now to remove jumper from JP1(REC)section now connect the MO(J5)to GND(J3)Section, status LED(LD2) will ON till the recorded sound play in the speaker.

4.4 PERFORMANCE EVALUATION



DoFs	Description
TA	Thumb Abduction
TR	Thumb Rotation
TM	Thumb Metacarpal
TI	Thumb Interphalangeal
IA	Index Abduction
IM	Index Metacarpal
IP	Index Proximal
ID	Index Distal
MM	Middle Metacarpal
MP	Middle Proximal
MD	Middle Distal
RA	Ring Abduction
RM	Ring Metacarpal
RP	Ring Proximal
RD	Ring Distal
LA	Little Abduction
LM	Little Metacarpal
LP	Little Proximal
LD	Little Distal

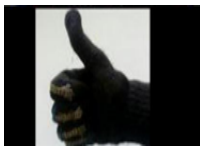
4.5 GESTURE RECOGNITION USING ACCELEROMETER



III. RESULT

In my proposed system, the person wearing the glove should keep it still for about 2 seconds for the appropriate detection of the particular gesture. Every gesture consists of some degree of movement and bending of fingers following a particular order with its specified angle respectively. The number of sensor values that gets initiated by each of the Flex sensors along with that of an accelerometer are fed to the ADC channel of the ATmega328 microcontroller. For every bending of Flex sensors with given instant and manoeuvre of an accelerometer, based upon the positions of these sensors they produce different analog values. The different gestures are assigned with multiple

unique numbers in order to identify a particular gesture that is being made. For the identified gestures, gets displayed on LCD and the same is transmitted via wireless transceiver. The comparison technique is maintained at the receiver side of the system, such that for each value that is received, the microcontroller generates output for each gesture with specific commands to be displayed on LCD module at the receiver end. The Voice IC simultaneously performs its action giving the speech signal and text accordingly.

GESTURES	DISPLAY	MESSAGE
		I NEED HELP
		WILL YOU COME WITH ME
		I AM HUNGRY
		NOT INTERESTED
		WHERE IS THE BATHROOM

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