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Interacting Device for Deaf & Dumb using ATmega 328 Processor

Amanpreet Singh Khajuria[1], Sonakshi Gupta[2]

[1]Student, Model Institute of Engineering and Technology,
Kot Bhalwal, Jammu, J&K, India.
[2]Asst. Professor, Dept. of Electronic and communication, Model Institute of Engineering and Technology,
Kot Bhalwal, Jammu, J&K, India.

Abstract - *This interacting device is a microcontroller based system which is basically outline for lessening the communication space between dumb and normal people. This system can be accordingly configured to work as a "smart device". In this paper, Atmega 328 microcontroller, voice module, LCD display and flex sensors are utilize . The device considered is basically residing of a glove and a microcontroller based system. Data gloves are used to detect the hand motion and microcontroller based system will interpret those few manoeuvre into human place voice. The data glove is furnished with four flex sensors placed on the glove. This system is helpful for dumb people and their hand manoeuvre will be converted into speech signal because of the date glove worn on the hands.*

Key Words: **Gesture Remembrance; Data Glove; Flex Sensor; Arduino UNO; Atmega 328; Voice module.**

1. INTRODUCTION

This gadget is a project for social motive. We are trying to contrivance a system which makes the communication gap between deaf people and normal people as pare as possible. Deaf people make use of sign language or gestures to make grasp what he/she is trying to say but it is impossible to grasp by hearing people. So, that we come on closure of making a simple prototype by making use of some of those gestures and transforming it into speech and visual form so that they can be apprehend by everyone. For that we are making use of Arduino UNO Board as Atmega 328 Controller board for interfacing all of the sensors. This research paper inspect the data from an tool data glove for the recall of some signs and gestures. A system is developed for recognizing these gestures and their conversion into speech signals.

2. LITERATURE SURVEY

Many scientists are working in the field of gesture remembrance. A wonderful and latest survey of the work done in this field [1] [2] [3] consider the gesture remembrance for human robot interaction and human robot symbiosis.[4] offers a novel "signal-level" perspective by exploring prosodic phenomena of spontaneous gesture and speech co-production. It also ready a computational structure for ameliorate continuous gesture remembrance based on two phenomena that catch voluntary (co-articulation) and involuntary (physiological) contributions of prosodic synchronization. [5] Consider different categories for gesture remembrance. Markov models are used for gesture remembrance [6] [7]. A comprehensive structure is presented that addresses two important issues in gesture remembrance systems in [8]. An augmented reality tool for vision based hand gesture remembrance in a camera-projector system[9]. A methodology using a neighborhood-search algorithm for tuning system criterion for gesture remembrance is addressed in [10]. A new method is introduced to recognize and estimate the scale of time-varying human gestures in [11].

3. METHOLOGY

3.1 BLOCK DIAGRAM

Figure 1 show the block diagram of system. The System consists of following modules:-

1. Data Glove using Flex Sensors
2. Atmega328p microcontroller
3. Speech Synthesis (Voice Module)
4. 16×2LCDDisplay

Basically an Artificial Neural Network is the abstraction of our system. Flex sensors are placed on the hand glove for deaf people which transfigure the criterion like bending angle of finger to electrical signal and the microcontroller takes action according to the sign and display the same on LCD.

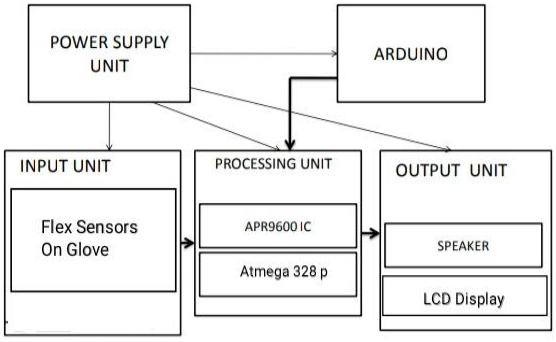

Figure 1: Block Diagram of the System

4. SYSTEM DESCRIPTION

4.1 Flex Sensor:

In this research setup data glove is furnished with four bend sensors, each of the bend sensor is meant to be stable on each of the finger of the hand glove for the watching and sensing of static movements of the fingers of the hand. A flex sensor is one which compute the amount of deflection or bending. Generally the sensors are secured to the surface and resistance of sensor component is varied by bending the surface. Since the resistance is straight proportional to the amount of bend, it is used as a flexible potentiometer.

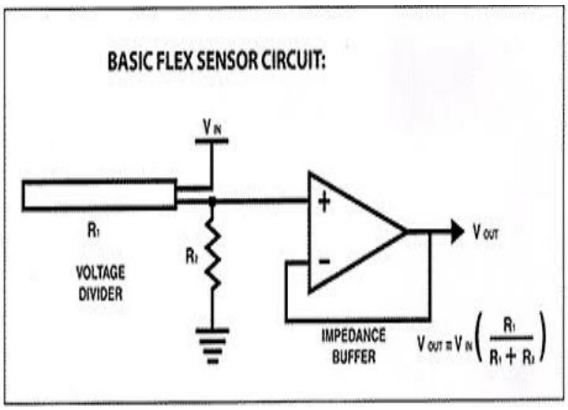

Figure 2: Circuit Diagram of flex Sensor

4.2 ATmega 328p Microcontroller:

The Atmel 8-bit AVR RISC-based microcontroller amalgamate 32 KB ISP flash memory with read-while-write capabilities, 1 KB EEPROM, 2 KB SRAM, 23 general purpose I/O lines, 32 general purpose working registers, three flexible timer/counters with compare modes, internal and external interrupts, serial programmable USART, a byte-oriented 2-wire serial interface, SPI serial port, 6-channel 10-bit A/D converter (8-channels in TQFP and QFN/MLF packages), programmable watchdog timer with internal oscillator, and five software selectable power saving modes. The device operates between 1.8-5.5 volts. The device attain throughputs approaching 1 MIPS per MHz.

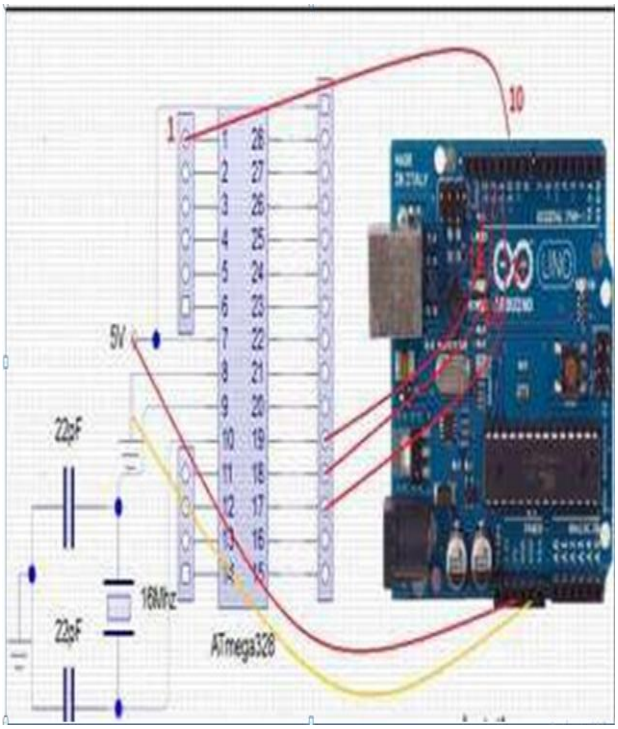

Figure 3: Connection of Atmega328 with Arduino-UNO

Here we grasp to burn boot loader on blank Atmega 328 chips using Arduino IDE and Arduino UNO.

Here we are using Arduino UNO as an interface to boot load the Atmega 328 microprocessor. We can implement this project using Arduino UNO but we are banishing the continuous use of Arduino UNO because of high power consumption. Figure 3 will show how Arduino UNO will be affixed to bare Atmega 328 micro controller. The Arduino UNO is connected with bare Atmega 328 controller; we connect Arduino UNO with the PC using USB Cable. Now, we will boot load the Atmega 328 chip using Arduino IDE. Once the Atmega 328 chip is set, we will upload the code and the chip is ready for the operation.

4.3 Voice Module

This module of the system composed of a APR9600 Audio Processor IC, mic and a speaker. The function of this module is to build voice according to the particular gesture made by bending of fingers which are connected with flex sensors.. The microcontroller collect the eight bit data from the flex sensors. It compares the eight bit data with the predefined values in the module. On the basis of these comparisons the microcontroller knows simply which gesture the hand is forming.

By using the voice module the dumb people can comfortably liaise with the normal people and with the Deaf people as deftly, but now the issue emerge for the dump people and that is, how to commune with them. The solution to this issue is to render those hand gestures into some text form. This text will be unveiled on LCD. The gestures have hitherto been detected by the "Gesture Detection" module. This module sends signal to the voice module, the identical signal is dispatch to the LCD display module. The LCD display module made up of a microcontroller and an LCD. The microcontroller will control the LCD. A signal against each gesture will be collect by LCD display module. The LCD display module will check each signal, and juxtapose it with the predefined values. On the basis of this comparison the microcontroller will take the decision on what should be unveiled; having taken the decision the microcontroller will send an eight bit address to the LCD,

This eight bit address will tell the LCD, what should be unveiled.

4.4 LCD Display

LCD stand for Liquid Crystal Display which is used to display the data and it find wide range of application. There is enough module of LCD but we use 16x2 LCD in which it has 16 columns and 2 rows.The character is build by 5x7 pixels and it has two register such as Command and Data. Command register secure instruction given to LCD and Data register store data show on LCD.

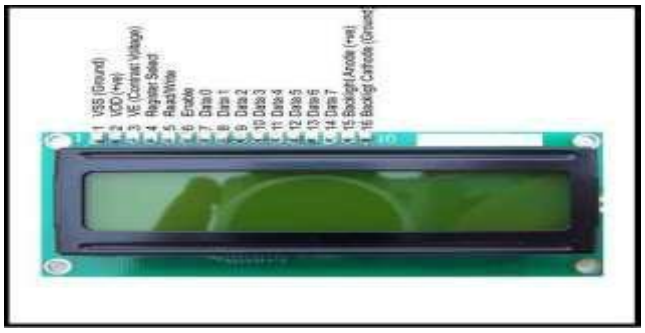

Figure 4: LCD Display

4.5 VOLTAGE REGULATOR (7805)

7805 is a voltage regulator integrated circuit (IC). Voltage regulators IC are the IC that is used to regulate voltage. IC 7805 is a series of 78XX voltage regulators and it is fixed linear voltage regulator IC's. In some circuit, the voltage source may have fluctuations and which would not give the fixed output voltage for such situation to ensure constant voltage, IC 7805 voltage regulator is used to maintain the constant output voltage. It maintains output at 5v and protects circuits from short circuit and thermal overloading.

5. CONCLUSIONS

This research paper explains the design and working of a system which is helpful for dumb & deaf people to commune with themselves as well as with the normal people. The dumb people use their standard sign communication which is not easily intelligible by generic people and dumb people cannot see and comprehend their gestures. This device converts the sign language into speech which is easily apprehend by dumb and generic people. The sign language is translated into some text for the deaf people as well which will get displayed on LCD.

6. FUTURE ENHACEMENTS

There can be a lot of future enhancements related to this research work, which includes:

1. In homes offices and more, gesture remembrance can be greatly used to increase usability and reduce the resources necessary to create primary or secondary input systems like remote controls or car entertainment systems with buttons.

2. Designing of a whole jacket which will be capable enough to read and vocalize the movements of animals and displaying the same on LCD for deaf people

3. Virtual reality application e.g., replacing the conventional input devices like joy sticks in videogames with the data glove.

4. Gesture remembrance along with facial remembrance, lip movement remembrance, and eye tracking can be combined to create something called perpetual user interface to interact with computer systems which will improve creativity by leaps and bounds.

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