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ANDROID BASED HAND GESTURES TO VOICE CONVERSION FOR SPEECH IMPAIRED

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Abstract

Generally, a speechless person conversation through sign language, which is difficult for the normal person to understand it. So, the main aim of our project is to develop an Electronic Speaking Glove, which is designed to facilitate an easy communication. Here, the gestures made by the user of this glove will be converted into a synthesized speech to convey an audible message to others. The glove is internally equipped with multiple flex sensors that are made up of "bend-sensitive resistance elements". For each specific gesture, internal flex sensors produce a proportional change in resistance of various elements. The processing of this information sends a unique set of signals to the PIC microcontroller. The microcontroller sends the given gesture data to android mobile via Wi-Fi. The Text to speech conversion is done by using the android application.

Keywords: Electronic speaking glove, Flex sensors, accelerometer sensor, PIC microcontroller, ESP8266 wife module.

1. INTRODUCTION

In recent years, researchers have been focusing on hand gestures detections and been popular for developing applications in the field of robotics and extended in the area of artificial or prosthetic hands that can imitator the behavior of a natural human hand. To provide with disability to speak a better world. To design a portable embedded system to develop an economical and simple solution for the detection of finger gestures. Cost effective, reliable data acquiring method and signal conditioning. The main aim of the project is to develop an Electronic Speaking Glove, designed to facilitate an easy communication through synthesized speech for the benefit of speechless patients. Generally, a speechless person communicates through sign language which is not understood by the majority of people. The proposed system is designed to solve this problem. Gestures of fingers of a user of this glove internal flex sensors produce a proportional change in resistance of various elements. The microcontroller sends the given gesture data to android mobile via will be converted into synthesized speech to convey an audible message to others, for example in a critical communication with doctors.

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2. PROPOSED SYSTEM

This would help the dump person to communicate with others by typing text on LCD screen through hand gestures. The text is converted into speech so that the blind person could hear and communicate. In proposed system we can get the text and voice in sentence. Communication reach different category of people. Audio signal is generated. The proposed block diagram is given below.

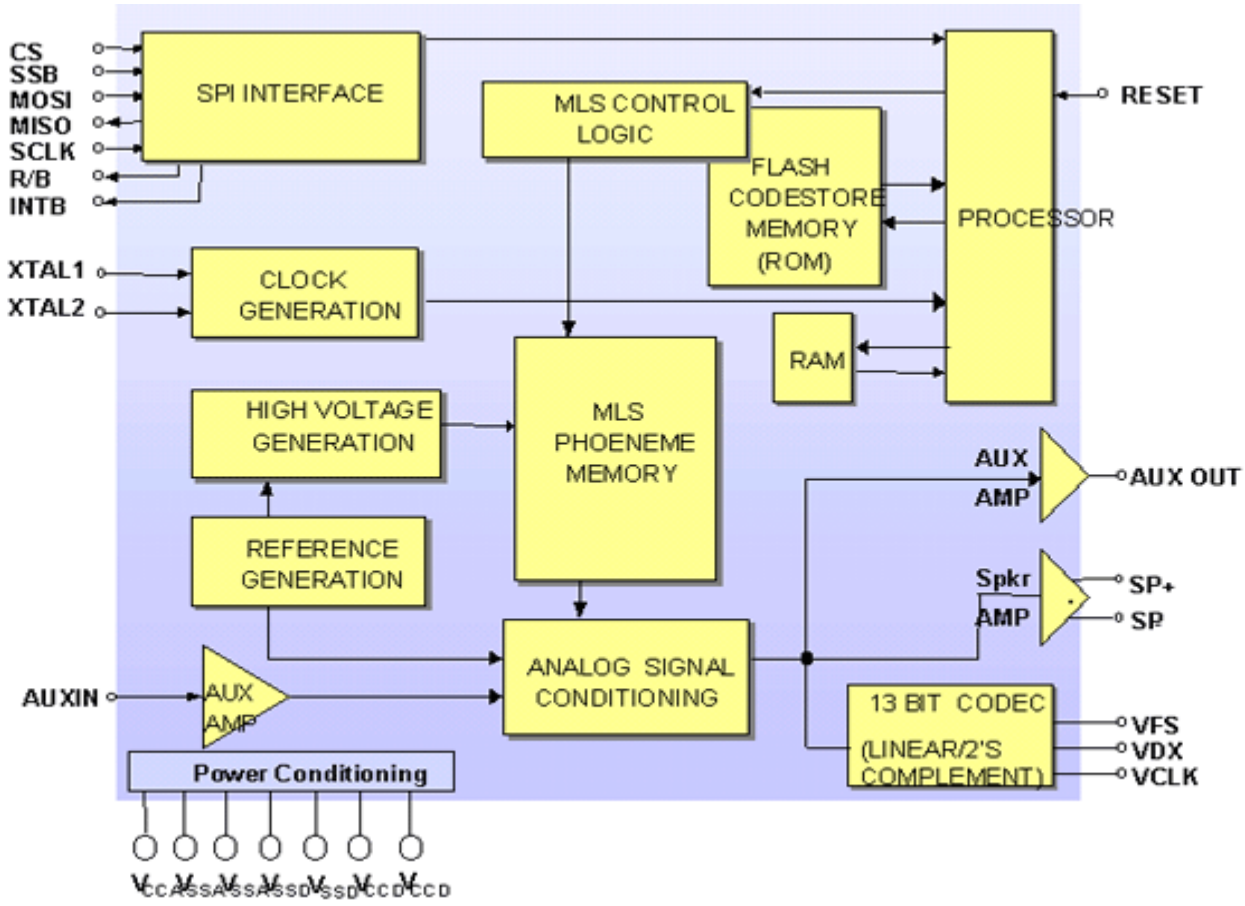

Fig 2.block diagram of proposed system

3. DESIGN AND IMPLEMENTATION

3.1 PIC MICROCONTROLLER

PIC microcontroller is widely used for experimental and modern applications because of its low price, wide range of applications, high quality and ease of availability. It is ideal for machine control applications, measurement devices, and study purpose and so on. It is also called as “Computer on a Chip”.PIC was

developed as Peripheral controller. PIC Microcontrollers are designed with a separate 14 bit program memory bus to carry instructions. A Separate 8bit data memory bus to carry data. This Design is commonly called Harvard architecture.

PIC18F4520

SPECIAL FEATURES

- Every instruction is coded as a single 14 bit word and fetched simultaneously with the corresponding data variable for that instruction.
- The Harvard architecture speeds up the Process by its design.
- The instruction set for the PIC Microcontroller consist of 35 instructions.
- Each occupying a single 14 bit program memory word and a two stage Pipelining.

It consists of Flash Memory which make the programming cost and time less

- C compiler optimized architecture:
- Optional extended instruction set designed to optimize re-entrant code
- 100,000 erase/write cycle Enhanced Flash program memory typical
- 1,000,000 erase/write cycle Data EEPROM memory typical
- Flash/Data EEPROM Retention: 100 years typical
- Self-programmable under software control
- Priority levels for interrupts
- 8 x 8 Single-Cycle Hardware Multiplier
- Extended Watchdog Timer (WDT):
- Programmable period from 4 mms to 131s
- Single-supply 5V In-Circuit Serial
- Programming™ (ICSP™) via two pins
- In-Circuit Debug (ICD) via two pins
- Wide operating voltage range: 2.0V to 5.5V
- Programmable 16-level High/Low-Voltage
- Supports interrupt on High/Low-Voltage
- Detection
- Programmable Brown-out Reset (BOR)
- With software enable option

The data is the ASCII value of the character to be displayed on the LCD. Click to learn more about internal structure.

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3.2LCD

LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs. The reasons being: LCDs are economical; easily programmable; segments), animations and so on. A **16x2 LCD** means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data. The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed on the LCD.

3.3 FLEX SENSOR

Flex sensors are passive resistive devices that can be used to detect bending or flexing. The flex sensor shown in this article is a bi-directional flex sensor that decreases its resistance in proportion to the amount it is bent in either direction. The sensor we are building is about 3/8" wide by 5" long. The materials needed for the construction of the bi-direction flex sensor is shown in figure 1 and listed below. The size of the materials listed is only a guideline to the sensor we are constructing in this article. These types of sensors can be manufactured to larger widths and lengths

Acetate 1/4" x 4.5" x .010 thick

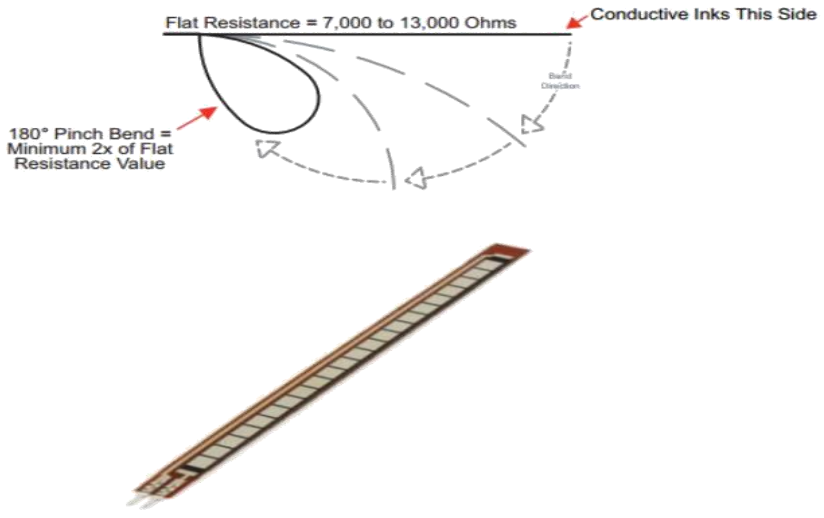

Fig.3 Flexible bend sensor 4.5”

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Copper foil laminate is used in the electronics industry to make flexible circuits. It is thin copper cladding on a plastic material substrate like acetate. The material we are using is single sided copper. Copper on one side and the substrate (plastic) on the other, the copper cladding material is cut into two pieces 1/4" wide x 4.5" long strips. The material is easily cut with a scissors. Solder about 6" of wire to one end of each strip. You may find it easier to solder the wire to the strip if you tin the bottom 3/8" of each strip. Solder each wire to one corner side of the strip.

3.4 ACCELEROMETER SENSOR

Most accelerometers are micro-electro-mechanical sensor(MEMS). The basic principle of operation behind the MEMS accelerometer is the displacement of a small proof mass etched into the silicon surface of the integrated circuit and suspended by small beams. Consistent with Newton's second law of motion (F=ma) as an acceleration is applied to the device, a force develops which displace the mass. The support beams act as a spring, and the fluid (usually air) trapped inside the IC act as a damper, resulting in a second order lumped physical system. This is a source of the limited operational bandwidth and non – uniform frequency response of accelerometer.

3.5 REGULATED POWER SUPPLY

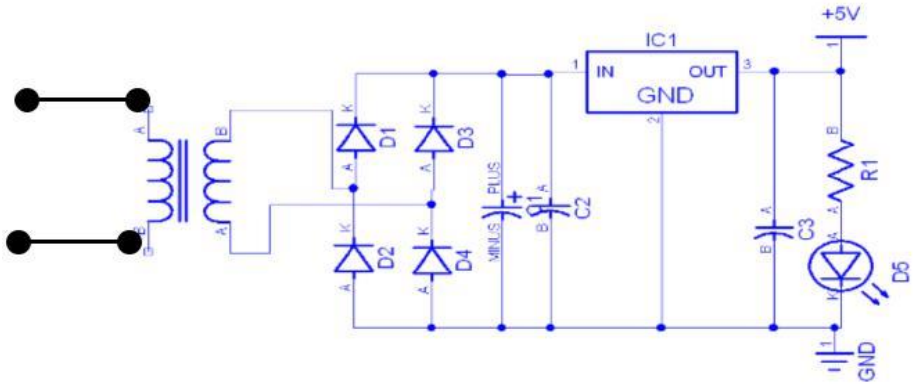

Fig.3.2 regulated power supply

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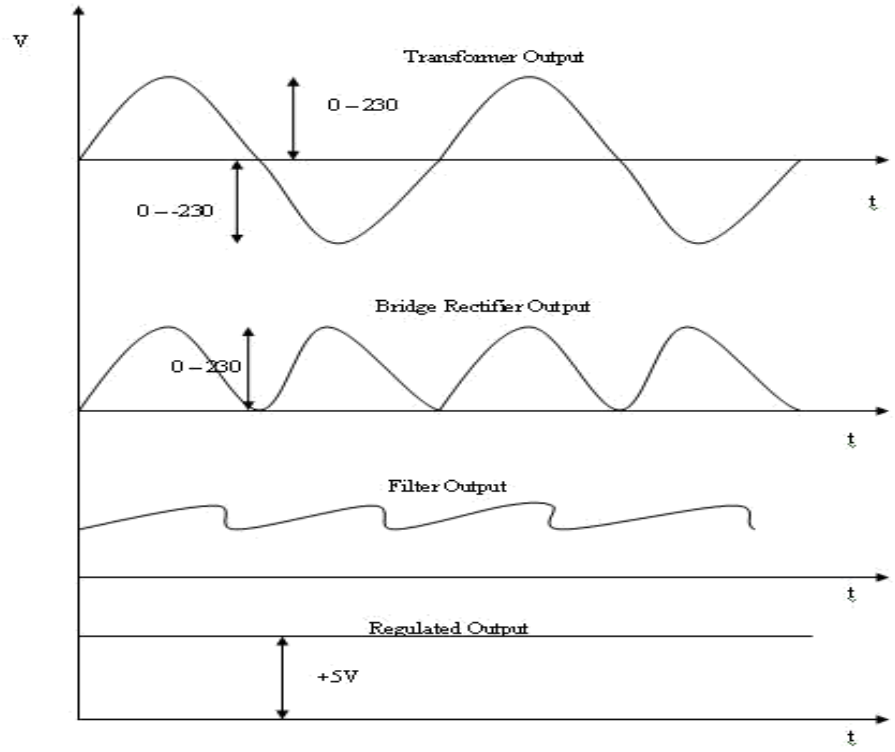
Almost all electronic devices used in electronic circuits need a dc source of power to operate. The source of dc power is used to establish the dc operating points (Q-points) for the passive and active electronic devices incorporated in the system. The dc power supply is typically connected to each and every stage in an electronic system. It means that the single requirement common to all phases of electronics is the need for a supply of dc power. For portable low-power systems batteries may be used, but their operating period is limited. Thus for long time operation frequent recharging or replacement of batteries become much costlier and complicated. More frequently, however, electronic equipment is energized by a power supply, derived from the standard industrial or domestic ac supply by transformation, rectification, and filtering.(The combination of a transformer, a rectifier and a filter constitutes an ordinary dc power supply, also called an unregulated power supply).

Graph of Regulated Power Supply



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ESP8266 PIN DESCRIPTION

Fig 3.3 ESP8266 Wi-Fi module

ESP8266 has 8 pins, 4 in the row of 2. The first pin on the top left is GND. The two pins right from the GND are GPIO 2 and 0. The pin on the top right side is the RX pin and the pin on the lower left is TX. These are the pins for communication. The middle pins on the bottom are CH_PD (chip power-down) and RST (reset).The main thing to remember is, that this device works with 3.3V; Even the RX and TX pins. Controller or many USB to serial converters work with 5V.

4. RESULT ANALYSIS

Based on the result analysis of these process, the output becomes like the sentence in text ,and the text is converted into voice by using android application.

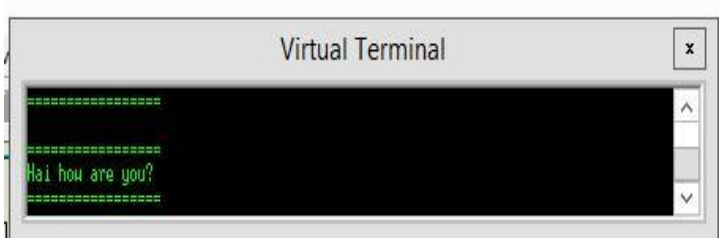

Fig 4. Output of text message 1

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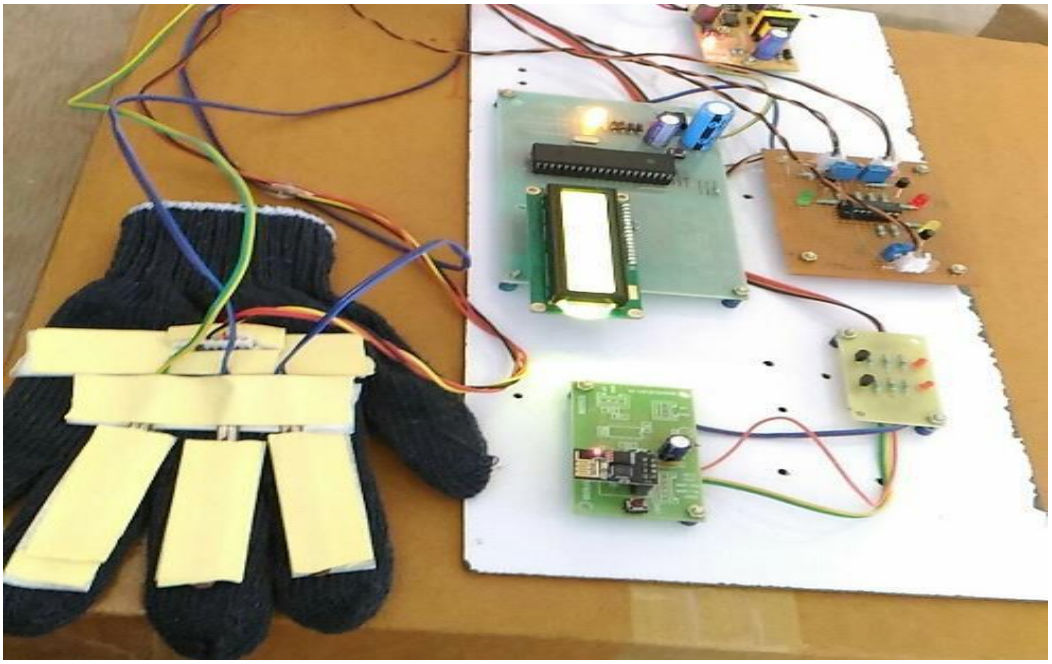

Hardware Structure

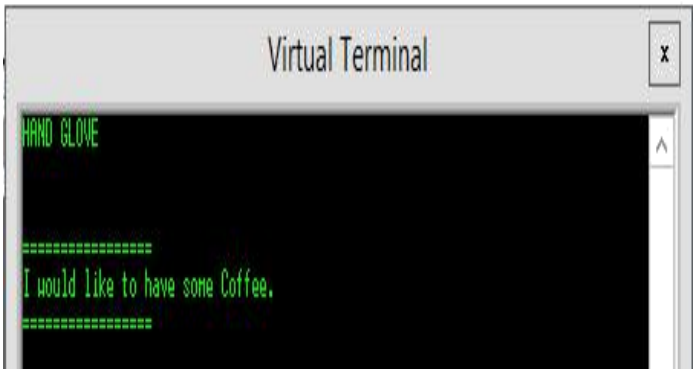

Fig 4.1output of text message 2

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CONCLUSION

A reliable and efficient system has been designed which would help the deaf and blinds to communicate easily. The model uses 26 gestures of hand to communicate alphabets and 10 more gestures to communicate numbers. This would help the dump person to communicate with others by typing text on LCD screen through hand gestures. The text is converted into speech so that the blind person could hear and communicate.

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