“Electronics Speaking Gloves for Mute Person”

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Certificate of Approval

The foregoing thesis entitled **"Electronic Speaking Gloves for Mute Using Microcontroller"**

is approved as a credited as a credible engineering study to be carried out and presented in a satisfactory manner in partial fulfilment of the requirements for the degree of Bachelor of Technology in the field of Electronics and Communication Engineering.

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LIST OFABBREVIATIONS

LCD	Liquid Crystal display
LED	Light Emitting Diode
CG	Character-Generator
CO	Crystal Oscillator
CMOS	Complementary Metal Oxide Semiconductor
EEPROM	Electrically Erasable Programing Read Only Memory
IC	Integrated Circuit
ADC	Analog to Digital converter
PCB	Printed Circuit Board

LIST OF FIGURES

ABSTRACT

Electronic Speaking Gloves for Speechless One

(A Tongue to a Dumb)

We describe as 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. This final year project is designed to solve this problem. It is based on need of developing an electronic device that can translate sign language into speech in order to make the communication takes place between the mute community and with general public. Gesture of fingers of a user of this glove will be converted into synthesized speech to convey an audible message to others, for example in a critical communication with doctors. The glove is internally equipped with "multiple flex sensor that are made up of bend-sensitive resistance elements". For each specific gesture, internal flex sensor produces a proportional change in resistance of various elements, the processing of this information sends a unique set of signals to the microcontroller which is pre-programmed to speak desired sentences.

Components Required: -

1. Arduino microcontroller
2. Flex Sensor
3. Speak Jet IC
4. Speaker
5. LCD

Project Guide: -

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CHAPTER -1

1.1 INTRODUCTION

Generally, dumb people use sign language for communication but they find difficulty in communicating with others who don't understand sign language. This project aims to lower this barrier in communication. It is based on the need of developing an electronic device that can translate sign language into speech to make the communication take place between the mute communities with the general public possible. Gesture recognition is the process by which gestures made by the user are used to convey the information or for device control. In everyday life, physical gestures are a powerful means of communication. A set of the physical gesture may compose an entire language, as in sign languages. They can efficiently convey a rich set of facts and feelings.

This project makes the modest suggestion that gesture-based input is such a beneficial technique to convey the information or for device control with the help of identification of specific human gesture Research into the uses of gesture in human-computer interaction is embryonic, and we hope to have stimulated others to work out their ingenuity in developing effective gestures. A primary goal of Gesture recognition research is to create a system which can identify specific human gestures and use them to convey information or for device control. Interface by computers using the gesture of the human body, classically hand movements. In gesture recognition technology, a camera reads the actions of the human body and communicates the data to the computer that uses the gestures as input to control devices or applications.

Gesture recognition is a topic in computer science and language technology to interpret human gesture via mathematical algorithms. Gesture can create from any physical motion or state but commonly originate from the face or hand. Current focuses in the field contain emotion recognition from the face and hand gesture recognition. Several approaches have been made using cameras and computer vision algorithms to interpret sign language. Through, the identification and recognition of posture, proxemics, gait, and human behaviours is also the subject of gesture recognition techniques. The design of the glove and the concept of decoding gestures by considering the axis orientation for gravity and the corresponding voltage levels are discussed. The accelerations of hand motion in three perpendicular directions are detected by accelerometers and acceleration values were transmitted to the microcontroller.

1.2. GENERAL DESCRIPTION

A sign language is a language which, instead of acoustically conveyed sound patterns, uses visually transmitted sign patterns to convey meaning simultaneously combining hand shapes, orientation and movement of the hands, arms or body, and facial expressions to fluidly express a speaker's thoughts. Wherever communities of deaf people exist, sign languages develop. Their complex spatial grammars are markedly different from the grammars of spoken languages. In linguistic terms, sign languages are as rich and complex as any oral language, despite the common misconception that they are not real languages.

The entire work has been divided in terms of segments. In the first segment of the work, we have accomplished a method to convert American Sign Language (ASL) gestures into resistance and voltage values by the use of flex sensors and analog /digital converters In the second segment of the work, we have implemented an embedded C program to generate alphabets from the corresponding set of input values. These input values being the various positions of fingers used in the American Sign Language. A Virtual human can more effectively communicate with the deaf –mute people than an animatedcharacter. In the third segment of the work, we have proposed a microcontroller system to realize American Sign Language gestures by connecting the characters to the flex sensor and analog/digital converter's output.

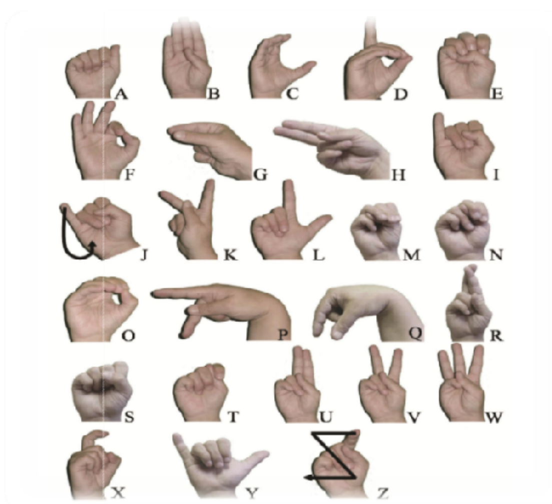

Fig. 1.1 Sign language

CHAPTER -2

2.1 LITERATURE REVIEW

[1] Jingdong Zhao, Li Jiang, Shicai Shi, Hegao Cai, Hong Liu, G. Hirzinger, "A Five fingered Underactuated Prosthetic Hand System", Proceedings of the 2006 IEEE International Conference onMechatronics and Automation, June 2006, pp. 1453-1458

Sign language Coach involves flex sensors that convert the hand gestures (bending of fingers) to resistance values depending upon the amount of bend of the sensors. The equivalent voltage values to the corresponding resistance values are found out using a voltage divider circuit. An analog to digital converter "ADC0809" has been used to convert the analog voltage values to digital values so that they can be fed to the P89V51RD2 microcontroller, which uses the digital input from the analog to digital converter and create corresponding character values stored in the microcontroller memory.

[2] Proceedings of the 2010 IEEE Conference on Sustainable Utilization and Development in Engineering and Technology University Tunku Abdul Rahman 20 & 21 November 2010, Faculty of Engineering, Kuala Lumpur, Malaysia

They developed a hand glove with the support of text on LCD display via computer interface with PIC 18F8680 micro controller having DC power supply\ instead of battery. Edin et al [3] developed a robotic hand for grasping and lifting different object. Wald [4] developed software for editing automatic speech recognition in real time for deaf and hard-hearing people. Simone et al [5] developed a low-cost method to measure hand and finger range of motion. Zhao et al [6] developed a five-fingered prosthetic hand system.

[3] International Journal of Engineering and Technical Research (IJETR) ISSN: 2321-0869, Volume-3, Issue-2, February 2015

In recent years, researchers have been focusing on hand gestures detections and been popular fordeveloping applications in the field of robotics and extended in the area of artificial or prosthetic hands that can mimic the behaviour of a natural human hand. Basic object of this project is to design a portable embedded system. Developing an economical and simple solution for the detection of finger gestures.

2.2 OBJECTIVE OF THE PROJECT

The main aim of this project is to design and build a portable device which helps the dump people to communicate with normal people. This project aims to lower this barrier in communication. It is based on the need of developing an electronic device that can translate sign language into speech in order to make the communication take place between the mute communities with the general public possible.

The main objectives of this project are:

- To design a portable device for speaking purpose.
- To control the microcontroller through flex sensor.
- To develop a source code for PIC microcontroller.
- To learn how to interface different components with PIC.
- Convert the ASL language into speaking language.
- To display the message in the LCD.
- Convert that text message into speech.

CHAPTER -3

INTRODUCTION OF COMPONENTS USED

3.1 SOFTWARE DESCRIPTION

3.1.1 ARDUINO SOFTWARE

Arduino programs are written in the Arduino Integrated Development Environment (IDE). Arduino IDE is a special software running on your system that allows you to write sketches (synonym for program in Arduino language) for different Arduino boards. The Arduino programming language is based on a very simple hardware programming language called processing, which is similar to the C language. After the sketch is written in the Arduino IDE, it should be uploaded on the Arduino board for execution.The first step in programming the Arduino board is downloading and installing the Arduino IDE. The open source Arduino IDE runs on Windows, Mac OS X, and Linux. Download the Arduino software (depending on your OS) from the official website and follow the instructions to install.

Now let's discuss the basics of Arduino programming.The structure of Arduino program is pretty simple. Arduino programs have a minimum of 2 blocks, Preparation & Execution

Each block has a set of statements enclosed in curly braces:

```
void setup( )

{

statements-1;

.

.

.

statement-n;

}

void loop ( )

{

statement-1;
```

.

.

.

statement-n;

}

Here, setup ( ) is the preparation block and loop ( ) is an execution block.The setup function is the first to execute when the program is executed, and this function is called only once. The setup function is used to initialize the pin modes and start serial communication. This function has to be included even if there are no statements to execute.

```
void setup ( )

{

pinMode (pin-number, OUTPUT); // set the ‘pin-number’ as output

pinMode (pin-number, INPUT); // set the ‘pin-number’ as output

}
```

After the setup ( ) function is executed, the execution block runs next. The execution block hosts statements like reading inputs, triggering outputs, checking conditions etc..

In the above example loop ( ) function is a part of execution block. As the name suggests, the loop( ) function executes the set of statements (enclosed in curly braces) repeatedly.

Void loop ( )

{

digitalWrite (pin-number,HIGH); // turns ON the component connected to ‘pin-number’

delay (1000); // wait for 1 sec

digitalWrite (pin-number, LOW); // turns OFF the component connected to ‘pin-number’

delay (1000); //wait for 1sec

}

Figure 3.1 Arduino Software windows

3.2 HARDWARE DESCRIPTION

3.2.1 ARCHITECHTURE

The proposed general architecture incorporates subsystems Flex sensor, Arduino Microcontroller, Speak jet and Speaker into a single automated architecture for practical implementation.

The figure shows a simple architecture diagram of the proposed system and its setup and connectivity.

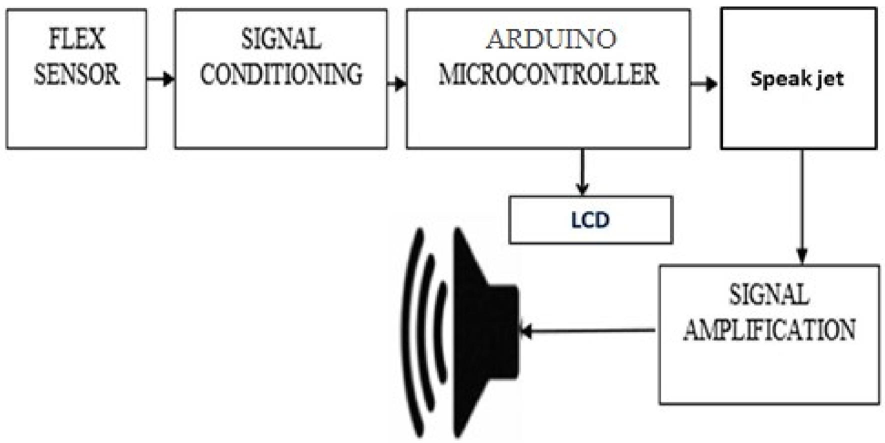

Figure-3.2 Simple Architecture of Electronics Speaking Gloves

3.2.2 COMPONENT REQUIREMENT AND DESCRIPTION

- LEDs
- Resistors
- Flex sensor
- Arduino microcontroller
- Transformer
- Capacitors
- LCD
- Recording Voice IC
- Crystal oscillator
- Connecting wires

3.2.3 Flex Sensor

Flex sensors are sensors that change in resistance depending on the amount of bend on the sensor. They convert the change in bend to electrical resistance - the more the bend, the more the resistance value. They are usually in the form of a thin strip from 1"-5" long that vary in resistance from approximately 10 to 50 kilo ohms. The Flex Sensor patented technology is based on resistive carbon 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 analog resistors. They work as variable analog voltage dividers. Inside the flex sensor are carbon resistive elements within a thin flexible substrate. More carbon means less resistance.

Fig 3.3 Flex sensor

When the substrate is bent the sensor produces a resistance output relative to the bend radius. The flex sensor shown below changes resistance when bent. It will only change resistance in one direction. An unflexed sensor has a resistance of about 10,000ohms. As the flex sensor is bent, the resistance increases to 30-40 kilo ohms at 90 degrees. The resistance variation is based on the basic circuit used in a plain voltage divider. It is used since we need to present a voltage to t he Analog in device and the bend sensor merely changes resistance. In the circuit below the resistance of the bend sensor reduces (as a result of bending it into a convex shape) the voltage on Ain will go up towards 5V. If the resistance of the bend sensor decreases (as a result of bending it in the opposite direction) the voltage on Ain will fall towards Gnd (0V).

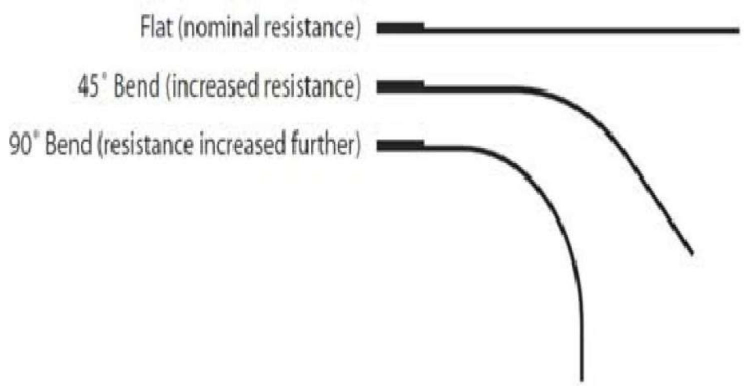

Fig 3.4 Bending of Flex sensor

Flexion sensors, (from Latin flectere, 'to bend') also called bend sensors, measure the amount of deflection caused by bending the sensor. There are various ways of sensing deflection, from strain-gauges to hall-effect sensor. The three most common types of flexion sensors are:

- conductive ink-based
- fibre-optic
- conductive fabric/thread/polymer-based

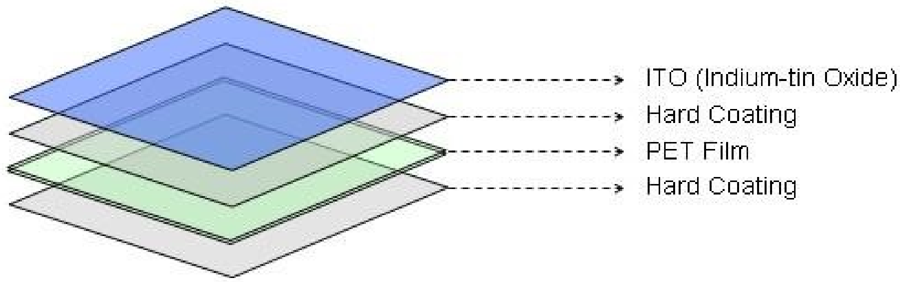

Fig 3.5 Property of Flex sensor

A property of bend sensors worth noting is that bending the sensor at one point to a prescribed angle is not the most effective use of the sensor. As well, bending the sensor at one point to more than 90˚ may permanently damage the sensor. Instead, bend the sensor around a radius of curvature. The smaller the radius of curvature and the more the whole length of the sensor is involved in the deflection, the greater the resistance will be (which will be much greater than the resistance achieved if the sensor is fixed at one end and bent sharply to a high degree). In fact, Infusion Systems define the sensing parameter as “flex angle multiplied by radius”.

Flex sensors are sensors that change in resistance depending on the amount of bend on the sensor. They convert the change in bend to electrical resistance - the more the bend, the more the resistance value.

3.2.4 ARDUINO NANO

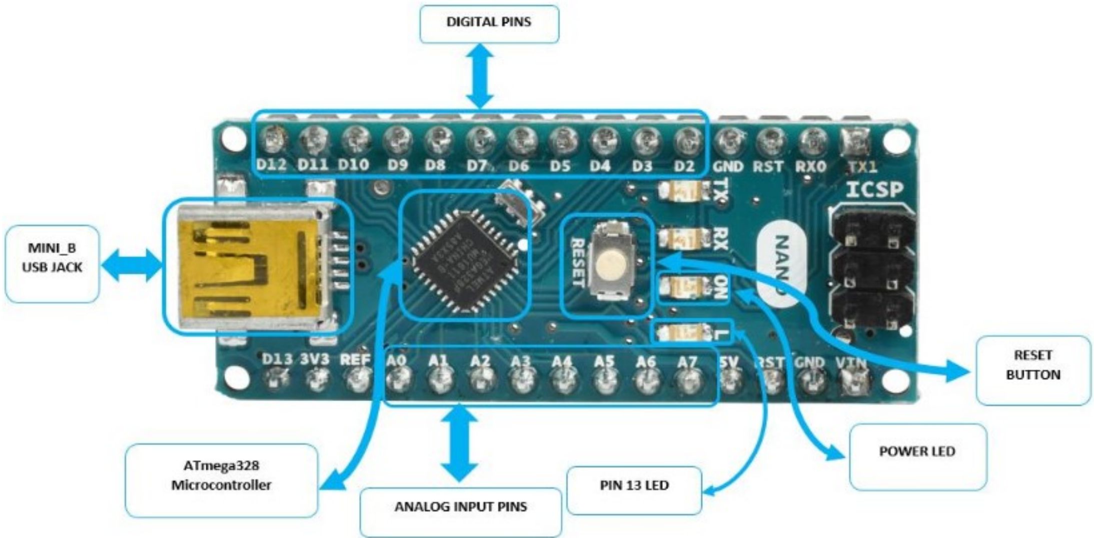

Fig 3.6 Arduino Nano

Arduino nano differ from other Arduino as it very small so it suitable for small sized projectsand it supports breadboards so it canbepluggedwith other components in only one breadboard.

PHYSICAL COMPONENTS OF ARDUINO NANO:-

Microcontroller in Arduino Nano 2.x version, still used ATmega168 microcontroller while the Arduino Nano 3.x version already used ATmega328 microcontroller.

Pin Description:-

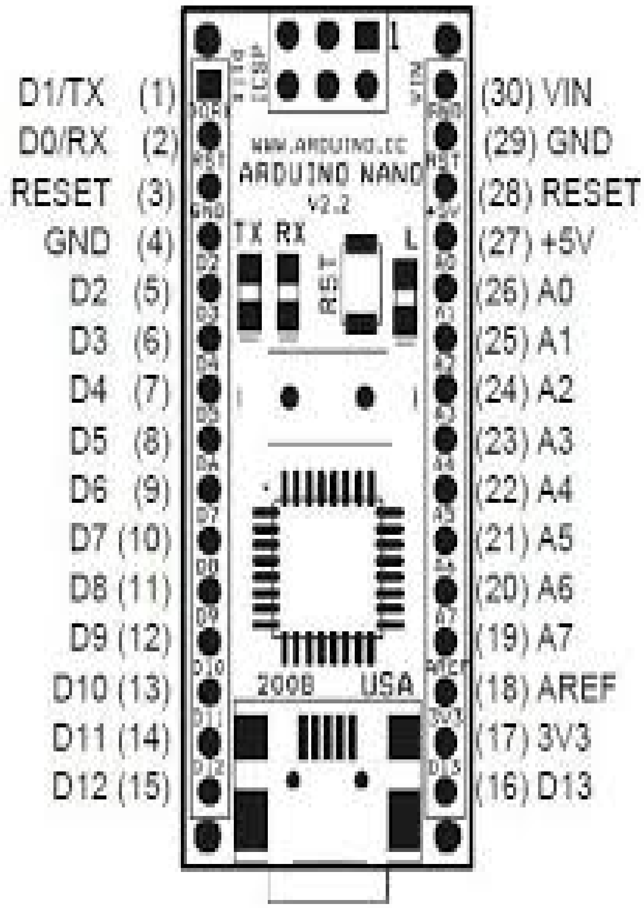

Fig 3.7 Pin Diagram of Arduino Nano

Vin. It is input power supply voltage to the board when using an external power source of 7 to 12 V.

5V. It is a regulated power supply voltage of the board that is used to power the controller and other components placed on the board.

3.3V. This is a minimum voltage generated by the voltage regulator on the board.

GND. These are the ground pins on the board. There are multiple ground pins on the board that can be interfaced accordingly when more than one ground pin is required.

Reset. Reset pin is added on the board that resets the board. It is very helpful when running program goes too complex and hangs up the board. LOW value to the reset pin will reset the controller.

Analog Pins. There are 8 analog pins on the board marked as A0 – A7. These pins are used to measure the analog voltage ranging between 0 to 5V.

Rx, Tx. These pins are used for serial communication where Tx represents the transmission of data while Rx represents the data receiver.

13. This pin is used to turn on the built-in LED.

AREF. This pin is used as a reference voltage for the input voltage.

PWM. Six pins 3, 5, 6,9,10, 11 can be used for providing 8-pit PWM (Pulse Width Modulation) output. It is a method used for getting analog results with digital sources.

SPI. Four pins 10(SS), 11(MOSI), 12(MISO), 13(SCK) are used for SPI (Serial Peripheral Interface). SPI is an interface bus and mainly used to transfer data between microcontrollers and other peripherals like sensors, registers, and SD card.

External Interrupts. Pin 2 and 3 are used as external interrupts which are used in case of emergency when we need to stop the main program and call important instructions at that point. The main program resumes once interrupt instruction is called and executed.

I2C. I2C communication is developed using A4 and A5 pins where A4 represents the serial data line (SDA) which carries the data and A5 represents the serial clock line (SCL) which is a clock signal, generated by the master device, used for data synchronization between the devices on an I2C bus.

Communication Programming:

- The Nano device comes with an ability to set up a communication with other controllers and computers. The serial communication is carried out by the digital pins like pin 0 (Rx) and pin 1 (Tx) where Rx is used for receiving data and Tx is used for the transmission of data. The serial monitor is added on the Arduino Software which is used to transmit textual data to or from the board. FTDI drivers are also included in the software which behave as a virtual com port to the software.
- The Tx and Rx pins come with an LED which blinks as the data is transmitted between FTDI and USB connection to the computer.
- Arduino Software Serial Library is used for carrying out a serial communication between the board and the computer.

- Apart from serial communication the Nano board also support I2C and SPI communication. The Wire Library inside the Arduino Software is accessed to use the I2C bus.
- The Arduino Nano is programmed by Arduino Software called IDE which is a common software used for almost all types of board available. Simply download the software and select the board you are using. There are two options to program the controller i.e either by the bootloader that is added in the software which sets you free from the use of external burner to compile and burn the program into the controller and another option is by using ICSP (In-circuit serial programming header).
- Arduino board software is equally compatible with Windows, Linux or MAC, however, Windows are preferred to use.

3.2.5 LIGHT EMITTING DIODES (LED's)

LEDs present many advantages over incandescent light sources including lower energy consumption, longer lifetime, improved robustness, smaller size, faster switching, and greater durability and reliability. LEDs powerful enough for room lighting are relatively expensive and require more precise current and heat management than compact fluorescent lamp sources of comparable output.

Figure-3.8 Light-Emitting Diodes (LED"s)

3.2.6 Voice Record Module

Voice Record Module is based on ISD1820, which a multiple-message record/playback device.It can offers true single-chip voice recording, no-volatile storage, and playback capability around 10 seconds. This module is easy to use which you could direct control by push button on board or by Microcontroller such as Arduino, STM32, ChipKit etc. From these, you can easy control record , playback and repeat and so on.

SPECIFICATION

1. Push-button interface, playback can be edge or level activated

2.Automatic power-down mode

3.On-chip 8Ω speaker driver

4. Signal 3.3V Power Supply

5.Can be controlled both manually or by MCU

6.Record up to around 10 seconds of audio

7. Dimensions: 37 x 54 mm

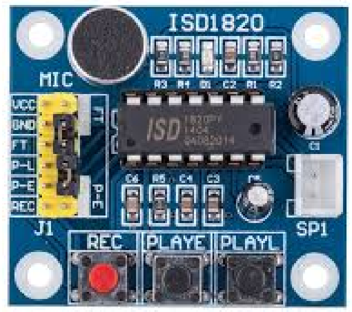

Fig 3.9 Voice Recording ISD1820

Pin Description:-

1. **VCC**– 3.3V power supply

2. **GND**– Power ground

3. **REC** – The REC input is an active-HIGH record signal. The module starts recording whenever REC is HIGH. This pin must remain HIGH for the duration of the recording. REC takes precedence over either playback (PLAYL or PLAYE) signal.

4. **PLAYE** – Playback, Edge-activated: When a HIGH-going transition is detected on continues until an End-of-Message (EOM) marker is encountered or the end of the memory space is reached.

5. **PLAYL** – Playback, Level-activated, when this input pin level transits for LOW to HIGH, a playback cycle is initiated.

6. Speaker Outputs – The SP+ and SP- pins provide direct drive for loudspeakers with impedances as low as 8Ω.

7. **MIC** – Microphone Input, the microphone input transfers its signals to the on-chip preamplifier.

8. **FT** – Feed Through: By connecting the mini jumper, this mode enable the Microphone to drive the speaker directly.

9. **P-E** – By connecting the mini jumper, Play the records endlessly.

3.2.7 LCD DISPLAY

Liquid crystal display (LCD) has material which combines the properties of both liquid and crystals. They have a temperature range within which the molecules are almost as mobile as they would be in a liquid, but are grouped together in an order form similar to a crystal.

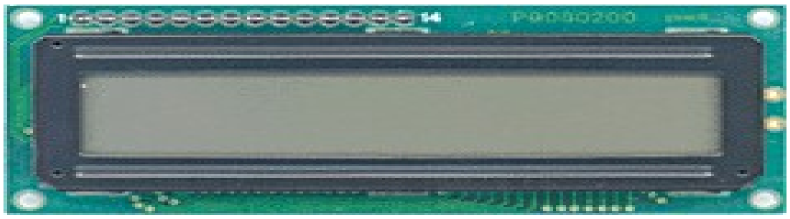

Fig. 3.10 LCD DISPLAY

More microcontroller devices are using 'smart LCD' displays to output visual information. The following discussion covers the connection of a Hitachi LCD display to a PIC microcontroller. LCD displays designed around Hitachi's LCD HD44780 module, are inexpensive, easy to use, and it is even possible to produce a readout using the 8 x 80 pixels of the display. Hitachi LCD displays have a standard ASCII set of characters plus Japanese, Greek and mathematical symbols.

For an 8-bit data bus, the display requires a +5V supply plus 11 I/O lines. For a 4-bit data bus it only requires the supply lines plus seven extra lines. When the LCD display is not enabled, data lines are tri-state which means they are in a state of high impedance (as though they are disconnected) and this means they do not interfere with the operation of the microcontroller when the display is not being addressed. The LCD also requires 3 "control" lines from the microcontroller

Enable (E) This line allows access to the display through R/W and RS lines. When this line is low, the LCD is disabled and ignores signals from R/W and RS. When (E) line is high, the LCD checks the state of the two control lines and responds accordingly.

Read/Write (R/W) This line determines the direction of data between the LCD and microcontroller. When it is low, data is written to the LCD. When it is high, data is read from the LCD.

Register select (RS) With the help of this line; the LCD interprets the type of data on data lines. When it is low, an instruction is being written to the LCD. When it is high, a character is being written to the LCD.

3.2.8 CRYSTAL OSCILLATOR

Fig-3.11 crystal oscillator

A crystal oscillator is an electronic oscillator circuit that uses the mechanical resonance of a vibrating crystal of piezoelectric material to create an electrical signal with a very precise frequency. This frequency is commonly used to keep track of time (as in quartz wristwatches), to provide a stable clock signal for digital integrated circuits, and to stabilize frequencies for radio transmitters and receivers. The most common type of piezoelectric resonator used is the quartz crystal, so oscillator circuits incorporating them became known as crystal oscillators, but other piezoelectric materials including polycrystalline ceramics are used in similar circuits.

Quartz crystals are manufactured for frequencies from a few tens of kilohertz to tens of megahertz. More than two billion crystals are manufactured annually. Most are used for consumer devices such as wristwatches, clocks, radios, computers, and cellphones. Quartz crystals are also found inside test and measurement equipment, such as counters, signal generators, and oscilloscopes.

3.2.9 SPEAKER

The synthesized voice output from Speak Jet is not much audible to human ears therefore; it is fed to an amplifier (LM386) that enhances its volume. It is configured at the gain of 200 that makes it quite natural to human ears; an 8Ω speaker is used to get the final output.

3.2.10 POWER SUPPLY

Power supply form the basic building block of any electronic circuits and therefore it's important to familiarize the DC power supply circuit construction. The given circuit illustrates a simple approach to construct a dual DC power supply of 5V and 12V from the 230V AC mains supply. The Voltage ranges 5V and 12V are widely used in all kinds of simple electronic circuits, so it's meaningful to learn this simple construction.

Circuit Diagram:

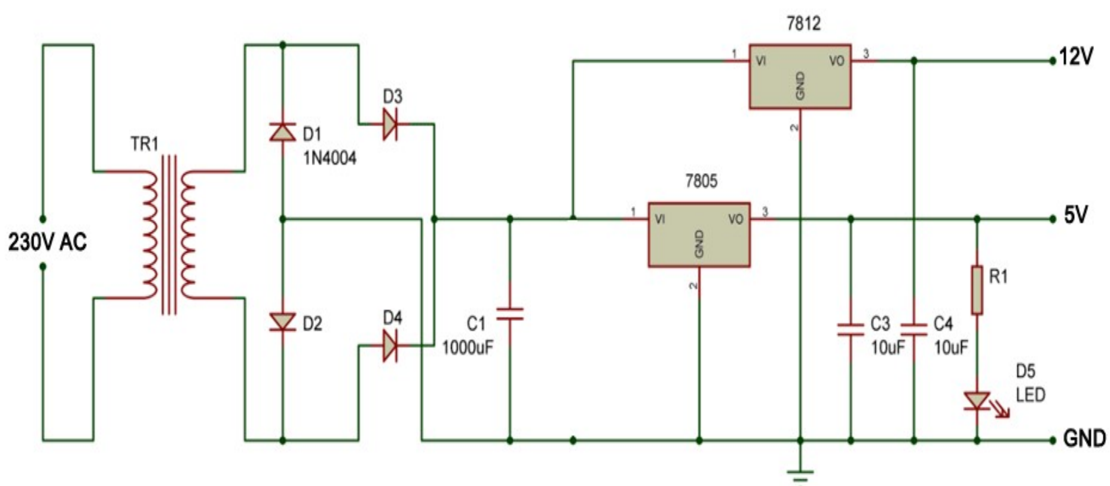

Fig 3.12 Power Supply

WORKING:

The above circuit obtains power from a 230V AC mains supply voltage and fed into a step down transformer for transforming higher voltage supply to lower one. The transformer TR1 can be of 230V primary, 15V secondary and 1A step down transformer. The stepped down voltage can be fed into the bridge rectifier made of four 1N4007 diodes for the conversion of AC supply to DC one.

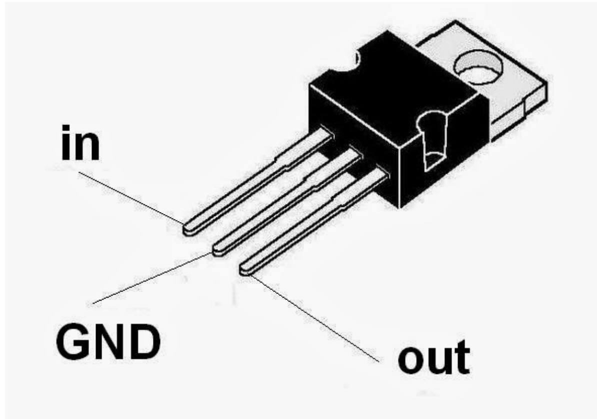

Fig.13 IC regulator pinout

The output from the bridge rectifier was filtered by the capacitor C1 to offer a steady DC level to the input pins of the regulators used in the above circuit. The DC voltage is then fed in to the IC 7805 which is a 5V regulator and also to the IC 7812 which was a 12V regulator. The output obtained from the 7805 & 7012 are 5V and 12V respectively. Capacitors C3 and C4 are employed at the outputs are used to give a steady voltage at the output terminal. A LED D5 was connected through the current limiting resistor R1 for indicate the state of the device.

This kind of circuits are highly useful where two dual range of DC voltages are used to power the operation of a circuit. Varying the voltage regulator IC's 7805 or 7812 with 7806 and 7808 to obtain 6V and 8V as output. But each IC have minimum and maximum voltage requirements, so make sure you build in such a way to meet the requirements.

3.2.11 TRANSFORMER

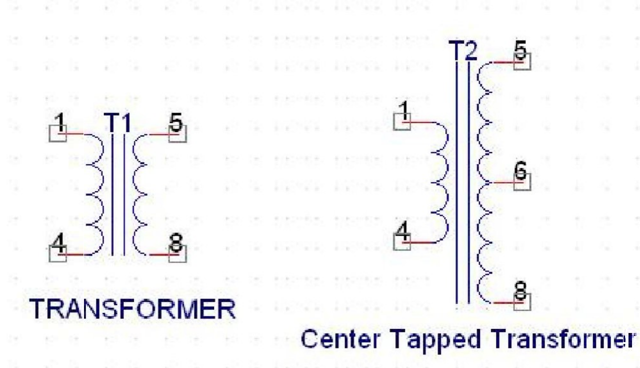

Fig 3.14 circuit symbol of transformer

A transformer consists of two coils also called as "WINDINGS" namely PRIMARY & SECONDARY. They are linked together through inductively coupled electrical conductors also called as CORE. A changing current in the primary causes a change in the Magnetic Field in the core & this in turn induces an alternating voltage in the secondary coil. If load is applied to the secondary then an alternating current will flow through the load. If we consider an ideal condition then all the energy from the primary circuit will be transferred to the secondary circuit through the magnetic field.

$$P_{primary} = P_{secondary}$$

$$I_p V_p = I_s V_s$$

The secondary voltage of the transformer depends on the number of turns in the Primary as well as in the secondary..

$$\frac{V_s}{V_p} = \frac{N_s}{N_p}$$

3.2.12 DIODES

Diodes are used to convert AC into DC these are used as half wave rectifier or full wave rectifier. Three points must he kept in mind while using any type of diode.

1. Maximum forward current capacity
2. Maximum reverse voltage capacity
3. Maximum forward voltage capacity

Fig 3.15 Diodes

The number and voltage capacity of some of the important diodes available in the market are as follows:

- Diodes of number IN4001, IN4002, IN4003, IN4004, IN4005, IN4006 and IN4007 have maximum reverse bias voltage capacity of 50V and maximum forward current capacity of 1 Amp.
- Diode of same capacities can be used in place of one another. Besides this diode of more capacity can be used in place of diode of low capacity but diode of low capacity can not be used in place of diode of high capacity. For example, in place of IN4002; IN4001 or IN4007 can be used but IN4001 or IN4002 cannot be used in place of IN4007.The diode BY125made by company BEL is equivalent of diode from IN4001 to IN4003. BY 126 is equivalent to diodes IN4004 to 4006 and BY 127 is equivalent to diode IN4007.

3.2.13 FILTER CAPACITOR

Even though half wave & full wave rectifier give DC output, none of them provides a constant output voltage. For this we require to smoothen the waveform received from the rectifier. This can be done by using a capacitor at the output of the rectifier this capacitor is also called as “FILTER CAPACITOR” or “SMOOTHING CAPACITOR” or “RESERVOIR CAPACITOR”. Even after using this capacitor a small amount of ripple will remain.

We place the Filter Capacitor at the output of the rectifier the capacitor will charge to the peak voltage during each half cycle then will discharge its stored energy slowly through the load while the rectified voltage drops to zero, thus trying to keep the voltage as constant as possible.

3.2.14 VOLTAGEREGULATOR

A Voltage regulator is a device which converts varying input voltage into a constant regulated output voltage. voltage regulator can be of two types

1) Linear Voltage Regulator

Also called as Resistive Voltage regulator because they dissipate the excessive voltage resistively as heat.

2) Switching Regulators

They regulate the output voltage by switching the Current ON/OFF very rapidly. Since their output is either ON or OFF it dissipates very low power thus achieving higher efficiency as compared to linear voltage regulators. The most commonly available Linear Positive Voltage Regulators are the 78XX series where the XX indicates the output voltage. And 79XX series is for Negative Voltage Regulators.

3.3 WORKING

The system is intended and built using the flex sensor, Arduino microcontroller. Our sensing device produces the analog values corresponding to the acceleration of three axes. Acceleration values for the eight gestures were placed in the lookup table in controller. Each incoming gesture value for all three axes be compared with every axis value in the table. The tolerance level for each axe is±5.When the detected gesture is same as that of collected one, one channel among eight in the voice chip will be automatically enabled. The same be also played through speaker using APR9600 voice chip. It is 8 channel voice chips. Since the algorithm is based on the acceleration values which is generalized from gesture motion analysis, it is not narrowed to specific users. Therefore, there is no requirement to train users before using it.

3.4 HARDWARE CIRCUIT

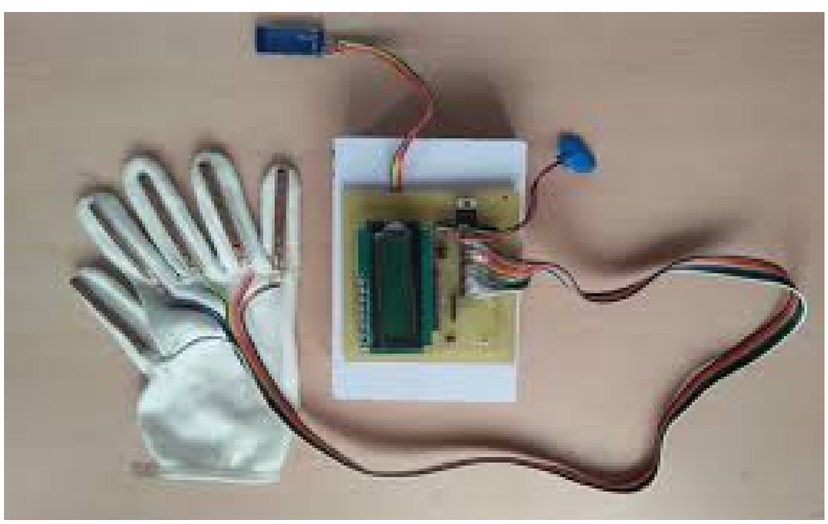

Fig 3.16 Hardware circuit

CHAPTER-4

EXPERIMENTAL RESULT ANALYSIS

4.1 CALCULATION:

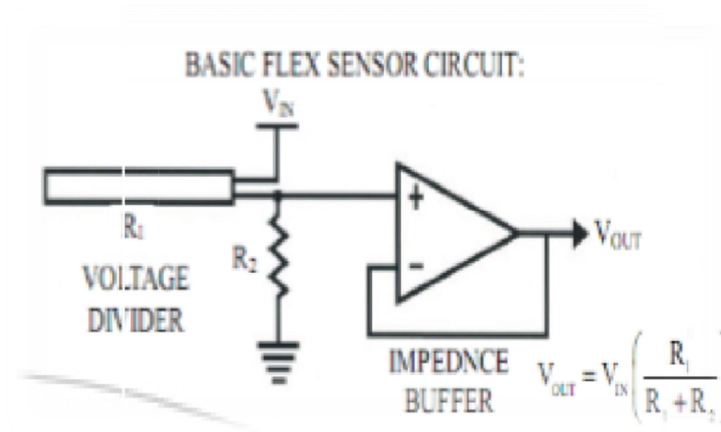

Fig 4.1 Basic flex sensor circuit

Calculation of signal conditioning

Formula for Voltage Divider,

Vo = VCC (R2/(R1+R2))

For Vo minimum when sensor deflection is 0˚,

R1=10KΩ, R2=51KΩ,VCC =5V

Vo(min)=5V(10K/(51K+10K))=0.81V

For Vo middle when sensor deflection is 45˚.

R1=20KΩ, R2=51KΩ,VCC=5V

Vo(min)=5V(20K/(51K+20K)=1.40V

For Vo MAXIMUM when sensor deflection is 90˚,

R1=30KΩ, R2=51KΩ,VCC =5V

Vo(min)=5V(30K/(51K+30K)=1.85V

4.2 RESULT

S. No.	Gestures	Message
1.		I need water.
2.		I am fine.
3.		Feeling cold.
4.		Thank you
5.		I am hungry

CONCLUSION

This project is a useful tool for speech impaired and partially paralyzed patients which fill the communication gap between patients, doctors and relatives. This project will give dumb a voice to speak for their needs and to express their gestures. A sit is portable, requires low power operating on a single lithium-ion rechargeable battery and having less weight.

A microcontroller and display unit with speaker.

The incoming acceleration value for each gesture will be compared with values in the stored templates. Since the standard gesture patterns are generated by motion analysis and are simple features represented by only acceleration values, big data base and complex recognition systems were not required and now needs to collect as many gestures made by different people as possible to improve the recognition accuracy.

FUTURE SCOPE

Nothing is perfect in this world, always there is a room for improvement. This project can be enhanced further by using memory which would have real voice recorded by humans to generate a huge speaking dictionary and more natural voice could be heard with ease.

To make it 100% waterproof, some protected layers may be fashioned in order to secure the circuit, battery. A system with more advanced algorithm than proposed and existing one has to developed, and use the same to detect gesture made by the people for automation.

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