

Design of GSM Based Voice Data Processing Using Bone Conduction Principle

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Abstract- The GSM based SoundBite hearing system allows people with to hear the sounds via bone conduction to wear an intraoral device and a small microphone in the deaf ear to regain lost hearing. This device consists of GSM modem PIC16F877A controller and audio amplifier unit. GSM modem will receive incoming calls and automatically answer the call via AT Commands. Then incoming voice signal is converted into low frequency vibration signal that fed through the teeth to cochlea. Unlike implantable bone conduction hearing aids, SoundBite requires no surgery. Rather, it is the world's first removable and non-surgical hearing solution to use the well-established principle of bone conduction to imperceptibly transmit sound via the teeth. Custom made for each person, SoundBite is simple, removable, and totally non-invasive.

Keywords- Soundbite, non-invasive, bone conduction device(BCD), speech recognition,ADM.

I. INTRODUCTION

Communication and community are a hugely important part of life but deaf people are cut-off from the usual form of communicating and also deafness is the third most common disability in the world .This deafness in people caused due to three types of failures in the human classified as:Inner drum failure ,middle drum failure and the outer drum failure. These failures removed by BoneConduction Principle. Bone conduction is the conduction of sound to the inner ear through the bones of the skull .

This transmission can be used with individuals with normal or impaired hearing.



Figure 1: Basic idea of Air and Bone Conduction

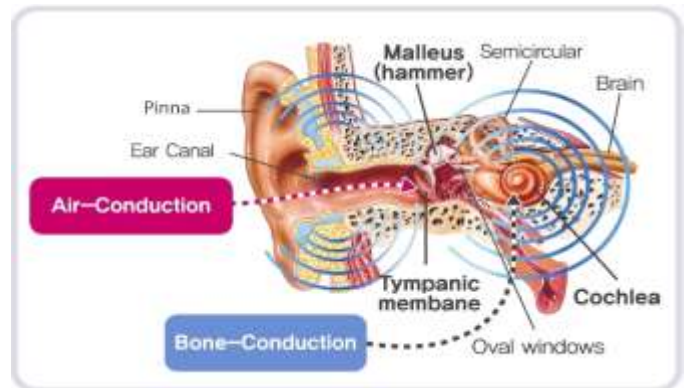


Figure 2: Basic idea of air and bone conduction

Bone conduction is the transmission of sound vibration directly to the inner ear or cochlea.The ear drum converts the normal sound waves which are actually vibrations in the ear into different kind of vibrations and transmit them to the cochlea.

II. EXISTING SYSTEM

Bone conduction is transmission of the sounds through the bones to the cochlea which can be really helpful for people with hearing losses .There are bone conduction devices has its own drawbacks and the problems and the adjustment issues which are solved by improving the design and placement of the device with surgical implantations .The other problems is speech recognition,as the background noise increases the recognition of the speech also reduces,it can reduce by 40% compared to conventional hearing and the user has to adjust us there are no other options.

Several hearing devices were found for outer drum problem only.Inner drum problem is usually a permanent condition which impairs one's ability to tell the direction a sound is coming from. It can also be responsible for difficulty understanding speech or conversations on the deaf ear side, particularly in a noisy environment. Some medical treatments has been proposed but that needs surgery. Due to that surgery it may leads to additional problems.

III. PROPOSED SYSTEM

This hearing device is designed to use the natural amplification of your ear. Any sound in that coming from GSM Modem. It uses a digital processor (PIC16F877A) to transmit to the sound to a piezoelectric actuator which needs very little power to generate the vibrations that travel through bone, which in turn sends those sound vibrations into your cochlea through your teeth. This way, the sound is transported from your impaired ear directly to your hearing ear. This hearing device will be fitted to the upper left or right teeth in the back of your mouth. This doesn't require any of your teeth to be altered, and the device can be inserted and removed easily. This hearing device is a flat piece (in Real-Time Product) that contains a sealed rechargeable battery, and electronics and wireless capabilities that can pick up sound transmissions from the behind-the-ear microphone.

IV. RELATED WORK

Pic controller, this board is built with PIC16F877A as a microcontroller unit. The input supply to the board can be fed from both ac and dc. It uses a crystal oscillator for generating frequency. A serial communication is achieved by an UART protocol. This board is specially designed for connecting digital and analog sensors which has input voltage range 5 or 12V_{DC} as well as it can be interfaced with serial communication devices, relay boards etc. The output can be monitored in LCD as well as pc. Data EEPROM is used to store data defined by the user. PCB design. When a variable is defined it is stored in program memory and the value of the variable is stored in data EEPROM Synchronous serial ports are used to communicate with other peripheral devices like serial EEPROMS, A/D converters and shift registers. PCB design. They have two modes. 1- SPI Serial Peripheral Interface 2- I2C Inter Integrated Circuit.



FEATURES Input Supply: Ac or Dc (9 to 12v), 8bit LCD, RS232 output, Analog channel: 5 sensor inputs, Crystal frequency: 4mHz.

Voice Module, WTV-SR is provided with mp3 mode, Key control one by one, parallel interface, one-line serial interface, three-line serial interface. Therefore, WTV-SR module is suitable for many occasions. It can be changed different control modes by setting I/O, which on the bottom of WTV-SR. It gives a Flexible power supply by either supply module or supply solution, so it is an effective recording solution. The recorded voice can be uploaded to the system. It also supports download voice from PC and play recorded voice with high quality. It can record up to 252 segment voice (including fixed voice) and recording time up to 1600 seconds. It supports audio recording at 10 KHz or 14 KHz sample rate.



FEATURES Operating voltage: 3.3v DC, Recording Time: 12 minutes, 8-level adjustable volume, Support MIC & LINE-IN recording, Support USB with programmer, With power down memory to retain.

Two relay board, A relay is an electromechanical switch which is activated by an electric current. A two relay board arrangement contains driver circuit, power supply circuit and isolation circuit. A relay is assembled with that circuit. The driver circuit contains transistors for switching operations. The transistor is used for switching the relay.

An isolation circuit prevents reverse voltage from the relay which protects the controller and transistor from damage. The input pulse for switching the transistor is given from the microcontroller unit. It is used for switching of a two device.



FEATURES Input voltage: 12V_{DC}, Driver unit: ULN2003A, Isolation unit: In4007,

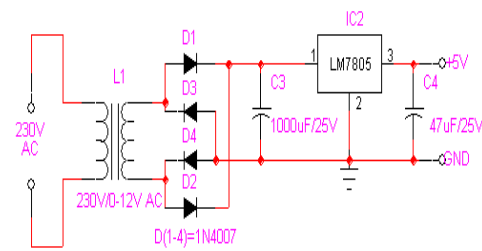
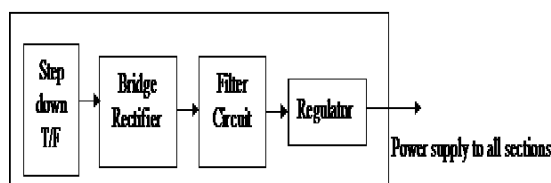
Fast switching, Motor forward and reverse operation.

GSM Modem, This GSM Modem can accept any GSM network act as SIM card and just like a mobile phone with its own unique phone number. Advantage of using this modem will be that you can use its RS232 port to communicate and develop embedded applications. The SIM800C is a complete Dual-band GSM/GPRS solution in a SMT module featuring an industry-standard interface, the SIM800CS is a quad-band GSM/GPRS module that works on frequencies GSM850MHz, delivers performance for voice, SMS, Data, and Fax in a small form factor and with low power consumption.



FEATURES High Quality Product □ RS232 interface @ RMC Connector for direct communication with computer or MCU kit Configurable baud rate SMA connector with GSM Antenna, SIM Card holder, Built in Network Status LED Inbuilt Powerful TCP/IP protocol stack for internet data transfer over GPRS, Audio interface Connector ,Normal operation temperature: -20 °C to +55 °C Input Voltage: 4.5V-12V DC

Power supply unit, The input to the circuit is applied from the regulated power supply. The a.c. input i.e., 230V from the mains supply is step down by the transformer to 12V and is fed to a rectifier. The output obtained from the rectifier is a pulsating d.c voltage. So in order to get a pure d.c voltage, the output voltage from the rectifier is fed to a filter to remove any a.c components present even after rectification. Now, this voltage is given to a voltage regulator to obtain a pure constant dc voltage.



V. CONCLUSION

This presents methodology to improve the speech recognition or intelligibility by using super directional microwaves made with the help of ADM. ADM takes in extra configuration of sound that can be of use and therefore increase the recognition of sound.

This hearing device is designed to compensate the deafness of the inner drum and also outer drum problem solved. The PIC16F877A connected with GSM Modem when the call Receives then it automatically attends it. Then using the motor vibration signals have been produced then incoming voice signal is converted into low frequency vibration signal that fed through the teeth to cochlea.

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