

Design of Ingenious Hearing Comfort

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Abstract- Assistance with an ability to perceive sound is assessed with the help of mobile operating system. To examine the ability to perceive sound of a human with hearing impairment, a mobile operating system is preferred. For examining the impairment, an assessed pair of small loud speaker drivers worn on or around the head over user's ears is utilised. They are nothing but the electroacoustic transducers, which converts an electrical signal to corresponding sound. The ingenious comfort includes a couple unit. Initially it is utilised to examine the hearing impairment of a human. With the outcome of the initial unit, the next unit achieves acoustic assessment systematically. By utilising the ingenious comfort, the human with the impairment will hear a lot better. These comforts do not restore your hearing to normal, but they improve it significantly. It becomes easier to hear what others say. Sounds you have not heard for a long time such as birds singing, door bells ringing, the howling of the wind and water running, may become available to you. It improves the user's social, psychological and physical sense of well being. It further curtails physical or mental pressure and it is cost effective. With GSM automation, intercommunication between the mobile operating system and ingenious hearing comfort is furnished.

Keywords: Mobile operating system, Hearing comfort, GSM, Systematic Audio assessment, Hearing impairment.

1. INTRODUCTION

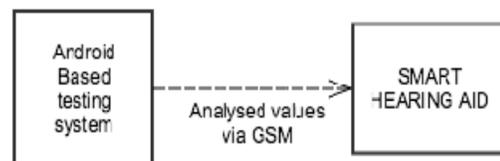
Owing to natality or meanwhile the maturity process, hearing trouble is the familiar trouble born by humans. By being evident to consecutive noise, some humans fall off hearing trouble. The constant cumulating in noise polluting is farther provoked. Hearing trouble was refined in the 17th century, towards conquering of hearing troubles [ref]. It is known as ear horn(trumpets), at the beginning, Which was a horn-shaped conic implementation. This device helps in centralizing vibrant of sound to ears. The ear horn does not crave any external potential. The hearing comfort was accomplished as an electronic device, recently. By the utilization of analog filters, the process of purification is made at the beginning. By the utilization of the digital signal processors, the hearing comfort was digitized recently. Nowadays, hearing comfort was accommodated into a mini device. But a hearing assessment laboratory is essential for the exhaustive assay of the substantial hearing trouble. This leading technology from this union designed to provide you and your child with the world's best hearing performance in all situations.

2. RELEVANT STUDY

By the typical laboratory assessment [3], H.G.Mc Allister promotes a hearing comfort withTMS320 processor. In which the hearing comfort is

accommodated from the audiogram which is the graphics sound recordings produced by the audiometry. We developed the hearing trouble interpreting as a clone appliance, in pursuance of making it uncomplicated. The morals interpreted are transmitted to the hearing comfort through GSM. So, the hearing comfort had systematically accommodated. In the ingenious hearing comfort, Finite Impulse Response(FIR) is utilized [6].

3. PRIMARY MODEL OF THE SYSTEM



The comprehensive system has two modules,

1. Clone-based examining system.
2. Ingenious hearing comfort.

Through GSM, the first one can communicate with the second one.

4. CLONE BASED EXAMINING SYSTEM

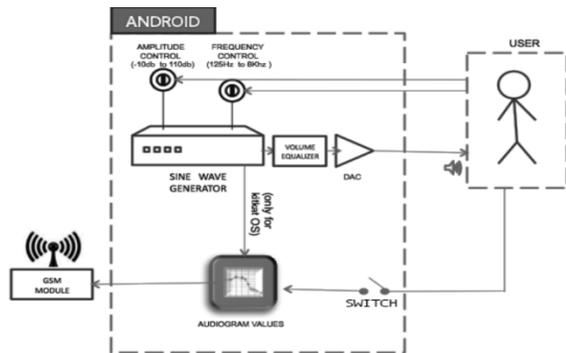


Figure 2 Block diagram of the Android-based testing system.

Clone predicted hearing trouble examining system is accomplished in clone province. The hearing trouble examining structure is shown in figure 2. It includes a GSM module, sine wave generator, volume equalizer, Digital to Analog Converter(DAC), the GSM module and user.

1. User:

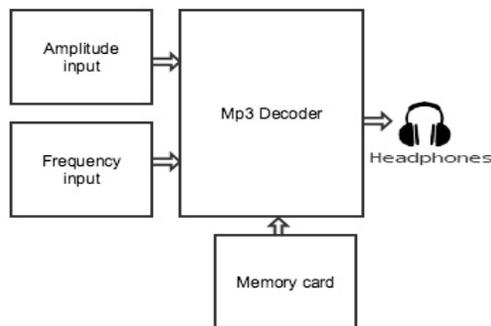


Figure 3 Block diagram of the Sine-wave generator.

The user is the one, who has troubles in hearing. So, the ingenious hearing comfort is contrived. Hence, the user who has trouble in hearing can utilize the system either by own or with meager compensation by others. It is essential to bear headphones for the user. In those headphones, the sound which is accomplished by the sine wave is heard. It is necessary to switch on the store stimulate knob in the clone appliance when the user hears the sound accomplished. This process was clearly exposed in figure2. In the former period clone appliance Operating System (OS), the user has to access the accumulated sinewave morals by their own. But in the latest versions of Operating System

(OS), the reports are systematically gathered in the appliance. In which the binary decoder is a combined logic circuit that converts binary information from now coded inputs to a maximum of 2^n unique outputs. Data De-multiplexing and memory address decoding are some of the applications.

2. Sine Wave Generator:

The sine wave generator is guesstimate constructed as exposed in the figure3. In the storage card, the acoustic portion of the sinewave is accumulated. The directory which has to be amused is chosen endowed to amplitude and frequency inputs. To hear the acoustics in the headphones, the mp3 decoder figure-out the mp3 case. The sine wave of various amplitude and frequency is accomplished by the sine wave generator. For the hearing trouble assay 125Hz, 250Hz, 500Hz, 1000Hz, 2000Hz, 4000Hz, 8000Hz are the frequencies utilized. For the generation of the sine wave, the frequency is kept idle and the amplitude is alternated.

3. Equalizer

A seven-band equalizer is an equalizer utilized to regulate the headphones, as like exposed in the figure 4. The resident frequency response should own by the headphones itself. A volume equalizer is utilized meanwhile for keeping the similar amplitude at all frequencies. As per the response of the frequency by each headphone, the chronic equalizer is over-written in the scope of a clone appliance. 63-188Hz, 125-375Hz, 250-750Hz, 500-1500Hz, 1000-3000Hz, 2000-6000Hz, 4000Hz-12000Hz are the morals of the seven band-pass filters.

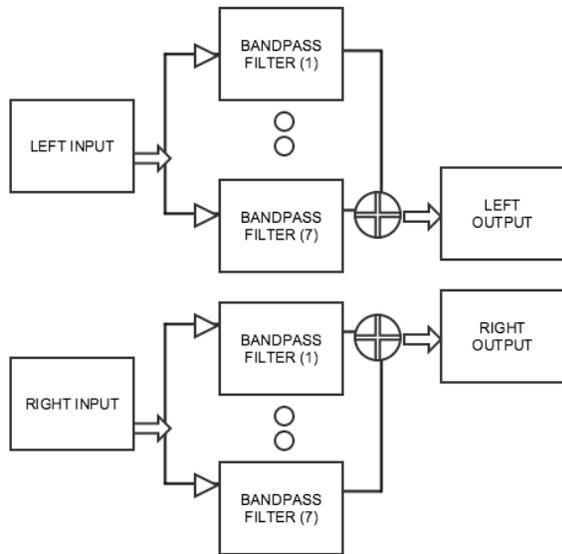


Figure 4 Block diagram of the Equalizer.

4. Digital To Analog Converter(DAC)

In the perspective of the ingenious hearing comfort, the chronic digital to analog converter of the clone

In abounding clone appliance, the GSM module is congenital. A SIM(Subscriber Identity Module) with a valid number is necessary for the GSM module. Through the SIM assistance, the GSM module is used to transmit the convoked audiogram morals to the ingenious hearing comfort.

The data processing of the ingenious hearing comfort was exposed in figure5. 'If' condition instruction is utilized to prefer either left or right behind the generation of the sinewave. The frequency input glances and it is agreed by the representative. The amplitude is also glanced and agreed by the representative, similar to the frequency. As quoted, the equalizer is utilized to prostrate the frequency acknowledgment of the headphones ultimately. GSM module is used to establish communication between a computer and a GSM system. Global Packet Radio Service (GPRS) is an extension of GSM that enables higher data transmission rate. Global System for Mobile Communications (GSM) is an architecture used for mobile communication in most of the countries. It is an open and digital cellular technology used for transmitting mobile voice and data service

appliance is utilized. Actually, this system needs 16000Hz sample rate exclusively for DAC, while it is the repudiate sample rate of a clone appliance,44100Hz is utilized.

5. GSM Module

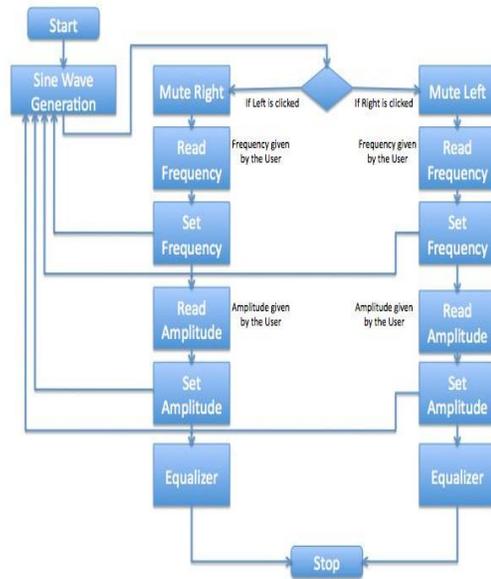


Figure 5. Flowchart of clone-based system

operates at 850 MHZ, 900 MHZ, 1800 MHZ, 1900 MHZ frequency bands. Improved spectrum efficiency, Hearing of high-quality speech and uses encryption to make phone calls secured are the features of the GSM module.

5. INGENIOUS HEARING COMFORT

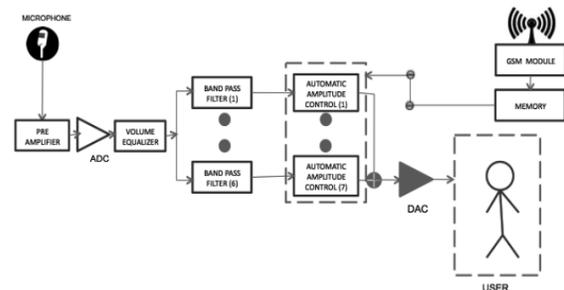


Figure 6 Block diagram of ingenious hearing comfort

In the boards like Arduino due, beagle board etc., the ingenious hearing comfort is accomplished. An apparent GSM should be merged.

1. Pre-Amplifier:

An infinitesimal amplification to the signal is obtained by a pre-amplifier. When a microphone is coherent to it, it can utilize in the amplifiers typically. Ahead of the vital amplification, this process should take place. From the microphones, the acoustic input is magnified. Hence, the beyond processing is made.

2. Analog To Digital Converter(ADC)

The analog to digital converters is implanted in many of the boards including beagle board. For digital signal processing, the analog signals are converted into digital signals(ie., signals are digitized). The signal cannot be digitized in the absence of the analog to digital converter.

Equalizer:

Equalizer is built of seven band-pass filters in the same manner of the clone-based analyzing system. An equalizer is utilized in pursuance of smashing the frequencies of the signal from the microphone.

4. Band-Pass Filter:

In order to bisect the signals into seven samples, seven band-pass filters are utilized. In the process of the clone-based predicting system, the morals of seven band-pass filters are 63-188Hz,125-375Hz,250-750Hz,500-1500Hz, 1000-3000Hz,2000-6000Hz,4000-12000Hz.

5.SYSTEMATIC AMPLITUDE CONTROL:

The response of the seven band-pass filters was obtained by seven systematic amplitude controllers. Through GSM, it checks the amplitude by the morals obtained. Here, a gate and a limiter are utilized.

6. DIGITAL TO ANALOG CONVERTERS(DAC):

The digitized response of the analog to digital converter is converted to the analog output in the

DAC. The working of DAC is opposite to the working of ADC.DAC has implanted in many of the boards such as beagle board, Arduino due. Only the analog signals are authorized in the typical headphone.DAC is utilized in the pursuance of hearing the processed signal in the headphones.

7. GSM Module:

It is an open source computer hardware and software company, project and user community that designs and manufactures single board of microcontrollers and microcontroller kits for building digital devices and interactive objects that can sense and control objects in the physical and digital world. An appliance, which is involving in receiving and transmitting the SMS is a GSM modem.SIM300, SIM900A are some of the GSM modules. By the utilization of attention commands, the predicted morals are acquired.

7. RESULT

The screenshot of the clone-based proving appliance was exposed in figure7. The radio knobs, which are utilized for choosing the frequency and the catalog is utilized for choosing the amplitude. The screenshot of the LAB VIEW was exposed in figure8. The audiogram of the evidence gathered is predicted and the frequency output is also investigated.



Figure7. Screenshot of the Android-based application

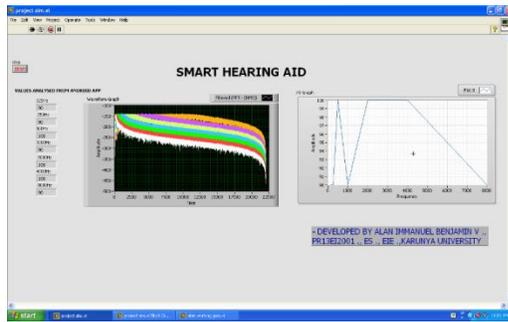


Figure 8. Screenshot of hearing comfort tested in LabVIEW.

8. CONCLUSION

Hearing impairment is a complex disability. Without any doubts, full reimbursement of hearing aids for all hearing impaired around the globe is the most humane solution. The impression of ingenious heading comfort is cost effectual. It is easy to carry (mobile). An assessed pair of loudspeaker should be in sophisticated standard. Though it has some curbs, it is an advancement over the present one. It enhances the quality of life of the people with hearing impairment. Any human with hearing impairment can examine his/her ability to perceive sound by education on fundamentals of examining. Two-third of the people in globe are utilising mobile operating system, they can examine their ability to perceive sound easily by utilising the mobile operating system with utmost no price.

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