VOLUME NORMALIZER FOR TELEVISION

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Abstract : The use of sound output to present information is an active area of research. Sound is used in a range of devices. One major problem with all such devices is that the sounds are often played at the wrong volume. Excessive loudness of sounds is a major cause of annoyance. Alternatively, in very loud environments sounds may be played too quietly and masked - rendering the information they contain unusable. Volume level may vary from channel to channel in televisions. Some user need louder sound level and some may need lower sound level. The main objective of our project is to control the volume fluctuations of signals and adjust the volume of the TV according to that particular user profile based on the volume level. So, user doesn't need to bother about the volume controller of the TV. With our Automatic Volume Control system(AVC), the volume of any sound system can be adjusted simply by using the record code and recording the signal so that no matter which channel the listener will change, they will hear the same volume level. System is very cost effective, high performance and can be used with any kind of speakers..

IndexTerms **– Normalizer, AVC, Annoyance, Excessive.**

I. INTRODUCTION

The use of sound output (speech and non-speech sounds) to present information is an active area of research within multimodal HCI. Sound is used in a range of devices from desktop computers, personal digital assistants and mobile telephones, to domestic appliances such as Radio, Televisions(TV) etc., One major problem with all such devices is that the sounds are often played at the wrong volume. The manufacturers do not know the ambient noise levels of the environments where devices will be used and so take a 'better safe than sorry' approach and make sounds loud (e.g. loud mobile phone ringing sounds in quiet cinemas). Excessive loudness of sounds is a major cause of annoyance. Alternatively, in very loud environments sounds may be played too quietly and masked - rendering the information they contain unusable. The simple solution described here is to automatically control the volume of sounds to ensure they are played at the ambient sound level i.e., they will always be at a suitable volume

Volume level may vary from channel to channel in televisions. Some user need louder sound level and some may need lower sound level. The main objective of our project is to adjust the volume of the TV according to that particular user profile based on the volume level. So, user doesn't need to bother about the remote volume controller of the TV.

The relatively recent marriage of stereo sound and television has drastically improved the quality of television audio. However, many television commercials are purposely recorded at extremely high audio levels relative to the audio levels of the television programs to attract the attention of the individuals watching the television programs. Many television viewers find the increased noise levels of the commercials to be very annoying. Although stereo broad casts have increased the dynamic range of the program audio, they exacerbate the problem of noisy commercials. Thus, these disgruntled viewers constantly have to resort to lowering the volume during commercials and raising the volume when the programs resume. Alternatively, the viewer must listen to the program at a lower volume level than otherwise desired.

Currently televisions exist, such as those produced by samsung, that include circuitry for automatically adjusting their volume when the television channels are changed between two channels broadcasting at different volume levels. The volume adjusting circuitry in these televisions is internal to the television set, and therefore, unless an individual purchases one of these particular televisions, the individual must manually adjust the volume of the television or stereo in order to maintain the volume within desired limits. Presently, no after-market product exists for automatically adjusting the volume of a previously purchased television set or stereo to ameliorate the problems associated with the broadcast of television commercials at loud noise levels.

Researchers are designing/analyzing Automatic Volume Control(AVC) circuit since late 1920's. As the world is going to be digitized, it is important to design some methods which can be implemented in both hardware and software. Conventional method for the AVC is to keep the Signal to Noise Ratio (SNR) acceptable. The system of Konstantinouet.al is a remote controlled AVC device that periodically measures sound-to-noise ratio to adjust the volume level by keeping the ratio constant at all times. First modern digital AVC was described in 1997 by Helms.

 F.Felber considered intelligibility of speech in 2011. He developed an Automatic Volume Control method for all devices, containing at least one microphone. Seefeldt emphasized on simulating the perceived loudness of human auditory system to design an AVC system in 2012. Equivalent Rectangular Band is used to design a frequency filter bank to analyze the audio signal. He further proposed another method using the concept of "Auditory scene analyses" that includes weighting auditory events using skew-ness in the spectra and controlling loudness of the events using the weights. Kim et.al. proposed Automatic Volume Control for mobile devices in noisy environments and he patented it.

Hussain Mohammed Dipu Kabir, Muhammad Enayetur Rahman, Arshia Zernab Hassan, Mohammed Nazim Uddin works on Correlation Based Automatic Volume Control System for Television/ Radio. Automatic Volume Control(AVC) automatically adjusts the volume of a Television/radio according to the surrounding noise or environment with the intelligibility of speech or audio signal from the audio device. AVC in TV/radio will be used to increase the understanding of the audio signal from the TV/ radio for the user in a noisy environment. Conventional method for the AVC is to keep the signal to noise ratio (SNR) acceptable. Correlation is used widely in signal processing.
 J.Benesty used cross-correlation for designing doubletalk detector. M. Collet used correlation for speaker tracking. Canonical correlation is used for multimodal speaker identification. In multimodal identification system speech and lip-texture modalities are fused for recognition.

B.Kunka tried to correlate eye-tracking with speech signal for determining interaction between seeing and hearing. Lots of research is going on for reduction of internal and external noises of audio.

With our Automatic Volume Control system(AVC), the volume of any sound system can be adjusted simply by using the record code and recording the signal so that no matter which channel the listener will change, they will hear the same volume level. This system will also be able to function with different speakers.

II.METHODOLOGY

A method and device shown in fig for automatically adjusting the volume of an existing audio device such as a television receiver. The automatic volume adjusting device of the present invention includes a receiver for receiving control signals transmitted from a remote control transmitter associated with the audio device, a transmitter for transmitting control signals to a control signal receiver of the audio device, a microphone for sensing an ambient noise level and a controller coupled to the receiver, to the transmitter, and to the microphone. The controller operates in a training mode and an operating mode. The training mode consists of recording and testing of the IR signals. In the training mode, the controller learns codes associated with volume adjusting control signals transmitted by the remote control transmitter. In the operating mode, the controller determines when the ambient level of noise detected by the microphone is outside a predefined volume range and adjusts the volume of the remotely controlled audio device to fall within the pre defined range by transmitting the learned control signals to the audio device. The automatic volume adjusting device may further include a push-button toggle switch and an indicator light, such as a light emitting diode (LED) for placing the controller in a training or operating mode.

Recording the signal

Record code will be used. To record the signal Volume down key needs to be pressed in the remote control and the signal will be recorded using Tsop 1738 receiver. When the volume key is pressed, signal is generated by remote control device and which will be received by IR receiver in the television. Received signal will be displayed in serial monitor and it will be noted for further use.

Testing the recorded signal using switch

Received Ir signal will be used in signal test code. Using switch we will test the working. When switch on the module is pressed, Volume down signal will be transmitted from the Ir transmitter LED and volume of the Tv will reduce.

Final testing of the project

Final project as shown in the Figure will be placed atleast a feet away from the TV speakers. Volume in the television is increased to the permitted level, it is tuned according to the user profile, maximum threshold is set and this permitted volume level is recorded. If the audio level is normal, led in the mic should be in off state, To adjust the levels we used preset in the module. Microphone module continuously checks audio level with the previously recorded permitted audio level. If the audio level is above normal, led in the microphone module goes to on state and the mic module will send signal (binary 1) to Arduino nano controller. Once the microcontroller gets signal from microphone module it will transmit volume down signal through Ir led and the volume in the television will reduce to the permitted level.
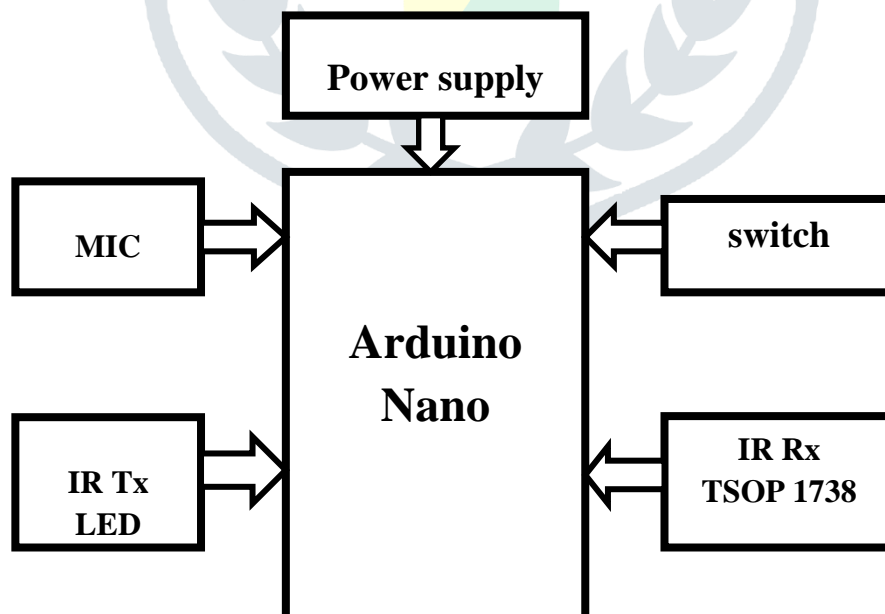

figure 1 voice modulation block diagram

III.   IMPLEMENTATION

Prior to full operation, as shown in the fig 3 flow diagram the automatic volume adjusting device should be trained so as to learn the codes transmitted by the remote control transmitter that the television will recognize as a VOLUME UP or VOLUME DOWN command. The training mode consists of recording and testing of the IR signals. By pressesing the VOLUME UP button and VOLUME DOWN button on remote control transmitter, VOLUME UP and VOLUME DOWN IR signals are recorded using TSOP IR Receiver. To test the recorded signals, the individual presses toggle switch to test whether the VOLUME UP code and the VOLUME DOWN code are right codes. Upon sensing that the VOLUME UP code and the VOLUME DOWN code are right codes, a predetermined volume level or threshold is set.

The device monitors the level of ambient sound produced by the television speakers using microphone and adjusts the volume level of the television by transmitting an IR signal to the IR receiver of the television. The transmitted IR signal includes the learned code and modulation scheme that the television will recognize as a VOL UME UP or VOLUME DOWN command from its associated remote control transmitter. After the predefined range is identified, controller monitors the ambient noise level sensed by microphone and determines whether the sensed level exceeds or falls below the limits of the identified predefined range. If the sensed level exceeds the upper limit of the identified predefined range controller controls IR transmitter to transmit a VOLUME DOWN IR signal to the television. If the sensed level falls below the lower limit of the identified predefined range, controller controls IR transmitter to transmit a VOLUME UP IR signal to the television. The device may raise or lower the volume to remain within the specified allowable volume range by transmitting a VOLUME UP or VOLUMEDOWN signal for a very brief period while subsequently monitoring the ambient noise level to determine whether subsequent transmissions of the VOLUME UP or VOLUME DOWN commands are needed to bring the ambient noise level within the specified range.

An individual may turn on the automatic volume adjusting device by pressing toggle switch once or by pressing a separate ON/OFF switch if one is provided. When controller senses a high voltage (+5 V) at its terminal associated with toggle switch, it executes control program and illuminates indicator light, which may be an LED.
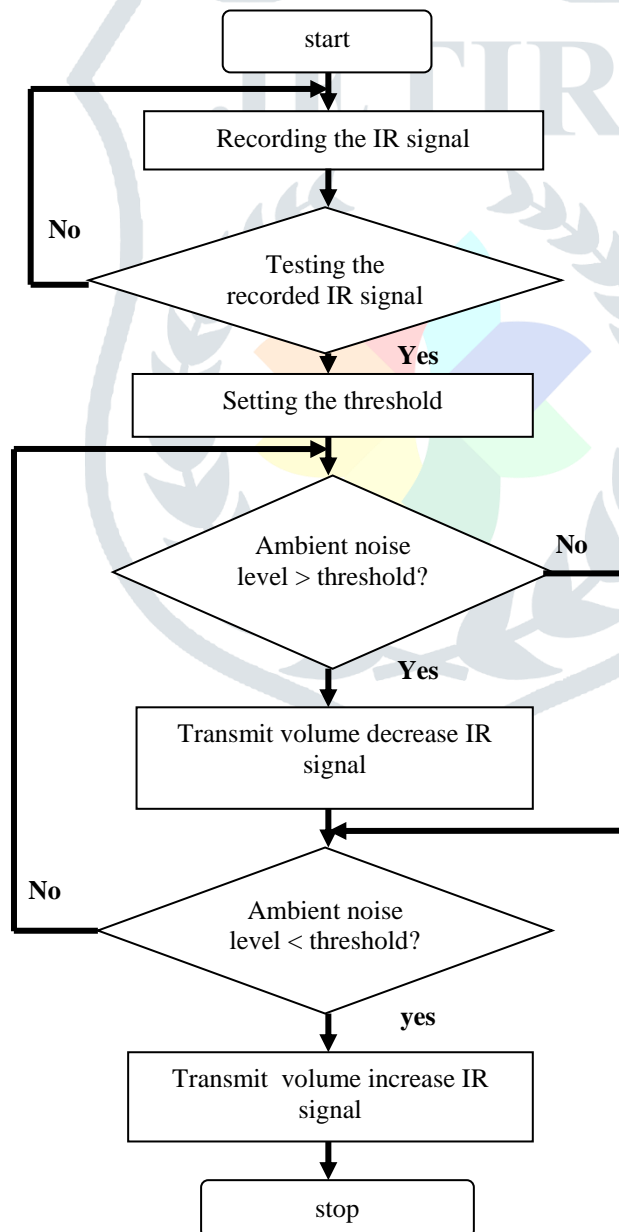

Figure 2 flow diagram

Advantages

1. Automated Audio level controlling
2. Safe audio handling
3. Setting ambient theshold
4. Frqeuency quality safeguard
5. Frequency tuning of channels.

Applications

This system also be able to function with different speakers such as

1. Desktop Computers
2. Personal Digital Assistants
3. Mobile Telephones
4. Domestic appliances such As Television, Radio and Stereo Receivers Etc.,

IV.　RESULTS AND DISCUSSION

The device as shown in the fig 3 image of the voice modulation circuit will monitor the ambient noise level and automatically adjust the volume of the television. The device is designed to adjust the volume of the television when it is in the operating mode, such that the sensed volume will not exceed or fall below limits selected by the user. Thus, this device will automatically reduce the volume of a television when a ambient volume level is greater than the normal level and will automatically increase the volume when a ambient volume level is lesser than the normal level. This device will adjust the television volume such that it remains at a substantially constant level when the television channels are changed between two channels broadcasting at different volume levels.

Volume normalizer for television will control the volume fluctuations of signals and it will be normalized. Automatic Volume Control system(AVC) helps to avoid volume fluctuation when the television channels are changed between two channels broadcasting at different volume levels. so that no matter which channel the listener will change, they will hear the same volume level. It is very cost effective, high performance system and it can be used with different speakers.

Figure 3 image of the voice modulation circuit

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