Acoustic Effect Generator with Graphical User Interface: A Simulation Model

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***Abstract*—Acoustic effects are generally generated with the help of acoustic setup units. The availability of enormous advanced technologies in the field of electronics but it is complex task to generate variable acoustic effects with low cost electronic equipments. Acoustic effects are used in various application of perception by human subject, localization in median/vertical plane and mostly in biomedical related research on sound localization, sound detection, and sound perception. It is found that for generation of various acoustic effects with the help of hardware system, operator require frequent changes in the acoustic setup, this require technical skills as well as large amount of time is consumed to rewire the electronic equipments. In this paper, a MATLAB based Graphical user interface is designed and developed which will help the users to generate various acoustic effects such as isochronic sound, sine wave sound, low and high frequency sound signals. The generated acoustic effects can be observed as output on the speaker/ headsets. The results shows that a variety of acoustic tones can be developed with this GUI based application.**

Keywords: Acoustic Effect,Graphical User Interface, Sound, Mechatronics-Real-Time Processing, MATLAB

I. Introduction

Graphical user interface (GUI) based acoustic effect generator is proposed where user interface is the space where interaction between humans and machines occurs. In thisacoustic source user can hear the sound of frequency, amplitude for fixed time. The approach used is simple but robust and can be utilized for providing exposure to the subjects. The exposure duration is fixed as it is hardware implementation and can be varied before performing the experiment on any subject. The environment is noise free while performing the experiments. The exposure of acoustic to subject is decided as per the requirement of the experiment and also to provide a comfort while performing the experiments. Several authors have reported different techniques to perform the experiments on acoustics. Various authors have reported several techniques to generate acoustic effects.In this paper author Head related transfer function is demonstrated by using 3d software to generate the 2d sound with the help of real time system [1, 2, 9].

Also there is a simulation work done in MATLAB which provides a toolkit that can be used for multiple channel sound signals and can be easily simulated with the help of simulations on Laptop [3-5].

From [6-15] it is found that advance technologies are also required in this area.Acoustics is used in several aspects, if we consider it in human society with major application in sound localization and perception [15-22].

II. Methodology

A. Programming Based

Programing is the most widely used method for taking the inputs from the user. Various input parameters can be taken from the user to make different programs. In general used software for programming can be MATLAB, LABView, etc [23-24] and various sound signals can be generated by the help of the programming techniques. The block diagram in figure 1 shows the general methodology followed for the programming of sound signals to be generated.

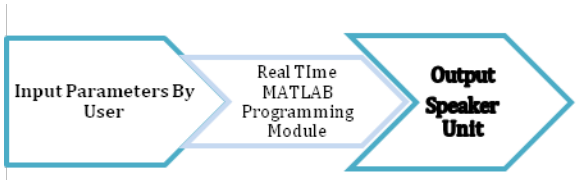

Fig.1: Generalized Programming Module

B. Graphical User Interface Based

The technique of programming is very useful to some level but it is generally a hectic task to repeat the programming again and needs repetitive efforts. To overcome this problem, Graphical user based systems can be utilized.Various sound signals can be generated with the help of this GUI systems. It is also seen that sound is an important aspects which is used in medical science and also provide an insight about the related terminology related to human physiology[25-27].The GUI used here also provides a few features such as stop, play and plot button as shown in fig. 2.

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III. Results

The results shown in fig. 3 and fig. 4below are for various frequency. In fig. 3 the sampling frequency is of 1500 and 1518 Hz. In fig. 4,the sampling frequency is of 2200 and 2250 Hz.

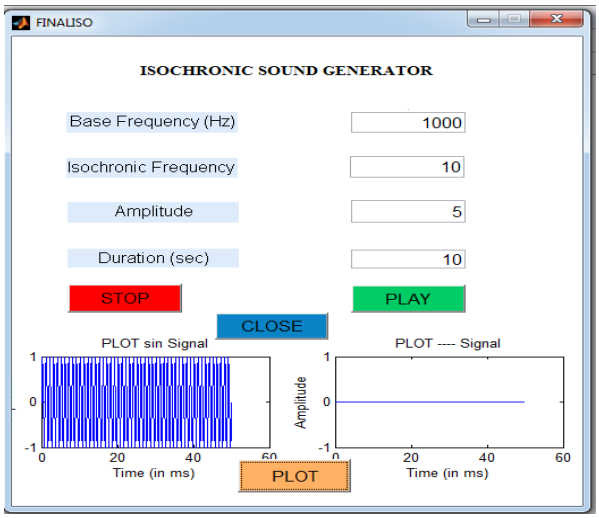

Fig.2: Isochronic Sound Generator Using MATLAB

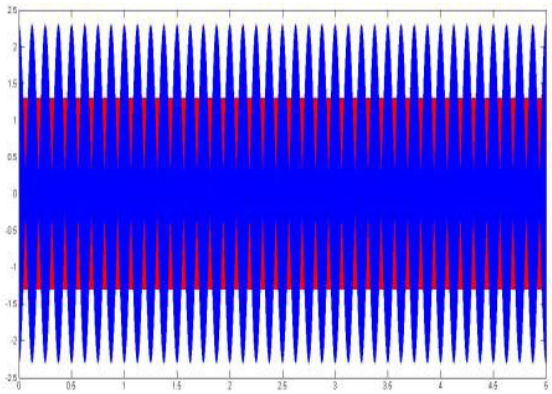

Fig. 3: Sample at Frequencies (1500 & 1518 Hz)

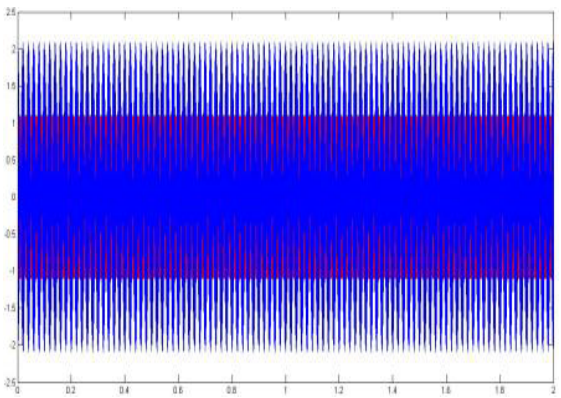

Fig.4: Sample at Frequencies (2200 & 2250 Hz) and

IV. Conclusion

Acoustic is important and vital experimentation technique in the field of sound perception. The simulated model in simulation software gives the desired output. The simulation model is also implemented as hardware acoustic source. The simulated model helps in determining the various parameters such as frequency, time duration, etc.

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