

FACULTY OF COMPUTERS, INFORMATICS AND MICROELECTRONICS
TECHNICAL UNIVERSITY OF MOLDOVA

SM

LABORATORY WORK #3

Sound processing.

Authors:

Daniel CALANCEA

Supervisor:

Doina BISERICANU

Laboratory work #3

1 Purpose of the laboratory

Study the principle of audio signals. Study utilization of audio resources.

2 Laboratory Work Requirements

Develop an application capable of:

- Take multiple sound files as input.
- Invert the sound.
- Change the speed of play.
- Add echo.
- Add noise.
- Play multiple files at the same time.
- Generate a metronome.
- Modify balance.

3 Laboratory work implementation

3.1 Audio Quantization

In digital music processing technology, quantization is the process of transforming performed musical notes, which may have some imprecision due to expressive performance, to an underlying musical representation that eliminates this imprecision. The process results in notes being set on beats and on exact fractions of beats. The most difficult problem in quantization is determining which rhythmic fluctuations are imprecise or expressive (and should be removed by the quantization process) and which should be represented in the output score. For instance, a simple children's song should probably have very coarse quantization, resulting in few different notes in output. On the other hand, quantizing a performance of a piano piece by Arnold Schoenberg, for instance, should result in many smaller notes, triplets, etc.

A frequent application of quantization in this context lies within MIDI application software or hardware. MIDI sequencers typically include quantization in their manifest of edit commands. In this case, the dimensions of this timing grid are set beforehand. When one instructs the music application to quantize a certain group of MIDI notes in a song, the program moves each note to the closest point on the timing grid.

The purpose of quantization in music processing is to provide a more beat-accurate timing of sounds. Quantization is frequently applied to a record of MIDI notes created by the use of a musical keyboard or drum machine.

Quantization in MIDI is usually applied to Note On messages and sometimes Note Off messages; some digital audio workstations shift the entire note by moving both messages together. Sometimes quantization is applied in terms of a percentage, to partially align the notes to a certain beat. Using a percentage of quantization allows for the subtle preservation of some natural human timing nuances.

In recent years audio quantization has come into play, with the plug in Beat Detective on all versions of Pro Tools being used regularly on modern day records to tighten the playing of drums, guitar, bass, etc.[citation needed]

The phrase "pitch quantization" can refer to pitch correction used in audio production, such as using Auto-Tune.

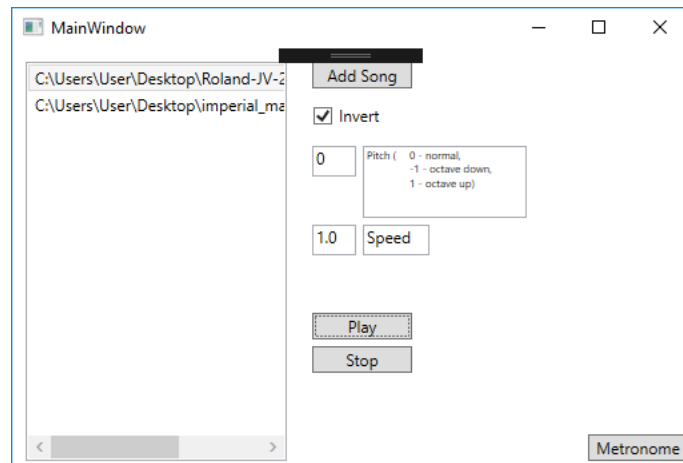
3.2 Implementation

The laboratory work was implemented in WPF forms in C#. The application has the following functionality:

- Ability to add multiple sound files.
- Ability to invert the sound.
- Ability to change the play speed.
- Ability to change the pitch.
- Ability to change play multiple files at the same time.

- Ability to stop a specific sound.

3.3 Screenshots



(a) Application.

Conclusions

In this laboratory we studied different types of sounds. We saw that we have 2 different types of sounds losless and compressed, just like images. Both of them have strong sides and weak ones, compressed sounds have lower quality, however their size is very small where losless sounds have their original quality but also have big size.