

A new database of **sound effects** recordings for **computer games** is being built by **Signal Processing Group**

### MOTIVATION

- ❑ Sound effects have to be ready for **non-linear processing** and **mixing** during the course of the game
- ❑ The effects can be **interrupted or overlaid** on each other if a player makes some actions.
- ❑ In case of overlaying, a simple correlation can be not appropriate as typically sound related to events can be more important than background music
- ❑ Some sound effects have to be played in a **loop** with the end point not hearable

### SOUND EFFECTS PROCESSING

- ❑ Dynamics processors (DPs) were used
- ❑ Depending on the level of the input signal, DP influence or reinforce the acoustic attenuation of the track in which they are placed
- ❑ DP are also used to provide a listening comfort
- ❑ The quieter parts could be not noted, the sound would be inaudible
- ❑ The effective signal value largely determines the subjective loudness by the recipient

### DYNAMICS PROCESSORS

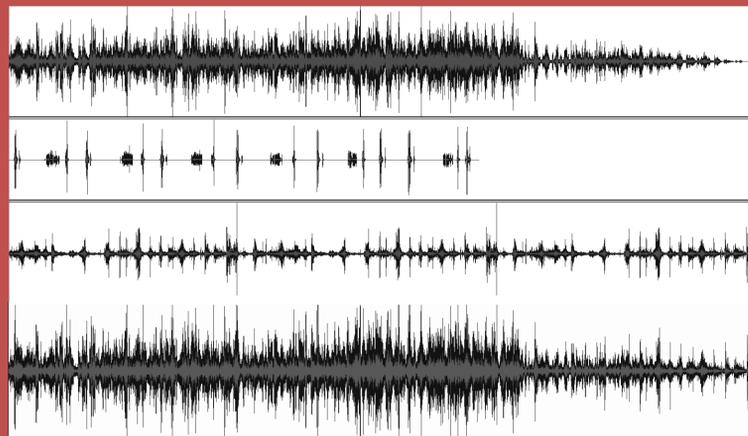
- ❑ Editing was performed using a digital audio workstation (DAW) developed by Steinberg - Cubase
- ❑ **Compressor** reduces the signal dynamics raising the RMS of a signal
- ❑ **Limiter** has similar characteristics to the compressor but the compression ratio tends to infinity, and the attack is as close to zero as possible
- ❑ **Limiter** was plugged at the output of the circuit to protect from the distortion (digital clipping) - normalisation has been made by finding the samples with the highest peak and setting the level of the track, so that the highest value reached almost 0 dBFS
- ❑ **Expander** works oppositely then the compressor
- ❑ It was possible to set the dynamics in order to get rid of much of the reverb, which is especially disturbing in impulse sounds. More difficult to edit were the continuous sounds, due to less possibility of interference in the recorded sample
- ❑ Short paths were modified to allow looping for the continuous playback of a track without noticeable discontinuity between the end and the beginning
- ❑ It was necessary to extract additional fragments, where the sound was quite constant
- ❑ If there were too many changes or pulses that stand out, the soundtrack would be somewhat rhythmic and predictable - the loop would have a noticeable effect

### RECORDINGS

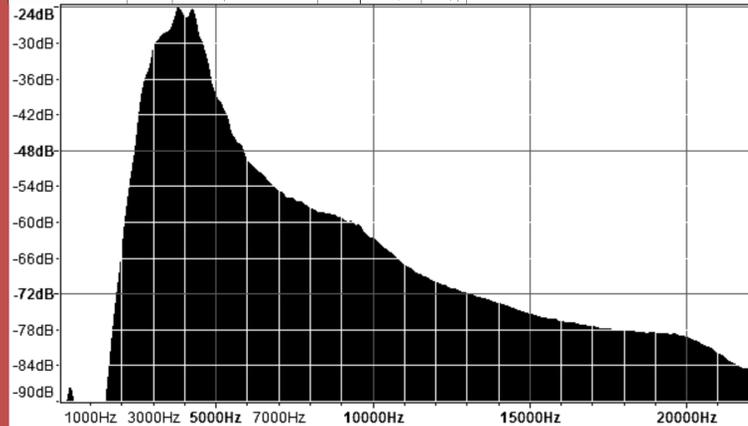
- ❑ **305 sound effects**
- ❑ **45 minutes** from paths which lasted 3 h 10 min.
- ❑ Post-production of the collection lasted about 70 hours not including the process of recording
- ❑ After a two-hour work of listening to the sound effects, the perception is worse
- ❑ The collection is just the preliminary one to establish proper work routines, methods and to allow to work on soundtracing algorithms for games
- ❑ The collection will be increased in the following two years to reach over 10 hours of sound effects
- ❑ Uncompressed PCM with a sampling rate of **44.1 kHz** and a resolution of **16 bits**

### DB STANDARDS

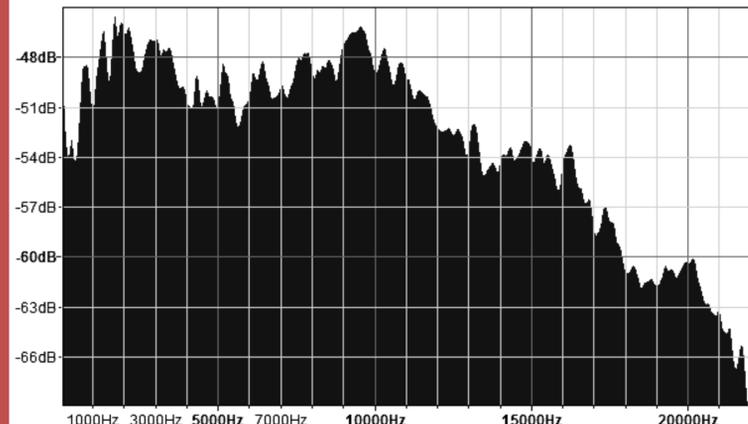
- ❑ No clear existing standard for a level of the effective value for sound effects for computer games
- ❑ RMS value depends mainly on the scale of using the compressor. The smaller the difference in the level of quiet and noisy signals, the greater the effective value
- ❑ Grows for music, 2000+ -10 dBFS, even -5 dBFS
- ❑ For classic music, where the dynamics is a very important element, the effective value -30 to -20 dBFS
- ❑ The RMS for sound effects will oscillate in limits similar to the case of classic music



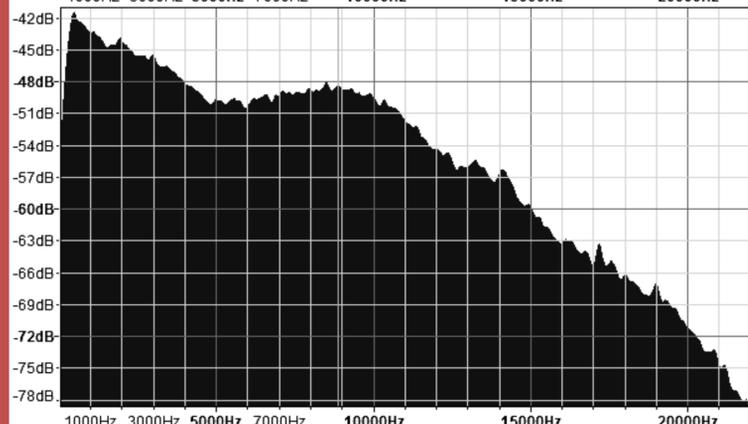
Birds sound effect (in the end intentionally fade out)



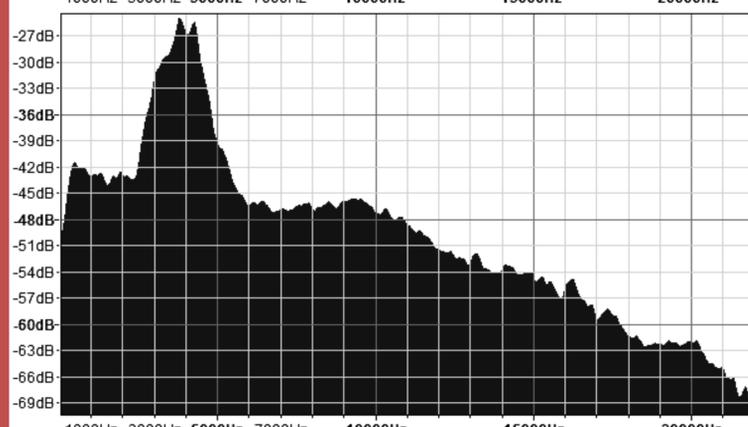
Spectrum of birds sound effect



Spectrum of camera sound effect



Spectrum of walking on leaves sound effect



Spectrum of their mixture

### FILE TAGS

- ❑ I - pulse sound
- ❑ C - continuous sound
- ❑ L1 - possibility of looping
- ❑ L2 - possibility of looping without impression of repetitive sound
- ❑ K - effect good for kids
- ❑ A - effect for adults only
- ❑ F - effect for funny games
- ❑ P - effect for positive games
- ❑ H - effect for horrors and mysterious games