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Press Release:
RAYA - realtime audio engine simulation for computer games

RAYA is a realtime game audio engine that was developed at AGH University of Science and Technology in Krakow, Poland in cooperation with Teyon. Developed library utilizes beamtracing to provide user with realistic audio auralization. All audio effects are computed based on the actual geometry of a given game level as well as its acoustic properties (acoustic materials, air attenuation). The sound changes dynamically along with movement of the game character and sound sources, so the listener can feel as if they were right there - in the game. A short film of the current version of the system is available at: https://www.youtube.com/watch?v=EWatzCC7rk0
Software works in a similar fashion as tools like CATT Acoustics, but calculations are conducted in real time.

Designers and producers of computer games were very focused on graphics of games leaving other multimedia often quite backwards. Graphical engines are typically the most important tools for each company producing games. It is difficult to evaluate if computer games industry invests so much in graphics, quite ignoring audio part, because these are real customers' expectations or because players simply do not yet know how good usage of audio elements can make games more attractive. There are some games which invested in audio and resulted in huge commercial success, but these were rather based on interesting samples or good direct connection of audio element and the plot, like in case of the game Thief.

Creation of sound paths and audio signal processing per each soundpath takes up to 10% of CPU computational capabilities, using modern commodity hardware. By "modern CPUs" we mean architectures that support AVX instruction set (introduced in 2011), namely last 3 gens of processors stating with Intels Sandy Bridge and AMDs Bulldozer cores. Keep in mind, that sound path creation algorithm supports phenomena like specular reflections, diffuse reflections and edge diffraction, whilst audio processing supports signal filtering (modelling air dumping, reflection/diffraction impact and so on), Doppler effect modelling and spatial effects. In the presented video directional sound is implemented using HRTF per each soundpath. Although we've implemented some of our algorithms for GPGPU, none of them are used in this presentation, so GPU may be fully dedicated to graphics rendering.

Please find more information and graphics on http://www.dsp.agh.edu.pl/en:research:rayav .

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