

OPTIMIZATION OF THE REFLECTION IN ACOUSTIC MODELING PLUGINS WITHIN GAME

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Abstract

Three rooms from the same house were chosen for the wide differences between its reverberations. Different systems and signal-processing methods based on the standards (ISO 3382-1 2009) were used in the measurement of impulse responses to replicate the acoustic characteristics of the space and process studio recorded audios with convolution. The rooms were modeled both in CATT acoustics and Unreal Engine 4, doing the audio integration in the last one with Wwise and FMOD middleware. To end, a questionnaire was done to participants to study how close is the acoustic modeling done in the game engines to the real acoustic characteristics

Introduction

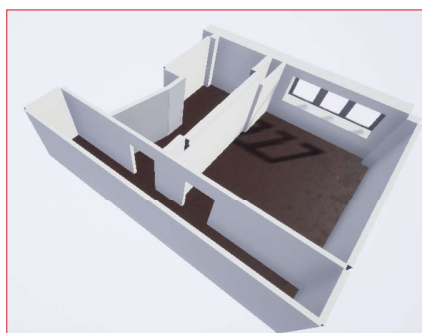
Acoustic modeling has existed since the mid-1990s but they were computationally very intensive and computers typically took days or weeks to render a model, which is not very useful for games. Now, the increase in computer speed combined with more efficient processes games can start experimenting with new advances.

This is due to games getting more realistic, therefore sound needs to be realistic to match it. Games with hyper-realistic graphics where designers scan surfaces to be the most accurate as possible need the sound to be the most similar to reality so players can not lose the feeling of being there. Most importantly, in the VR experience, where immersivity is the key.

Nowadays, game engines are not only used in game development but in architecture, archeology and historical studies, so it is also interesting to study possible uses of game engines in more areas than just video games.

Aims

- Study how close is the acoustic modeling done in the game engines to the real acoustical characteristics of a space.
- Study different application the use of game engines could have outside the development of video games.
- Test how good the human being is at perceiving the reverberation of a space just by looking at a digital image.



Method

Record IRs

By using the logarithmic sine sweep and the transient method in each room.

STEP
01



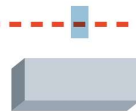
3D Model

Build the 3D model of the rooms within UE4 and CATT Acoustics.

STEP
02

Convolution reverb
Process the studio recorded audios with the convolution reverb plugins within Wwise and FMOD

STEP
03



STEP
04

Questionnaire
with questions related to the perception, differentiation and preference of real and artificial reverberation.

Results

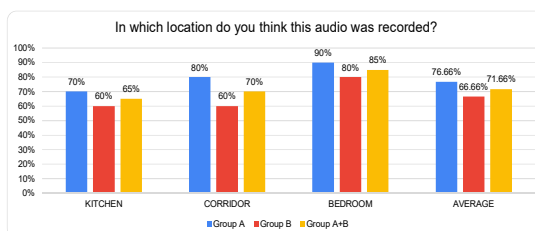


Figure 1. Overall results for question 1.

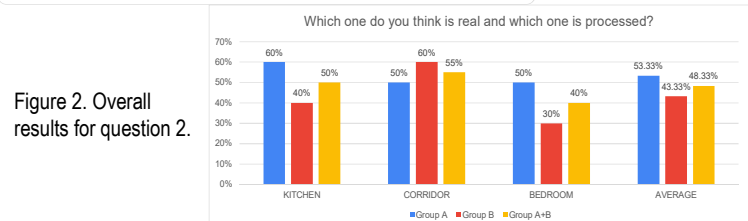


Figure 2. Overall results for question 2.

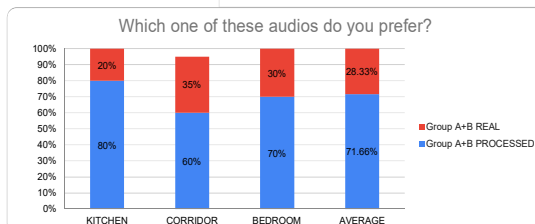


Figure 3. Overall results for question 3.

Conclusions

People can actually do an approximate estimation of the reverberation of a room just by looking at a picture. This highlights the importance of using a reverberation according to what is being seen. Also, convolution has been proved to be a great tool when it comes to recreating the reverberation of a room. To end, an interesting data came up with the questionnaire of people preferring artificial reverberations over real ones, probably because people have gotten used to artificial reverb from hearing it in movies or music a continuously.