

ABSTRACT

The explanatory note comprises 118 pages, includes 4 illustrations, 26 tables, 2 appendices, and 24 references.

Topicality. The study addresses the problem of creating realistic reverberation sound effects in computer games. The primary features of existing reverberation generation methods are outlined, including the complexity of manual sound parameter adjustments, the static nature of models, and limited adaptability to the geometry of the game environment. The necessity of developing an automated method for procedural reverberation generation, which accounts for changing acoustic conditions in real-time and optimizes performance for limited hardware resources, has been identified.

The aim of the study. The purpose of this research is to enhance the realism and dynamism of sound design in computer games by developing and implementing a method for procedural reverberation generation.

Object of the research: software for procedural reverberation generation in computer games.

Subject of the research: methods and algorithms for procedural reverberation generation based on environmental acoustic data.

To achieve the research goal, the **following tasks** were formulated:

- Analyze existing methods for reverberation generation in computer games;
- Develop a method and algorithm for automating the process of generating acoustic characteristics of a space;
- Optimize the use of audio data to create a realistic acoustic profile of environments;
- Evaluate the efficiency of the proposed solution.

The scientific novelty of the master's dissertation is an improved method for generating reverberation effects based on the acoustic characteristics of a space using machine learning models has been developed. The proposed approach automates the

process of creating acoustic profiles for subspaces, considering the geometry of the environment, thereby increasing the dynamism of sound design in computer games.

The practical value of the obtained is a software solution for offline reverberation effect generation was developed, allowing the generated acoustic data to be used in real-time. This ensures high adaptability of sound to the geometry of the game environment while reducing computational load. The proposed method can be integrated into modern game engines, such as Unreal Engine, and applied to commercial projects.

Relationship with working with scientific programs, plans, topics. The work was conducted within the Department of Software Engineering at the National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute."

Approbation. The scientific findings of the dissertation were presented and validated at the VII International Scientific and Practical Conference for Young Scientists and Students "Software Engineering and Advanced Information Technologies SoftTech-2024."

Publications. The scientific findings of the research were published in the following sources:

1) Zarodyuk A.V., Likhousova T.A. Method of Procedural Generation of Reverb Effects for Computer Games // VII International Scientific and Practical Conference of Young Scientists and Students "Software Engineering and Advanced Information Technologies" (SoftTech-2024). Conference Proceedings. December 20-22, 2024. Kyiv. – pp. 36-38.

Keywords: REVERBERATION, ACOUSTIC CHARACTERISTICS, PROCEDURAL GENERATION, MACHINE LEARNING, COMPUTER GAMES.