276. THE IMPACT OF OPTIMIZATION PROCESS ON GAMEPLAY IN MODERN COMPUTER GAMES

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The paper considers the role of software optimization in the gameplay of modern computer games. It analyzes the main aspects of optimization and shows that the level of optimization directly affects the gaming experience, control comfort, and the degree of player immersion into virtual world.

Computer games can be seen as highly sophisticated interactive software that integrate numerous components such as graphic design, simulation of the real world, animation, artificial intelligence, and individual game mechanics. As technology advances, the same applies to huge amount of power, or processing technology, required to create and simulate game worlds and the interactions with players. As a result, software optimization becomes increasingly necessary in terms of utilizing processing technology and sustaining the overall performance of the game. In the realm of user experience, the most influential factor is the frames per second (fps). As a metric, fps determines animation, as well as the level of clarity of events occurring in the game.

Game optimization also directly influences how players perceive and interact with virtual environment. When a game is optimized efficiently, system resources such as central processing unit (CPU), graphic processing unit (GPU), and memory are used more effectively, allowing the game world to respond smoothly to player actions. This responsiveness is essential for maintaining a sense of control and immersion, which are the key elements of enjoyable gameplay. In this way, optimization does not only affect technical performance, but also plays a significant role in shaping the player's emotional experience during gameplay.

If a game runs at a low frame rate, the movements of characters and objects become discontinuous, which can make control difficult and reduce the comfort of the gaming experience. In contrast, high and stable image refreshing rate makes movements smoother and more predictable for the player. The research shows that increasing frame rate improves the perception of the gameplay and increases the effectiveness of player's actions, especially in dynamic games where the user's reaction speed is important [1].

Optimization also affects input latency, which refers to the time between the player's action and the game's response to that action. With high latency, keyboard controls can feel less precise and responsive, reducing enjoyment of gaming experience. Optimizing graphics and computing processes reduce the time it takes to process user actions and improve control accuracy. This is especially noticeable in competitive games, where even small delays can affect the outcome of the game and players perception of its fairness [2].

Optimization also plays a significant role in ensuring that games are accessible to wide audience of users. Well-optimized games can run smoothly on devices with different specifications, including those with lower performance. This means that more people can enjoy a gaming experience without the need for expensive equipment. Studies on mobile game development note that the use of basic optimization techniques significantly improves the stability and performance of applications, which has a positive effect on users' satisfaction and their desire to continue playing [3].

Optimization is particularly important for maintaining the player's emotional engagement. Quick response to user actions and the absence of technical issues creates conditions in which the player can focus on exploring the game world, completing game quests, and interacting with characters.

Thus, optimization is an important stage in the development of modern computer games and has a significant impact on the quality of gameplay. Increasing the number of frames per second, reducing input lag, and ensuring stable program performance directly affect the comfort of the gaming process and the level of enjoyment players get. As gaming technologies become increasingly complex, the importance of optimization continues to grow, as it is what allows maintaining a balance between high-quality graphics, complex game mechanics, and the accessibility of games to a wide range of users.

References:

1. The Effects of Frame Rate and Resolution on Users Playing First Person Shooter Games: scientific article/ M. Claypool, K. Claypool, F. Damaa – Bellingham, 2006. – URL: https://web.cs.wpi.edu/~claypool/papers/fr-rez/paper.pdf (date of access: 10.03.2026).

2. On Frame Rate and Player Performance in First Person Shooter Games: scientific article/ K. Claypool, M. Claypool. – URL: https://web.cs.wpi.edu/~claypool/papers/fr/fulltext.pdf (date of access: 10.03.2026).

3. Improving Mobile Game Performance with Basic Optimization Techniques in Unity: scientific article/ G. Koulaxidis, S. Xinogalos. – URL: https://www.mdpi.com/2673-3951/3/2/14 (date of access: 10.03.2026).