

Research on Interactive Experience based on 3D Game Scene Design

Yiming Liu *

Liaoning Communication University, Shenyang, 110000, China

* Corresponding author Email: 1603925712@qq.com

Abstract. This article mainly conducts in-depth research and discussion on 3D game scene design. Firstly, the background and significance of 3D game scene design are introduced, and the importance of good game scene design to improve player experience and game quality is pointed out, Enhance the interactive experience of game players and 3D games, and provide more reference ideas and strengthening opinions for game designers.

Keywords: 3D Game Scene; 3D Scene Design; 3D Game Scene Analysis; 3D Game Scene Future.

1. Introduction

1.1. Research Background

3D game scene design plays a vital role in the modern game industry. With the continuous development of game technology and the increasing prosperity of the game market, more and more game companies have begun to pay attention to the design of game scenes and take it as an important competitive strategy. The quality of the game scene not only affects the visual effects of the game, but also directly related to the gamer's game experience and emotional resonance. Therefore, in-depth study of the principles and methods of three-dimensional game scene design is of great practical significance for improving game quality, promoting the development of the game industry and improving the satisfaction of gamers.

1.2. Purpose of the Study

This paper aims to systematically discuss the relevant theories and practices of 3D game scene design, explain the process and elements of 3D game scene design, and analyze the role and importance of game scene design in the modern game industry. Specifically, the objectives of the study include the following:

1. Analyze the concept and characteristics of the three-dimensional game scene, clarify its design requirements and design goals;
2. Discuss the process and methods of 3D game scene design, including art planning, modeling, material mapping, lighting design, special effects design and final adjustment;
3. Focus on the elements of three-dimensional game scene design, including layout design, terrain design, architectural design, item design and character design;
4. Analyze the role and importance of 3D game scene design in the modern game industry, and how game companies can improve the quality and competitiveness of games through scene design;
5. Through the case analysis of the scene design of games such as "The Witcher 3: Wild Hunt", "The Elder Scrolls 5: Skyrim" and "Battlefield 1", the practice and application of 3D game scene design are further elaborated;
6. Finally, the development trend of 3D game scene design is analyzed and prospected.

1.3. Research Methodology

This paper adopts a combination of literature research and case analysis. In terms of literature research, this paper will theoretically explain the concept, characteristics, process, elements and related design principles of three-dimensional game scene design through the comprehensive analysis of relevant academic papers, books and game-related materials. In terms of case analysis, this article will select some representative 3D games, such as "The Witcher 3: Wild Hunt", "The Elder Scrolls 5: Skyrim" and "Battlefield 1", etc., to conduct detailed analysis and evaluation of their scene design, so as to help readers better understand the practice and application of 3D game scene design.

2. Overview of 3D Game Scenarios

2.1. Definition of a Three-dimensional Game Scene

A three-dimensional game scene refers to the environment with three-dimensional spatial perception presented in the game, including the combination of terrain, buildings, roads, vegetation, water bodies, sky and other elements. More than just a static background in the game, it is an important part of the game's plot, characters, and player interactions, with a wealth of information and emotional expression. The quality of the three-dimensional game scene is directly related to the visual effects of the game and the player's game experience, and is an indispensable part of the modern game industry.

2.2. Classification of Three-dimensional Game Scenes

3D game scenes can be categorized according to different classification criteria. Here are a few common classification methods:

According to the type of scene: 3D game scenes can be divided into two types: natural scenes and artificial scenes. Natural scenes mainly refer to scenes composed of natural elements such as landscapes, grass and trees, sky, and water bodies, such as grasslands, forests, deserts, etc. Artificial scenes refer to scenes composed of artificial elements such as cities, buildings, and indoor scenes, such as city streets, apartments, offices, etc.

According to the scene function: 3D game scenes can be divided into three types: battle scenes, exploration scenes and social scenes. Battle scenes mainly refer to the scenes used in the game to fight and fight, such as battlefields, castles, caves, etc. Exploration scenarios refer to scenes that allow players to explore and discover hidden content and secrets in the game, such as dense forests, dungeons, caves, etc. Social scenes refer to scenes used in games for social interaction, such as city squares, pubs, etc.

By game type: 3D game scenes can be categorized by game type. For example, the scenes of action games are usually fast-paced and exciting, such as "Devil May Cry", "God of War", etc.; The scenes of role-playing games focus on the game background, character settings, plot stories, etc., such as "The Elder Scrolls", "The Witcher", etc.; The scenes of shooting games are mainly combat scenes, such as "Call of Duty", "Battlefield" and so on.

The above are several common classification methods for 3D game scenes, and different classification methods can be flexibly used according to the actual situation.

2.3. The Importance of Three-dimensional Game Scenes

The 3D game scene plays a very important role in modern games, not only as a static background for the game, but also as a key component of the gaming experience. Here are a few important aspects of a 3D game scene:

1. Visual effects: A good three-dimensional game scene can provide realistic, vivid and beautiful visual effects, enhancing players' immersion and game experience. The modern game industry pays

attention to the visual effects of games, and high-quality scene design can bring players a strong visual impact and visual enjoyment, so as to better attract players.

2. Game experience: The three-dimensional game scene is an important part of the game experience. Through the design and construction of the scene, game developers can immerse players in the world of the game, feel the realism and sense of substitution, so as to better enjoy the fun of the game.

3. Storyline: A good three-dimensional game scene can provide rich background and environmental information for the storyline of the game, thereby helping players better understand the plot and story line in the game. At the same time, the detailed setting of the scene can also provide hidden tasks and plot clues of the game, increasing the challenge and depth of the game.

4. Interactivity: 3D game scenes can provide players with a rich interactive experience. For example, players can interact with objects in the scene, explore hidden areas, use props in the scene, etc., and these interactive designs can enhance the fun and interactivity of the game.

In short, good three-dimensional game scene design is an indispensable part of modern games, which is directly related to the visual effects, game experience, storyline and interactivity of the game. Therefore, for game developers, carefully designing and building high-quality scenes is one of the important means to improve the quality of games and attract players.

3. The Process of 3D Game Scene Design

3.1. Art Planning

Art planning is the first step of three-dimensional game scene design, which mainly includes the overall art style, tone, atmosphere and other aspects of the game scene. Art planning is not only to make the scene beautiful, but also to bring players a better game experience. Through art planning, game developers can establish the basic visual characteristics of the game scene, formulate the overall art style direction, and provide guidance and support for subsequent modeling, material mapping, lighting design, special effects design and other work.

3.2. Modeling

Modeling is one of the important links of three-dimensional game scene design, which refers to the process of modeling objects, buildings, terrain and other elements in the game scene with three-dimensional software. Modeling needs to pay attention to the representation of objects in terms of size, scale, detail, etc., as well as the relationships and combinations of objects in the scene. Good modeling can make the game scene more realistic and detailed, and enhance the player's sense of substitution and immersion.

3.3. Material Maps

Material mapping refers to applying maps to surfaces in a scene to make them look more realistic, rich, and detailed. Material maps need to be made to consider attributes such as texture, color, reflectivity, and gloss on the surface of the object, as well as the lighting and atmosphere of the entire scene. Material maps are one of the keys to producing high-quality game scenes, which can add realism and beauty to the game scene, allowing players to better integrate into the game world.

4. Elements of 3D Game Scene Design

4.1. Layout Design

Layout design is the basis of 3D game scene design, which involves aspects such as the position, size, scale and spatial relationship of elements in the scene. Reasonable layout design can make the game scene look more natural, comfortable and beautiful, and also provide convenience for the operation and experience of the game. In the layout design, developers need to consider the overall structure

and functional layout of the scene, as well as the interaction and articulation between elements, so that the game scene has coherence and playability.

4.2. Topographic Design

Terrain design refers to modeling and crafting the terrain in the game scene to form the landscape and terrain of the game scene. Terrain design usually includes setting the height of the terrain, mapping the surface texture, sculpting the terrain details, simulating the water surface, and so on. Through the fine terrain design, the game scene can present the real natural terrain such as mountains, rivers, hills and plains, etc., providing gamers with richer exploration and experience.

4.3. Architectural Design

Architectural design refers to the modeling and fabrication of buildings in the game scene to form buildings, castles, walls, etc. in the game scene. Architectural design usually includes the design and fabrication of the structure, materials, textures, details and other aspects of the building. Through elaborate architectural design, the game scene can present architectural styles with different cultural characteristics, providing gamers with more diverse environments and experiences.

5. Case Study of 3D Game Scene Design

5.1. The Witcher 3: Wild Hunt

The Witcher 3: Wild Hunt is a role-playing game produced by Polish game development studio CD Projekt RED. The game uses the Unreal Engine 4 and is set in medieval Europe, including a large number of towns, villages, forests, rivers, lakes, and more. The game has a well-designed setting and excellent graphics. Among them, the architectural design of towns and villages takes into account the European medieval style, while adding various details such as vines on the walls, arches, carvings, etc. The forests and rivers in the game are also very realistic, providing gamers with a very realistic environmental experience through the design of vegetation and terrain.

6. Development Trend of 3D Game Scene Design

6.1. Technological Developments

1. Application of virtual reality technology: With the continuous development of virtual reality technology, the future three-dimensional game scene design will be more realistic and realistic. Players can wear VR headsets or other devices to immerse themselves in the game scene and feel a more realistic gaming experience.

2. Application of ray tracing technology: ray tracing technology can more accurately simulate the propagation of light in the scene, making the lighting effect of the game scene more realistic. With the continuous improvement of computer hardware, ray tracing technology will be more widely used in the future three-dimensional game scene design.

6.2. Developments in Design

1. Increased player participation: In the future, the design of three-dimensional game scenes will pay more attention to player participation, and the game scene will be more open, and players can freely explore, discover and create. At the same time, the missions and plot in the game scene will also be more personalized and diverse.

2. Rich interaction methods: In the future, the design of 3D game scenes will adopt more kinds of interaction methods, such as gesture recognition, voice recognition, etc., to make the interaction between the game scene and the player more natural and smooth.

3. Strengthening of social elements: The future three-dimensional game scene design will strengthen social elements, so that players can make friends, form teams, and complete tasks and challenges together in the game scene.

In short, the future three-dimensional game scene design will be more realistic, realistic, free, open and diverse, and the game scene will become a more vivid and rich virtual world.

7. Conclusion

7.1. Research Contribution

This paper comprehensively discusses 3D game scene design from multiple perspectives, such as definition, classification, importance, design process, case analysis, and future development trends. The main contributions of this study are as follows:

1. The three-dimensional game scene design is comprehensively explained, so that readers have a clearer understanding of the concepts and basic knowledge of the field.
2. The importance of 3D game scene design is analyzed, and the importance of good 3D game scene design for game experience is clarified.
3. The design process of three-dimensional game scene design is discussed in detail, and some practical design tips and precautions are provided.

7.2. Limitations and Outlook

The research limitations of this paper are mainly as follows:

1. Lack of in-depth technical discussion. Although this paper covers some technical aspects, due to space and specialization constraints, it is not possible to delve into the specific details of technical implementation.
2. Limitations of the research object. The cases discussed in this paper are from three well-known games, and cannot cover all 3D game scene design.
3. Influenced by the author's experience and background. Due to the authors' different experiences and backgrounds, there may be personal biases and limitations in the understanding and analysis of some issues.

8. Prospect:

In the future, the design of 3D game scenes will continue to develop and improve, and this research can also be expanded in the following points:

1. Strengthen the discussion of technical aspects, including the development trends and application cases of hardware devices, graphics engines, ray tracing, etc.
2. Broaden the research object, expand the scope of cases, and cover more types of games and scene design. Through practice and case studies, more practical design techniques and strategies are further summarized and summarized, providing more valuable references for game developers.

References

- [1] HE Xianxuan, SU Yunlu. The whole process of making next-generation 3D game props by PBR method [J]. *Computer Age*,2023(03):129-132. DOI:10.16644/j.cnki.cn33-1094/tp.2023.03.030.
- [2] Chen Lingchao.3D Analysis of game engine architecture and game animation rendering technology[J]. *China New Technology and New Products*,2022(01):16-18.DOI:10.13612/j.cnki.cntp.2022.01.003.
- [3] LIU Ming. Some thoughts on the teaching of "Unity 3D Game Special Effects" course[J].*Beauty and Times (Part I)*,2021(12):129-131.DOI:10.16129/j.cnki.mysds.2021.12.037.
- [4] zxas9."Cyberpunk 2077" Waterloo: The Pearl Jade in the Front[J]. *Look at the World*,2021(03):84-87.