

## Research on the Development of Outdoor Orienteering Virtual Simulation Game Based on Game Engine

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**Abstract:** In order to study the development of virtual simulation game for outdoor Orienteering under game engine, this paper collects some technical data of Unity and studies this technology. On this basis, combined with Autodesk 3ds Max, the preliminary design of the system is carried out. Then, based on the above research, the virtual simulation game system of outdoor Orienteering was verified by experiments. According to the system test results, when the player punches in, the system will automatically send out a reminder sound; when the player completes the last punch touch, the game is successful. Carton phenomenon may occur when the system runs on a low-configuration computer.

### 1. Introduction

Orienteering is a new type of sports which has developed rapidly in recent years. It not only tests the physical strength of athletes, but also tests the intelligence of athletes. It can not only strengthen the body, but also exercise the mind, so it is loved by sports enthusiasts. Virtual timeliness has the characteristics of vividness and interactivity. It has been widely used in industry, education and other fields, and has achieved remarkable results. Modern sports, especially competitive sports, are developing in the direction of difficulty and refinement. To achieve this goal, modern technology is indispensable. The emergence of virtual technology provides a new opportunity for the development of outdoor orienteering. The combination of virtual technology and outdoor Orienteering can more effectively guide the training process of athletes and improve the training effect.

In order to improve the feasibility and rationality of outdoor Orienteering virtual simulation game design, it is necessary to study Unity technology and Autodesk 3ds Max, and design the simulation game system on this basis.

### 2. Virtual simulation game design of outdoor Orienteering under game engine

Unity3D technology is a relatively new technology compared with other game-making software. Like other software, Unity has the function of game-making. In addition, compared with other game-making software, Unity3D is also a game engine, and its compatibility is very good. Unity3D is a very comprehensive front-end game development tool that allows players to create three-dimensional video games, building visualization, real-time three-dimensional animation and other interactive multi-platform. It is a very professional game engine. Editors can run under Windows and Mas OS, and the games produced can be released to Windows, Mac, Android, IOS and WebGL platforms, etc. At the same time, the games can be released as web games by plug-ins.

UI refers to User Interface -- user interface. Users can interact with the software through UI. In Unity3D, it usually refers to the menu of the game, that is, the user's operating interface, which generally includes introduction, rules, settings and so on. After entering the UI, the player chooses the board to enter the game. First, set the background for the UI. Create Canvas in the Hierarchy panel UI, named MainUI, create an empty object named BG, right-click UI, Image, add pictures to the background, and drag the. bng format image to the Project Assets to be added. During this

process, a problem was found that Source Image could not find the resource of the background image just dragged into the property panel of Image. The reason is that the Texture type of picture knowledge needs to be converted to Sprite (2D and UI) type, and then click Apply. Then you can find the picture background in Source Image. Function keys refer to the function buttons that can be selected by players after entering the game menu. In this software, the function buttons include Level - level selection key, Instruction - rule description key, Setting - adjusting sound effect and sound size key, About US - software introduction and copyright issues, Exit - quit the game. Function keys need to be placed in the canvas, new Panel, new 5 Buttons in Panel, and change the content of Text in Button to Level, Instruction, Setting, About US, Exit respectively. Make the content corresponding to the function key separately.

3DS Max is a PC-based three-dimensional animation rendering and production software developed by Autodesk. It is widely used in advertising, film and television, industrial design, architectural design, multimedia production, games, assistant teaching and engineering visualization.

Standing on the player's point of view to design the game can enable players to use the software at the same time will have a better game experience. According to the MDA game model, the design of educational games from the perspective of aesthetic experience can take full account of the players' experience effect. Aesthetic experience design mainly includes four aspects: sensory design, fantasy design and challenge design.

Sensory design refers to the sensory judgment of a product - sensory evaluation by specially trained testers by comparing similar products. The main purpose of good sensory design is to present players with optimal experience in both visual and auditory aspects. This software includes the main interface, three game interfaces, interface color coordination, simple operation. First is the design style. The appropriate design style should conform to the aesthetic habits of the target group. The target group of the outdoor orienteering game software is adults over 18 years old. Therefore, the software style should be simple, generous, relaxed and pleasant, which is totally different from the style of children's application software. In terms of software layout, it is also the basic requirement of simplicity. After entering the game, the home page of the game, namely the navigation page, appears first. In the navigation page, players can easily find the information they want related to the game through the navigation button, such as operation method, software information, setting up the game and so on. Through the button of level 1, you can enter the first level of the game, and the player can complete the game step by step with the prompt of the text. The whole layout structure is very clear, so that players will not waste time in figuring out the structure of the game. Software color is mainly green, the color is not too fancy, to avoid the impact of the player's attention because of the complexity of the color. Icons in the game's home page and checkpoints are clear, accurate and concise, such as the logo of the gear and the acceleration and deceleration icon. Players will quickly know its role. At the same time, the background music should be less than the sound effect of prompts. According to the conditions of effective learning environment, the subjective experience should be avoided because of interference and interruption. If the background music is greater than the sound effect of the prompt, it will become interference and affect the player to continue to operate. The size of background music can be adjusted by sliders, and icons are common patterns in games.

By creating a fantasy world, let players immerse in the experience. The world created for players in this software is based on real life situations, because the learning of landmarks can not be separated from real life. The common road conditions of outdoor Orienteering include rural roads, urban roads and seascape streets. One of the scenes selected by this software is urban roads. Fantasy design is mainly designed from the perspective of game situation. Game scenario design can not be separated from the actual situation. The game scenario of this software revolves around the seascape highway, adding appropriate fantasy factors on the basis of real road simulation, such as adding weather changes, buildings and other materials, simulating the natural light at dusk, making the players seem to be in the real sports scene.

The design of the challenge mainly focuses on the second and third levels. In the second level,

the player is a challenge obstacle. In the course of the game, the player will face different obstacles. Players need to avoid these obstacles reasonably or use props. In subsequent levels, players compete with time. Players need to complete the punching in a limited time. If they fail to complete the punching requirement within a specified time, players need to play the game again or return to the home page. Secondly, players can extend the time by using the overtime tools available in previous levels. Game time gives players a sense of time pressure. Challenge design can be carried out from four aspects: checkpoints, obstacles, pass rewards, reward tools and scene switching.

In terms of reward design, according to Maslow's hierarchy of needs theory, the reward mechanism is provided to affirm the players and meet the players'self-realization needs through continuous clearance. Provide appropriate incentive tools for users to complete tasks

Tool, so the reward tool that players get through the customs can be used as the tool to pass the next customs. Through level 1, explosives can be obtained to break down rockfall obstacles in level 2, and through level 2, a 10-second delay tool can be obtained to assist players to pass through the third level. In the aspect of scene switching design, according to T (migration) in RETAIN model, we can apply the new knowledge and skills we have learned to the new situation. The third level will switch the game scene into the evening, so that the players can remember the concept of the landmark more skillfully.

### 3. Realization of virtual simulation game of outdoor Orienteering under game engine

There is a dual-core 8G memory computer in the process of scene making. The software includes 3ds Max, Unity, Photoshop. The main contents and steps are as follows. The technical chart is shown in Figure 1.

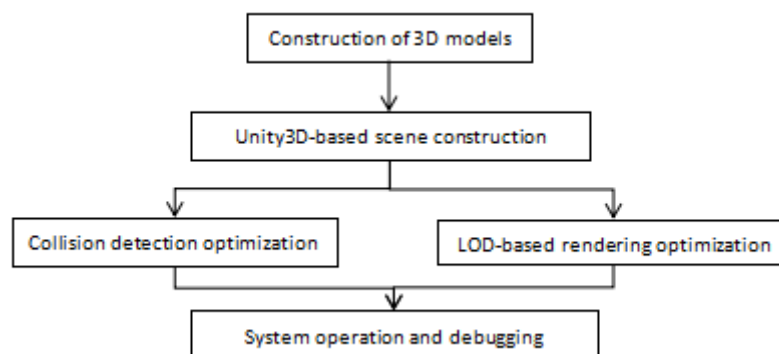


Figure 1 Simulation game system design technical diagram

(1) Firstly, the basic model, building and vegetation model used in the system are established by using three-dimensional modeling software, which can be obtained from terrain data and real-time data processing. The production of terrain model should be based on terrain data and assisted by satellite image data. Character models and equipment models need to be refined and standardized, and processed by baking technology. (2) Import the three-dimensional model data into Unity3D engine, by adding multi-person camera, collision settings, skybox and other operations, and integrate the video and sound files used in the system to generate the basic framework of the system. (3) Make and import the audio and video files needed by the system. (4) Running by compiling footwood.

The most important part of the system is the design and construction of the scene model. Every building model in the scene is hollow. In the construction, more elaborate models can be made. Some buildings can interact with the players, and the players can go up the stairs.

And so on. Each model in the scene has a collision body. The placement of the model reflects the overall beauty of the scene, the size of the model and the proportion of the player's perspective are consistent with the proportion of the real world and people's perspective. Next, we choose two models to introduce the following ways and steps of making these models with 3ds Max.

In the production of model one, two cubes are used to create the outline of the building. One of

them removes the front, left and right sides, and the other retains the three sides, so that the last two cubes can just be joined together. In this way, the building is hollow. The first half of the building is converted into editable polygons. Many lines are created and then extruded by polygons. The extrusion tool is used to fine-tune the extrusion surface. It is very important to control the numerical value in the process of adjusting. This will determine whether the size of the model and the role interact appropriately. The operation principle of the latter part is the same. Because the building is hollow, it is necessary to make floor splints to separate each floor from each classroom. When the building is roughly outlined, windows need to be made. Because the corresponding windows are in the same position on both sides, a batch of cuboid models are used to run through the whole building to punch the window holes by Boolean order. After the concrete adjustment, a piece of glass material is made, and then the glass accessories are framed, and the windows are fitted to the gap of the building model Bull one by one, and then fine-tuned. The result of model making and importing into Unity3D is shown in Figure 2 below.



Figure 2 Model-Unity3D rendering

In this scenario, the second model is a large and fine model, which consists of plastic runway, football field, rostrum and green fence. The runway and football field are made by line, then rendered and coarsened. The rostrum is an extension of polygon modeling, and then separated into several elements, each element is mapped separately and imported into Unity3D to adjust the reflectivity. In the production of the fence, first build an iron fence, by copying and changing the size and thickness of the position, then rearrange the combination, so as to create a fence, and then combine and copy multiple groups. The model is the most conspicuous model in the whole scene, so it is also the most elaborate in the production. The number of questions in the model of the rostrum, the concave precision of the roof of the rostrum, the large plastic runway are the most delicate. The number of small lengths and wide fences has been made with actual data. The effect chart is shown in Figure 3.



Figure 3 Model 2 Unity3D renderings

In this system, the main choice is a campus map, the size is 800\*2000m, that is, the map is not too small to lose the game experience, nor is it too big to appear boring. Terrain scenario parameters are shown in Figure 4 below.

The model file in FBX format derived from 3ds Max is imported into Unity3D. Because the

mapping mode supported in Unity3D is only multi-dimensional sub-object mapping and standard mapping, all kinds of attributes with high authenticity, such as metal, will be invalid, so some models need to be redesigned by producers and put into Unity3D, during the stretching process. Some parts will be misaligned, and the model reflectance will become larger, which needs to be adjusted. After importing the model, some effects of Unity3D system can be added. The flexible conversion of Unity3D and 3ds Max can complete the whole scene.

Adding sound effects to the game scene can make the scene more realistic. Unity's audio system can import audio files in standard format, play sound in 3D space, and support Ogg Vorbis, WAV, AIFF, MOD, IT, XM and other formats.

In the scene of this system, the player's "ticking" sound of punching cards and the calls of various birds and insects are introduced respectively. The sound of punching is triggered by the player's contact with the puncher. By adding a trigger on the puncher, the player can judge whether to perform audio playback operation with the trigger. With the sound of punching, the player can know whether the punching is successful. Various bird calls or insect calls drag the imported sound directly into the game scene, adjust the trigger range, the minimum sound distance and the loudest sound distance, and use curves to control the change of sound with distance. For example, when bird calls are placed on the top of a tree, the sound becomes louder near the top, but lighter far away. The same is true for all kinds of insect calls.

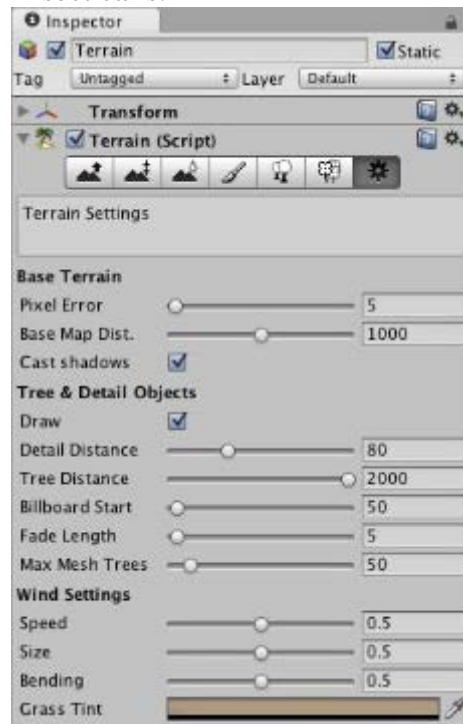


Figure 4 Terrain scene parameters

Unity3D supports the use of MonoDevelop editor to debug the footwork. Profiler in Unity can help game developers to optimize their games. It can directly let game developers know the occupancy of resources in all aspects of the game runtime, including CPU, GPU, rendering, memory, audio and physics. Choosing the right footwork optimization in Unity can improve the efficiency of code execution and directional map script design more than aimlessly adjusting code.

Because one of the main characteristics of directional motion is to have directional map, in order to achieve simulation, there is no point in the actual map where the player is located, so the map only needs a common picture, which appears at the time when the player needs to open. In the design direction, it is made before the time of the first person character. A transparent canvas, on the canvas import a map with directional punch point, and then set to not display, press the M key (Map) to display the canvas and canvas objects.

Because the system is biased towards the design and production of game scenes, the UI of the start and end interface is relatively simplified. The UI is mainly composed of background pictures

and text buttons that can jump scenes. Play the game for players by looking for 12 points marked out in the map, running to 12 points in turn to touch the card, the player and the card instrument collision will issue a "ticking" punching sound, complete the last punching point touching the end of the game, the system as long as the final completion of all points of the punching card counts as the game is successful. ◦

In game testing, the time required to play the game from the beginning to the end of all points is generally controlled in about 10 minutes. Players who first come into contact with such games will take longer, and scenarios running on low-configuration computers will drop frames and carton.

#### **4. Conclusion**

In this paper, the development and design of outdoor Orienteering virtual simulation game based on game engine are studied. Through collecting and researching Unity3D technology, the virtual simulation game system of outdoor orienteering is preliminarily developed. At the same time, the game experience of the simulation game system is considered from the player's point of view, and the beauty is carried out. Sensory design. On this basis, the scene model, Unity3D scene construction, system design and operation of the game system are analyzed. Finally, the simulation game system is tested. The results show that when the player completes the last punch point touch, the game is successful, and there may be carton phenomenon in the running process. In the era of Internet technology, more and more virtual simulation designs and applications of sports have been made. The virtual simulation game of outdoor Orienteering designed in this paper conforms to the trend of the times, but there are still some problems such as Carton, which need to be further explored in future research.

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