Three-Dimensional Interactive Shooting Game Based on DirectX

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Received: *14.12.2020,* ***Accepted:*** *07.01.2021*

Abstract

Three dimensional games are getting more popular in these dayswith the evolution in Gaming technology and availability of advanced graphic cards and high processing computers systems. Video game design and production is a fast paced, high driven technology-based Industry. Hardware used in gaming consoles and personal computers continue to excel, getting faster and cheaper at a dazzling pace. This game is a 3D environment computer game equipped with high end graphics and smooth game-play. In this paper we present our experience in achieving the required game with the help of 3DSMAX, PHOTOSHOP and Unreal Engine.

Keywords - Direct X, Shooting, Three Dimensional, NavMesh.

1. INTRODUCTION

As we all knows that there are several types of computer games. The best-known game in genre can be first person shooter as per the research reports. The game which is recognized as first person game can be defined as game which makes the player may feel within the gaming world. In 3-D game or somehow similar games, the main character is the most likely character and the game camera is fixed at his eyes to complete the game. After the success of Doom, the first-person shooter video game developed by Id software first time, many companies took a crack at this type of game. In these days the best seller game is a kind of first-person shooters.

We can define that DirectX is a set of application programming interfaces (APIs). And it is used for handling tasks which are very essentially related to multimedia and are especially game programming and video, on Microsoft platforms. It gives interfaces for features that are commonly used in games, like GPU-accelerated 2D and 3D graphics, input from controllers, networking, programming etc. It's can also be used by applications that require accelerated graphics or high-performance drawing and sketching, like programs that visualize 3D data or media players (Horvath2015). There is much game development software based on DirectX such as Crytek, EA game engine, Unreal game engine. Hence the game includes 3D concepts which are innovative for shooting.

Related Word

There are lots of shooting game developed till now, this is a basic game based on 3-D. In current scenario, many games are developed using virtual reality. This game can be used with virtual reality also.

A paper based on virtual game presents cost-effective system for the army-based firing shooting game. According to him, the game was to train teaching strategies, maintain the learner's weak point on shooting, and improve the learner's shooting skill and essentials [West, G. L., et al.2018].

Technology Used

A game is a complex structure composed of so many things altogether with level of detail as close as the human references. In order to achieve this task, we use different technologies given as follows.

a. Autodesk 3DS MAX

3DS MAX is very popular 3D modeling software of today time and it is also a rendering software which lets you create massive worlds objects in games, stunning scenes for design visualization and engaging Virtual Reality (VR) experience. Renders, professional-quality 3D animations, and models with 3ds Max® software are created. An efficient toolset helps you create better 3D and virtual reality (VR) content in less time (Steiner, *et al.,* 2015). 3DS is equipped with bundles of tools for accomplishing different tasks such as

- Character animation and rigging tools
- General Animation Tools
- Particle Flow Effects
- High DPI display support

b. Adobe Photoshop

Adobe Photoshop is software which is used for editing, filtering painting, and anything which requires precise pixel placement, stroke-based painting, filtering and so on. It is also used to make texture maps. So, stuff requiring precise graphic designs, normal maps and specular maps. UI elements and head up textures are easier in adobe Photoshop.

In adobe photoshop we can edit the objects as per our choice and demand. In some real-time objects, the software become slow to perform operation the object, so for any vector-based graphics there is a need to display in a game would usually be "baked" out into a 2D texture (or possibly several such textures at different sizes) in Photoshop in advance.

c. Unreal Engine

Unreal Engine is a very popular game engine which is developed by the Games, it is first introduced in the 1998 first-person shooter game. Unreal engine is primarily developed for first-person shooters games, it has been successfully used in a variety of other genres, including stealth, MMORPGs, and various other RPGs. The type of code which is basically written in C or C++, the Unreal Engine game provides a very high degree of portability and you can say that it is a tool which is used by many game developers nowadays(Angel, *et al.,* 2011)(Anonymous*.,* 2017).

Unreal Engine 4 was designed to take advantage of fully programmable shader hardware (in DirectX 9 terms, it required shader model 3.0). All lighting calculations were done per-pixel, instead of per-vertex. On the rendering side, Unreal Engine 4 provided support for a gamma-correct high-dynamic range renderer (Shih, *et al.,* 2012).

2. MODULES

There are several modules to design this 3D game base on direct-X.

2.1 *Level Designing*

Level Designing is the data entry and layout portion of the game development cycle. A level is, for all purposes and intents, the same as a mission, stage, map or other venue of player interaction. We will break the whole environment into blocks, blocks will be categorized as different objects depends on their functionality in the scene.

There will be three kinds of objects

- Primary object-INITIALIZE as A
- Secondary object-INITIALIZE as B
- Semi secondary objects-INITIALIZE as C

All the objects will have different materials assigned in 3dstudio max which will help us in future to re align materials according to scenario.

Figure 1: Types of MAP

All the objects in the scene will have one different material and each material contains 4 maps

- Diffuse map-Color
- Height map-Depth
- Normal map-History(decals)
- Specular maps-Shine

2.2 *Creating Scenario*

First, we will choose the lighting of the scene in UDK and import the objects one by one and align them according to their grid points and snap them respectively in the game engine viewport.

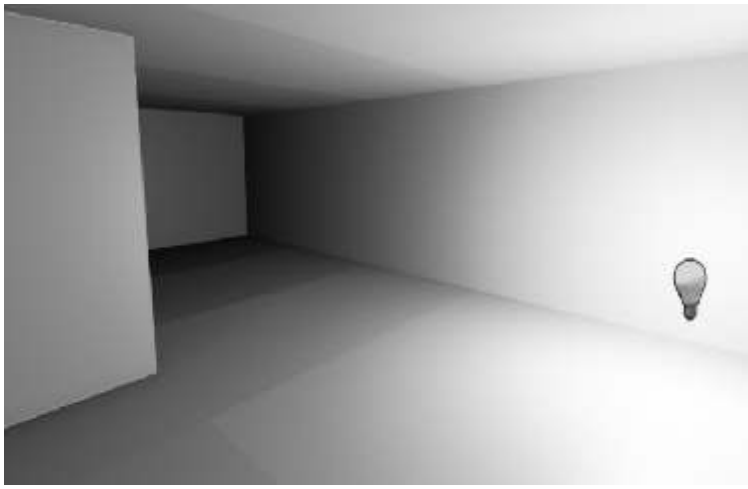

Figure 2: UDK Scene

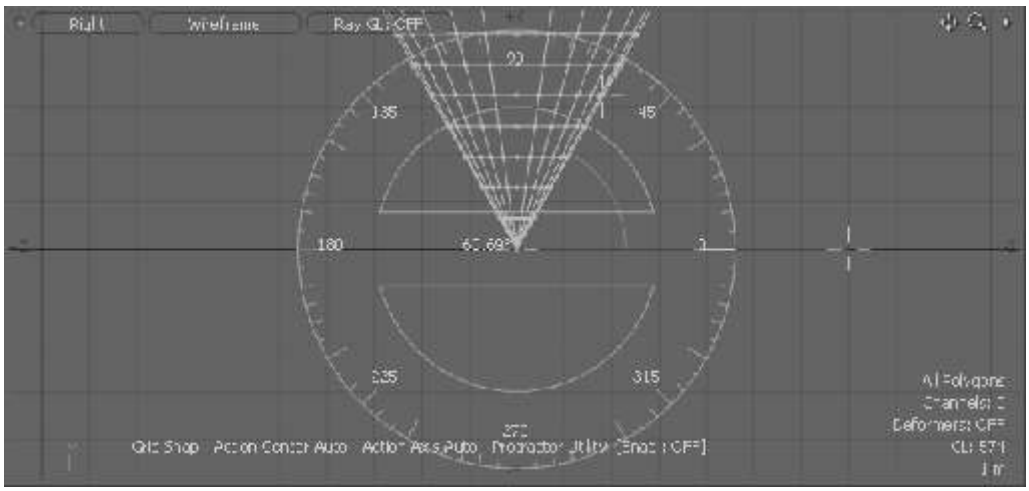

Figure 3: Alignment of Grid Point

2.3 *3-D Modeling*

In 3D modeling, the 3D modeling or three-dimensional modeling is process in which mathematical representation are products of any object (either living or nonliving) in three dimensions via special software.

We can divide 3D models in two categories

- Solid – These models define the volume of the object they represent (like a rock). Mostly the solid models are used in engineering and in the medical simulations, and solid models are usually built with constructive solid geometry

- Shell/boundary – these models represent the surface, e.g. it is the boundary of objects, not the volume

- Two popular ways can be used to represent the model:

- Polygonal modeling –vertices can be defined as the points in 3D environment and then all the points are connected by line segments to create a polygon mesh. Nowadays it has been seen that most of the 3D models which are used are built as the textured polygonal models (taken as an example), because 3D models are more flexible in nature and because computers can render 3D models so quickly. Polygons are planar and they can only approximate curved surfaces by using the many polygons.

- Curve modeling – Surfaces are defined with the help of curves; curve surfaces are influenced by weighted control points. Points are followed by curves. If we increase the weight for a point will pull the curve closer to that point (West, *et al.,* 2018).

2.4 *Creating enemies*

- Enemies are artificial intelligent bots which are designed in 3 parts

- AI NavMesh-We first assign different functions we want our enemy to perform & also creates aNavigation Mesh, which forms our first behavior tree task.

- AI Attack-We create the task that tells the Bot to attack the enemy Pawn.

- AI Mind-we create a Service Task which controls the state of the bot by Detecting for Nearby Enemies

2.5 *Movements*

- Finally, we will assign controls and respective actions in Unreal development kit through the help of some C++ coding with some predefined libraries in Unreal Engine.

1. CONCLUSION

In today's time 3D games are creating good opportunities for the developers, researches, manufactures and companies etc. in computer science related domain. Design and implementation related concerns faced during design and implementation of a DirectX based 3D 1-person shooting game is discussed here. As an output we get a high definition game.

2. FUTURE SCOPE

In future we can extend the gameplay and story of our game, and also include different difficulty modes. We can also increase Characters, weapons and enemy of the game and can make it harder to play.

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