3D GAME DEVELOPMENT USING UNITY GAME ENGINE

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Abstract: **In this paper, we present the design and implementation of the game called Cognitive Arenas. It is a very common game and was developed keeping the Mac OS X and Windows Operating Systems in mind. The aim behind the project was to promote education via innovation. The students playing our game can learn their given material in one of our modules and answer the questions asked in the game where simultaneously he play the shooter game. The player can move to three levels of scenes depicted in Unity3D Game Engine and 3ds Max to play the game interestingly.**

Keywords: Unity Game Engine, 3ds Max, Cognitive Arenas, Education

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1. INTRODUCTION

Game development has always been a controversial academic topic. The computer gaming industry has grown by leaps and bounds, becoming a mainstream software development sector, and earning billions of dollars in revenue each year. The gaming industry has also been one of the main driving forces behind the development of advanced modern hardware such as multi-core, hyperthreaded processors, high-performance graphics processing units (GPUs), advanced sound processing devices, and extraordinary human-computer interface devices such as virtual reality helmets and brain sensor caps. Computer games are like a book, a movie, or a museum.

In this paper we present our experience in creating a game based on the Unity game engine and promoting education via innovation. We want to use this more visual, more easily accepted medium to depict the world through which we can educate the people. Our game is a shooter game which also includes quiz based on the materials provided for learning. Shooter games are a subgenre of action game, which often test player's speed and reaction time. It includes many subgenres that have the commonality of focusing on the actions of the avatar using some sort of weapons.

Unity3D Game Engine is an integrated development tool used to develop interactive contents like video games, architectural visualization and real-time 3D animations. Its editor runs on Windows and Mac OS X platforms. though it runs on only two platforms, it has the ability of developing applications for multiple platforms which are mentioned as follows – Windows, Windows Phone, Mac OS X, iOS, Linux, Android, Web Player, etc. All we need for it to develop the application on respective platforms is the software development kit (SDK) for it.

2. RELATED STUDIES

2.1 Introduction to Unity3D

The Unity game engine was introduced by Unity Technologies in 2005, and has since become one of the most popular platforms for developing 2D and 3D games. It has been embraced both by small, third party developers and by large commercial game development companies. The functions thet are supported by Unity3D are very abundant. Unity3D produces the applications based on JavaScript and/or C#. These are used to assign the animation or real-time transition of the Game-Objects defined in the application. GUI of Unity3D helps a new developer to approach easily and script and program the transition of the Game-Object. The latest version, Unity 5, is a fully functional game engine, with all advanced features enabled and freely available to developers.

Unity is an integrated environment, which combines a number of sophisticated components such as the PhysX physics engine, the Mechanim animation system, a self-contained terrain editor and much more. It is also seamlessly integrated with the Monodevelop code editor, so that any changes made in Monodevelop are transparently compiled by Unity's C# or Javascript compilers, and inserted into game. Compilation errors are displayedin the Unity console window.
>> Rendering:

Unity supports art assets and file formats from 3ds Max, Maya, Softimage, Blender, Modo, ZBrush, Cinema 4D, Cheetah 3D, Adobe Photoshop, Adobe Fireworks and Algorithmic Substance. These assets can be added to the game projct, and managed through Unity's graphical user interface. Unity also has built-in support for Nvidia's (formerly Ageia's) PhysX physics engine, (as of Unity 3.0) with added support for real-time cloth simulation on arbitrary and skinned meshes, thick ray casts and collision layers. 3D objects in made in 3dsMax, can be saved as .max files directly into the project or export them into Unity using the Autodesk .FBX or other generic formats. Unity imports meshes

from 3ds Max. Export 3D file formats such as .fbx or .obj from 3D modeling software in generic formats that can be imported and edited by a wide variety of different software.

>> Scripting:

The game engine is based upon the JavaScript and C#.
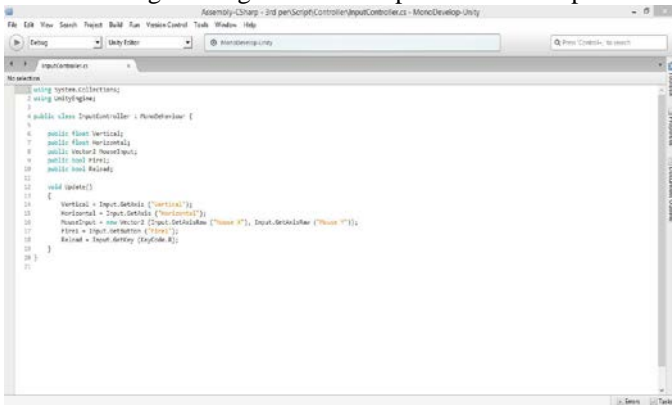
Unity's scripting is built on Mono, an open-source implementation of .NET Framework. MonoDevelop is an open-source IDE for Linux, MacOS X and Windows. It supports Boo, C, C++, C#, CIL, D, F#, Java, Oxygene, Python, Vala and VB .NET. Scripts are used to respond to input from the player and arrange events in the gameplay to happen when they should. They can also be used to create graphical effects, control the physical behavior of objects or even implement a custom AI system for characters in the game.
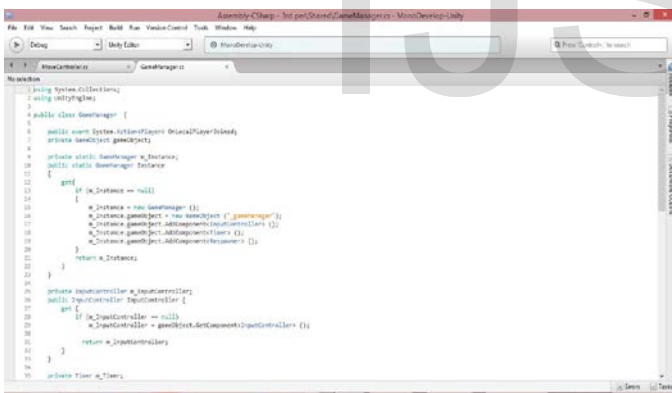
>> Asset Tracking:

Unity also includes the Unity Asset Server – a version control solution for the developer's game assets and scripts. It uses PostgreSQL as a backend, an audio system built on the FMOD library (with ability to playback Ogg Vorbis compressed audio), video playback using the Theora codec, a terrain and vegetation engine (which supports tree bill boarding, Occlusion Culling with Umbra), built-in light mapping and global illumination with Beast, multiplayer networking using RakNet, and built-in pathfying navigation meshes.

>> Platforms:

Unity supports deployment to multiple platforms. Within a project, developers control over delivery to mobile devices, web browsers, desktops and consoles. Unity also allows specification of texture compression and resolution settings for each platform the game supports.

Currently supported platforms include for Windows, Mac, Linux/Steam OS, Unity Web player, Android, Ios, Blakberry 10, Windows Phone 8, Tizen, Windows Store apps, WebGL, PlayStation 3, PlayStation 4, PlayStation Vita, Wii U. Xbox One, Xbox 360, Android TV, Samsung Smart TV, Oculus Rift and Gear VR.

2.2 Autodesk 3ds Max

Autodesk 3ds Max is a professional 3D computer graphics program for making 3D animations, models, games and images. It is developed and produced by Autodesk Media and Entertainment. It is frequently used by video game developers, many TV commercial studios and aechitectural visualization studios. It is also used for movie effects and movie pre-visualization. In addition to its modeling and animation tools, the latest version of 3ds Max also features shaders (such as ambient occlusion and subsurface scattering), dynamic simulation, particle systems, radiosity, normal map creation and rendering, global illumination, a customizable user interface, and its own scripting language.

Modeler and texture artist could increase the speed of working and efficiency because of extensive polygon modeling and texture mapping tool set. CAT (Character Animation Toolkit) that is completely integrated provides advanced rigging and animation system that can be used immediately. Artist could create very realistic or great image by using mental ray renderer and integrated 3ds Max scan line including mental ray network that can finish rendering faster. Since it supports C++ and .NET, model with Autodesk 3ds Max, send it to Autodesk FBX exchange technology file after animating it and then bringing it to Unreal Editor Contents production software.

2.3 Importing from 3ds Max to Unity

The things that are imported from 3DS MAX from Unity3D can be largely divided into five parts. First, it is every node that has position, rotation, scale. Second part includes pivot point, names, vertex and meshes with colors. Third, they are normal and one or two UV sets. Fourth, they are diffuse texture and materials with colors. Fifth, they are many materials per mesh, animation, and bone based animations. Tus, these five parts are the ones that Unity recognizes from 3DS MAX. Also, Unity3D could import FBX file. FBX provides supports for software and applications that are both independent and from certain companies. FBX is used within e tertainment pipeline or as a part of design production. Files can be sent more smoothly, more data is maintained, and the work flow is more efficient. To send a file from 3DS MAX to Unity3D, first convert to FBX file with export from 3DS MAX, and send it. Then the file can be imported from Unity3D. Only, if the name of FBX file is in Korean, Unity3D cannot recognize it.

2.4 Summary of the Game Development

In this research paper

1) **Game Name:** Cognitive Arenas
2) **Game Genre:** Quiz, Shooter
3) **Platform:** Supports Multi-platform (Wiindows PC, Android, etc.)
4) **Game Characteristics:** Our game has three levels for the player to travel through. The various scenes depicted in those levels are
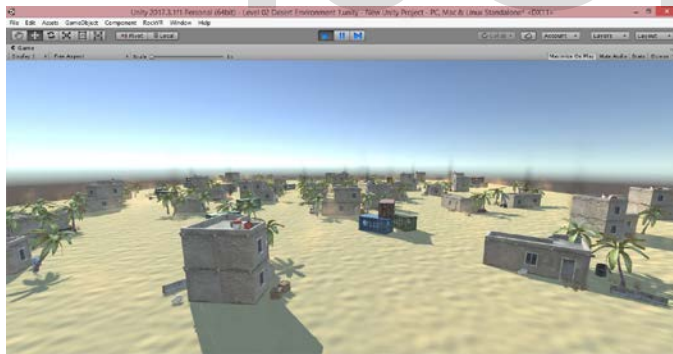
Level 1>> The Snowies:

This level contains snowy mountains and sereny place for the player to travel.
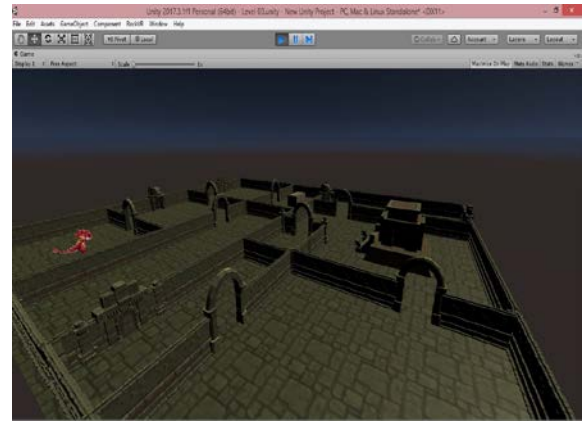

Level 2>> Deserted Area:

This level scene looks like a desert that also contains sand houses.

Level 3>> Mayan area:

The building in this level looks like Mayan buildings which will be in old-fashioned style.

The player will travel through all these levels to complete the game. The player can learn the material given in the game for answering the questions. The learning material will be available in the LEARN module of the game. The rules and controls of the game will be given in the modules of the game for the player to follow. The PLAY module of the game will direct the player to the game scenes to play. The player has to answer the questions asked in the game by exploring the answers from the given environment and has to undergo offending and defending activities agains the enemies in the game.
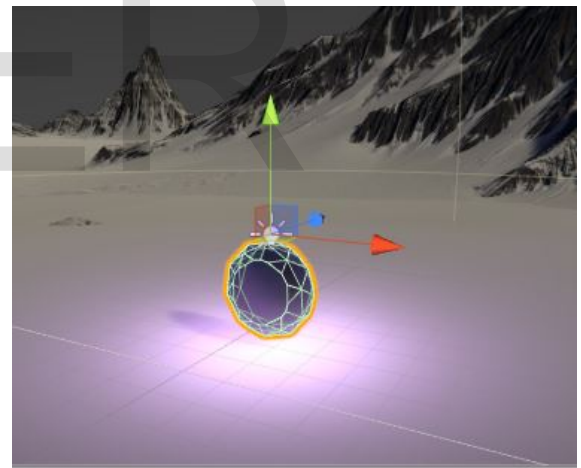
The object that helps the player to score points.

5) **Core Idea of the Game:**

The objective of our game is to promote education via innovation. We want to use this more visual, more easily accepted medium to depict the world through which we can educate the people. Our game is not just entertainment, it's a channel that is responsible for promoting education. It gives the feel of intangible treasure through the environment provided. We found there is a need of a medium that will provide education through entertainment. And this may be a solution for lack of interest as well as getting bored in learning.

3 MODULES

3.1 Game UI screen

>>Modules:

- Play
- Settings
- Rules

The player in the first level.

>>Settings:

This module can be used to modify the volume for the game.

>>Rules:

This module shows the rules and controls required for the movement and exploration by the player in the game and constraints need to be followed by the player.

>>Learn:

This module provides the materials published for the game to answer the given questions. The materials given can be read by the player and use those information to answer the questions asked in the game.

>>Quit:

This module is used to close the game window that is to exit from the game application.

4 CONCLUSION

This study aims to design and develop a gaming application using Unity Game Engine. Through this cornerstone for a new concentration on Game Development, we have conveyed our views and ideas on promoting education via innovation. The functions that Unity3D supports autonomously are very abundant. All game developments are possible such as shader, physics engine, network, terrain manipulation, audio, video, and animation, and it is enabled so that it is possible to revise, meeting demand of user according to the need.

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