DEVELOPING 3D HIDDEN OBJECT GAME USING UNITY

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Developing 3d Hidden Object Game Using Unity

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Hidden object game is very famous casual game. This game is commonly made in 2D where the user will be set in a flat image to find what is needed. Hidden object game is very addictive because it has very easy gameplay, understandable rules and low memory storage. This game is not only to entertain the users but it also helps on building their focus skills, recognition or mental abilities. Because of this game attributes, the proponents developed a 3D hidden object game which the user can rotate and search not only in flat image but also around the objects they are manipulating. This research is made using a game engine called Unity which can handle 3D manipulation and rendering that could make the game more realistic and fun to be played.

Key Words and Phrases: Hidden Object Game, Game Development, Unity 3d, Casual Game

1. INTRODUCTION

1.1 Background of the Study

Hidden object games are considered one of the most addictive and convenient game in the market to play with besides of its graphics this game is best in exercising the players in focus/attention and recognition to the details. Every month, an estimated 300 million consumers play the casual games it means this includes the HOG. In the reviews on the internet they said they choose casual games specifically hidden object games because they don't after for the graphics instead of its gameplay and very light game that could not consume much space in their hard disk. Hidden object games are commonly created in 2d especially in online and mobile platforms. The proponents are interested in developing this type of game into 3D approach which the user could search around the chosen objects and maneuver their way to the 3d world. The research is new to this game genre which could contribute to the developers who are developing this kind of games.

1.2 Technology Application Context

Nowadays, Casual games like Hidden object games are slowly in demand in the game industry. Others are starting to like puzzle games mainly because of its multimedia elements and gameplay. The gameplay consists of rules, complexity and story that should be connected to the theme to make concept of the game easy to understand. The project developed in a game engine called Unity 3d.The research is to make a new type of Hidden Object Game into 3 Dimensional in a PC platform. The main goal of this research is to apply 3D animation from a 2D type of genre. The typical Hidden object game is simply a flat image which the user point and click the hidden objects which is more common and made the player tired of playing this kind of game, which leads to the idea of the proponents to make it more lively and make it into 3D animation which the user can manipulate the object, the objects are movable and the hidden object might be hidden from behind that certain object. The research will be reviving the Hidden Object Game and setting it into newer style so that it will be marketable and fun to play. And also to improve and enhance the user experience of the hidden object game from 2D into manipulative kind of game which is the 3D.

1.3 Objectives of the Study

The general objective of this study is to develop 3D hidden object game in Pc platform using UNITY Engine.

The specific objectives are:

- To implement 3D model behavior using Java Code in Unity.
- To implement backgrounds or skin in the game environment using Photoshop.
- To implement object models using Blender.
- To implement Audio files using Itunes converter.
- To be able to make an engaging and appealing game by improving the following game elements:
    - Story
    - Graphics
    - Sounds
    - Gameplay
    - Core Mechanics

1.4 Significance of the Study

This research can contribute to the field of game development and to this type of game which will be improvised. It also contributes to other developers who are stepping in the field of game development specifically in hidden object games. This study also includes creation of 3 dimensional objects, using Blender graphics software which would enable the proponents to learn about on concepts what object would you like to create with regards to fundamentals of 3d modeling such as polygon meshing and digital sculpting. It can also be an exercise for the players in recognition, attention and exploring the hidden objects in a 3d world.

It also contributes to the learning of the proponents in developing games and competes with other game developers who are into this type of game genre. With the help of the software such as Blender, Unity, Itunes, Adobe Photoshop and Java Programming, The proponents can visualize and develop a 3d Hidden Object game wherein they would let the players immerse themselves and be entertained with the game.

1.5 Scope and Limitation of the Study

This project focused in the field of game development about 3D manipulation, also the game is implemented using the Unity and Blender. The game has different stages which consist of different themes and complexity that motivate the player to play the game. The game has storyline to be followed. The idea of the proponents to make it livelier and make it into 3D animation which the user can manipulate the object, the objects are movable and the hidden object might be hidden from behind that certain object. This game will only run in pc platform. The scripting of the game will be made using Java programming.

2. REVIEW OF RELATED LITERATURE AND TECHNOLOGY APPLICATIONS

Nowadays, game development is rapidly increasing and it is evolving depending on the player's interest. In game development, a framework is essential because it's a process in which a game can be made in an organized way.

2.1 Game Interaction, Elements and Learning

It is fairly clear from the breadth of research on the subject, that video games do affect learning. While there is widespread consensus that games motivate players to spend time on task mastering the skills a game imparts, some disagreement over the specific characteristics that provoke that motivation exists. Nevertheless, the literature reveals that a number of distinct design elements, such as narrative context, rules, goals, rewards, multisensory cues, and interactivity, seem necessary to stimulate desired learning outcomes. Moreover, researchers are beginning to theorize the cognitive processes that occur through video game play. As these inquiries progress, a better understanding of educational game design and the production of improved educational games will ensue. In turn, design and development will likely generate further research on the learning outcomes afforded by educational game play, including those affected by gender preferences.

2.2 Hidden Object Games origins, techniques, gameplays and complexity

"Mystery Case Files: Huntsville" Released in November 2oo5 by Big Fish Games. The game is having a role of a detective trying to solve a town's crime problems. Investigating various locales for clues the player is able to piece together the culprit behind each case. The company Big Fish released five more hidden objects games in the year 2006. Two of which were follow-ups to the Mystery Case Files series but the genre really took off in 2007 when the games portal hosted over 30 new games. Five more games were released in 2008. Hidden object games are among the top game genres at Big Fish's website. Indeed, these types of games are often featured on the front page of Big Fish's website recommended by the site's staff.

Many hidden object games consist of the same core gameplay but there are few key differences. Example is "Mystery Case Files: Huntsville," pits players against the clock. The player is given 15 minutes to solve each puzzle which can consist of several play screens followed by a special sequence that requires sliding tiles into place to form a picture. If the player fails, she must restart the puzzle with different hidden objects to find. Additionally, the player is penalized time off the clock for clicking the mouse too rapidly. This type of hidden object game is better suited for advanced players. Another popular game, "Veronica Rivers: Portals to the Unknown," is easier for beginners. There is no time limit wherein the only penalty for clicking the mouse too fast is a temporary freeze on the ability to find the objects.
Most games also implement a hint system, in which one hidden object becomes briefly highlighted. In "Veronica Rivers," hints are unlimited, but the player must wait 15 seconds between activating them. In "Mystery Case Files," players are only allowed three hints per puzzle. Other games, such as the "Hidden Expedition" series, allow the player to regain hints by finding certain hidden objects.

The simplest hidden object games are basically puzzle words that is only with pictures. You are presented with a scene and must click on a described item or items. For instance, you might see a landscape filled with wild horses, squirrels, all sorts of trees, a lake, ducks and geese, insects and the like. Somewhere in this scene you might have to find a gold coin or a pixie.

The detective-type hidden object games are more complicated. In these, the player must try to solve some sort of mystery that is presented at the beginning of the game. For instance, a chest of gold is stolen from a room in a mansion. By clicking on certain clue objects, the player will move from room to room, working to find the identity of the thief and recover the stolen loot.

2.3. Gameplay interaction, digital games could be categorized as major genres

According to (Bryceson, 2009): (1) Shoot-'em-ups and beat-'em-ups: the former refers to shooter games emphasizing a series of combats that involve projectile weapons; the latter means fighting games focusing on a series of battles against large numbers of antagonists. This genre of games requires players' eye-hand coordination but require little knowledge. (2) Flying, racing, and sports: they are also called sports games that emulate traditional physical sports. Some games emphasize the playing of the sports, while others highlight the realistic and authentic vehicle simulation. (3) Strategy and puzzle games: games in this genre require skillful thinking and planning for managing resources or solving complex problems, either in turn based or real-time form. The game scope ranges from solving a small puzzle, running a farm, to managing a city, or a planet. (4) Adventures and role-playing games: although these games involve somewhat exploration, puzzles, obstacles, and enemies to overcome, one common characteristic is that the main character reflects the players' alter ego. The main character often evolves with the progress of the players' advantage and the advance of the storylines.

2.4 Game Development: Multimedia and Audio Perception

In game development, multimedia plays a large role to make the game more entertaining. Multimedia is heavily used in game development especially for creating the text, graphics, still images, audio and animation. Dr. Vicky Cereijo from University of North Texas discussed about the text should be concise and less than a half of the screen. In emphasizing and good headings, use appropriate type of fonts such as decorative, serif, sans serif. Also, different type of styles such as bold, italic and underline should be used. Be consistent in using the styles by using same fonts for similar sections. The text should be made readable by avoiding "ransom note" effect, choosing the fonts that can be located in most systems, and choosing only up to four variations of type styles, fonts and size.

At Nordic game jam 2009, Focus on players audio perception in interactive game environments. A player is immersed into the game play and how sound encourage the player to interact. Regarding subjects such as sound engines, adaptive music, dialogue, how to avoid repetitions and player profiles. When we look at the graphic interface – it is a 2-dimensional representation or simulation of a 3D graphic environment, displayed on a flat TV or PC screen. But audio is not a simulation. Audio is in fact the only true 3-dimensional physical event that happens during game play. Audio has the properties of pressure and frequency, as it propagates through air and occupies an expanding volume. So the sound wave travels through air from the headphones or TV monitors to our ears. This physical event makes us react physically by making haptic spasmodic inputs on the controller.

A Bachelor's degree in Multimedia Design and Development from DeVry University with a specialization in graphic and multimedia design can help game developers develop all these skills including design standards, business fundamentals and emerging technologies. In additions, to learn how to correct and enhance digital images, web video fundamentals, advance imaging, advance illustration, 3d model design and construction and animation. '

2.5 2D, 3D and 2.5 D Game Industries

The gaming industry of today has reached new heights and successes over the past years. It truly had become a powerhouse industry and it sure would be for the coming years. With so much to choose from gamers of all sorts enjoy games through different platforms and kinds from 2D to the 3D games that now dominate the market and the concept of 2.5D games, a cross between 2D and 3D which are also being adapted now by many games. With the advent of 3D games, 2D games may seem dated and obsolete but according to one of IGN.com's bloggers in his blog post 2D Gaming Isn't(IGN,2011) nowadays 3D games may be the leading platform in consoles but 2D games still

appeal to consoles like PSP and Nintendo. 2D games never really disappeared; as a matter of fact it allows game developers to preserve such game concept and apply modifications and features that would satisfy gamers of nowadays and also improve the quality 2D games itself.

2.6 Unity3d

With the aforementioned reviews of related literature and related studies, the researchers are convinced that the proposed research study which is to implement a game adaptation of the traditional game Tumbang Preso will be implemented accordingly with the purpose of instilling the game's fundamentals and principles to the consciousness of its players. Given that Unity 3D is free and has many technical features such as its built -in physics engine, scripting/programming functions and modeling functions that would cater the designing & development process of the game especially the game is proposed to be in a 3D perspective, not to mention the support features and tutorials that can be obtained from its main website and on other known Unity 3D tutorial sites. Also the researchers are convinced that this study will contribute to the preservation of traditional Filipino games and the researchers also believe that this study may bring the advantages of gaming mentioned in the related literatures regarding gaming and its benefits since this study aims to instill the fundamentals of the game to the players in way that the game itself would present Filipino characters, setting, storyline and most of all gameplay which will be accurately based to the Tumbang Preso rules being reviewed in this chapter.

3. PROJECT METHODOLOGY

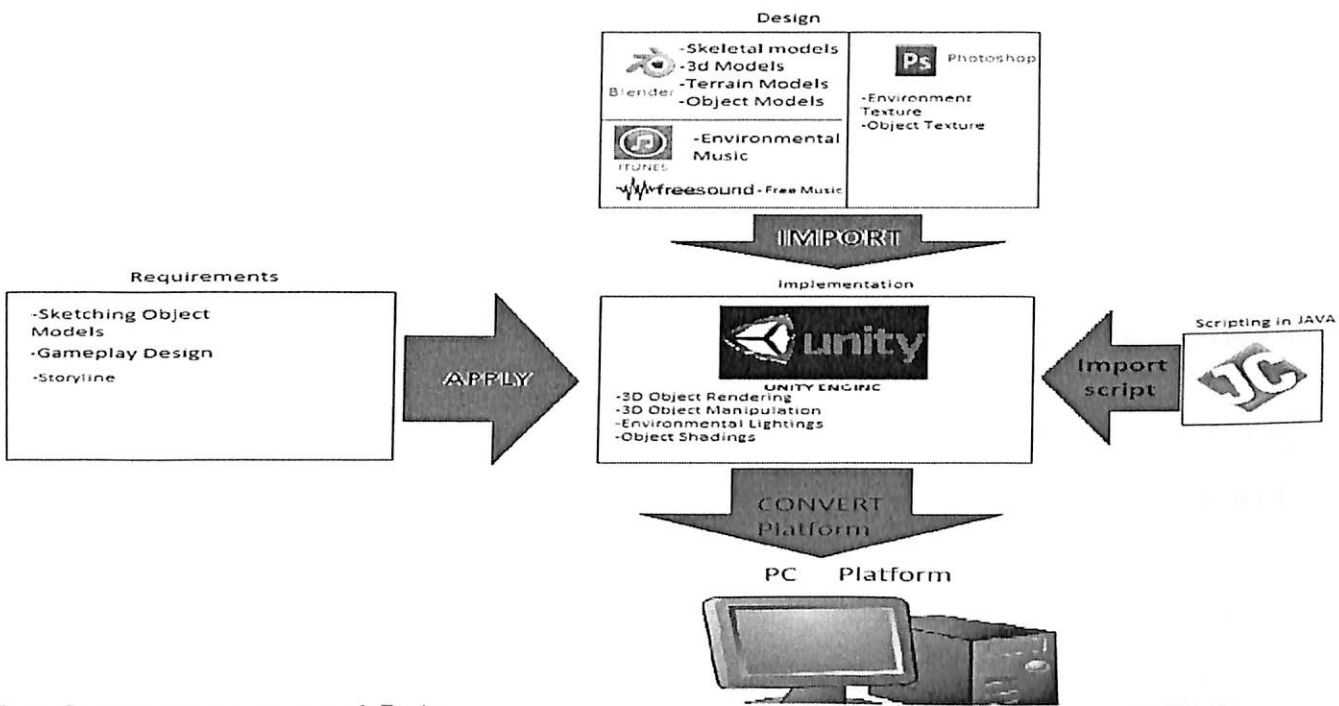

Fig. 1. Game Development Research Design

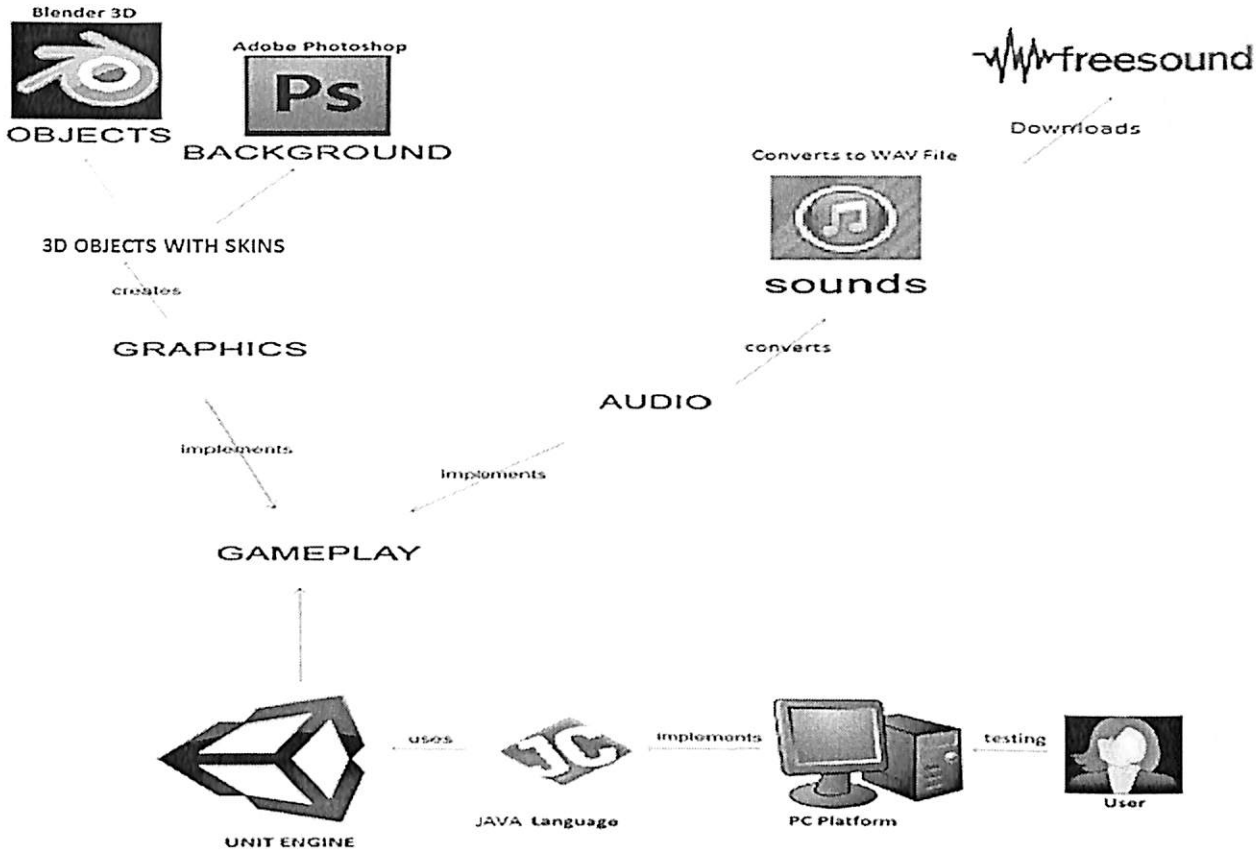

Fig. 2. Game Development Research Design

3.1. Incorporating 3D in a 2D Game Genre – Hidden Object Games

The proponents improvised the typical 2D hidden object game into 3D experience by:

1. Adding all properties of a 3D game objects into the game which consists of Width, Length, Depth, Reflection and Angles. . In usual Hidden Object games, objects only have width and length properties.
2. Adding navigability actions to objects i.e. drag and rotate movements. In usual Hidden Object Games, objects of interest are just clicked.
3. Implementing the First Person Perspective, such that a player has the ability to walk, jump, and collect the hidden objects.

3.2. Evaluation and Selection of Tools

The proponents need some other technologies which can support the achievements of the game. The proponent gathers and compared possible Game engine such as Game Maker, Game Salad and Unity 3d. After comparing the engine the proponents choose unity 3d because this engine can handle the research that the proponents are proposing which is the 3d game. The Unity Engine handles object rendering, preloaded object enhancement tools, object lightings and especially it is user friendly. The tools in the unity engine can be understood

easily. And lastly the proponents prefer c# and javascript on programming which the unity also handles. Blender will be used as modeling 3d for polygon meshing. There will be different kinds of meshing tools for creating objects such as plane, circle, cone, cylinder, icosphere and UV sphere. The proponents choose Blender because is less complex in regards to meshing and also using the faces, edges and vertex editing mode when modeling an object rather than other 3d modeling softwares like Maya and 3ds Max.The proponents used Photoshops because we have background in using it and it has many features that could help making backgrounds and skins of our objects generated by blender. The proponents used Itunes converter for the audio background of the game because it has free WAV format converter from Mp3 downloaded from freemusic.org.

3.3. Development

The **3D hidden object game** will be created into a PC platform. The first Step of this research is to Sketch Object models to be the guide in making the 3D models in Blender, and Gameplay of the game. Next is Constructing or Meshing Objects Using **Blender**, creating textures using **Photoshop** and Gathering Sound effects using **ITUNES**. Those are raw materials to be imported into the **Unity engine** which will be manipulated and add additional effects such as lightings, dust particles, smokes and some other effects which are also featured by the Engine. The Unity engine also has its own compiler of **javascripts** which will be used as the language of the game in making Object Commands and behaviors.

The proponents need to make the 3d models using Blender as the resources for the game. In making the project, the proponents used a modeling tool called "meshing". The proponents also used Adobe Photoshop for making raw skins and to be implemented to the engine as well as the 3d models. For the game to be livelier, it must have music, so the proponents will use iTunes convert to make mp3d files into WAV format that the engine requires. Lastly, for the game to be finished, the proponents will use unity 3d, and here where the behavior of the models created in blender to be implemented as well as the design in the environment. The overall integrity of the models is suitable to use in animation especially in dragging objects and rotation.

The final game should consist to all the required objectives. The game has a story to be followed. Unlike typical hidden object game, the viewpoint of the game is a first person perspective which the user can move around the environment and find the hidden items. For the gameplay, there are no difficulty rounds such as easy to hard. Each room has different storylines and themes including office, garage, bathroom and bedroom. The complexity is based in every level and the list of objects in every room will be hidden underneath, inside and behind another object. For Example, a pen is part of the list therefore you can find it in the closet, underneath a bed or even behind a pillow. The player can roam around the room freely and there is no time limit. The goal is to search all the objects in the list every room so that you can proceed to another level. Each object can be rotated and dragged in order to find and move the specific objects. When the user is the done and completed all the specific objects he/she will go to a door and proceed to another room with another list of objects will be provided. The implementation of the game style can make the game genre more enjoyable for the user.

3.3.1 Storyline

The story is about a witch and an intelligent explorer named Doro as the main character of the game who were exploring at the same forest as the witch lives. He accidentally found the witch house and witnessed all of her plans. The house of the witch was surrounded by spells and it detects Doro. Doro run away from the house to report what he witnessed. The witch didn't catch him instead she cast a powerful spell to find the guy. The spell couldn't kill Doro but it could lose a part of his memory. The spell could not perfectly work to him because of his brilliant intelligence. Later, when Doro got home unfortunately the witch spell become more effective and mostly corrupted his memory. In order to repel the witch spell, he must acquire all the things that were corrupted. He ends up in his home with no memory of what happened before he got there.

3.3.2 Gameplay and Controls

The viewpoint for the gameplay is a first person perspective that typically used in first person shooting game so that the user will be comfortable on playing it. It has the ability to walk, jump and manipulate objects around the room. The controls for the game are still similar to the first person style. Press **W,S, A, D** to walk forward, backward and sideward, **SPACE** for jump and for the manipulating objects just **HOLD** the left-click and drag or rotate the object.

3.3.3 Object Modeling

In blender the compiler designed object models to be imported in the UNITY engine and used as hidden object. There are 3 axis in visual option of designing a 3d: x is the red, y is the green and z is the blue. The user perspective for the 3d modeling viewpoint is left-right for x, forward-backward for y and up-down for z to make it bigger, smaller, wider and longer. In reshaping the object, the proponents used the key **S** for the scale. There are different types of transformations for object mode: Translation for dragging the object from the cursor, Rotation, Scale and Mirror. In the Upper left of the image is the mesh, for selecting different shapes of the objects.

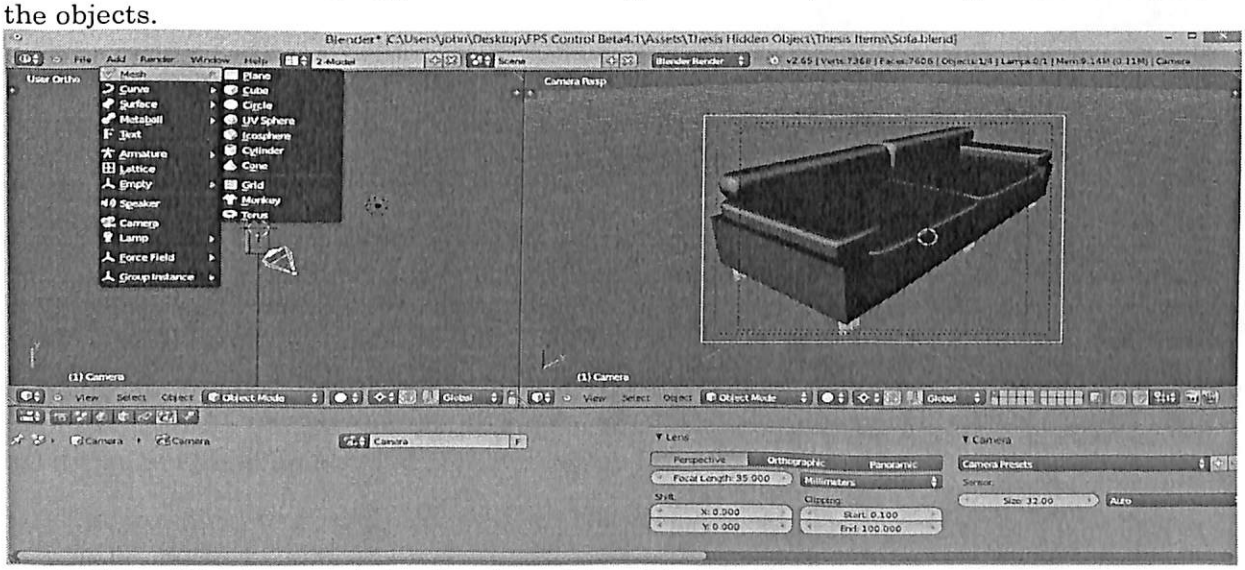

Figure 3: Using Blender as a technology in making objects in the game.

3.3.4 Object Skins/Environment Skins

In making game background images and skins, the proponents used Adobe Photoshop as a tool in achieving it. The backgrounds are based on real life object skins, which are made in adobe photoshop and them imported to the unity as well as the objects from Blender and the object will be wrapped with the image to make it more realistic.

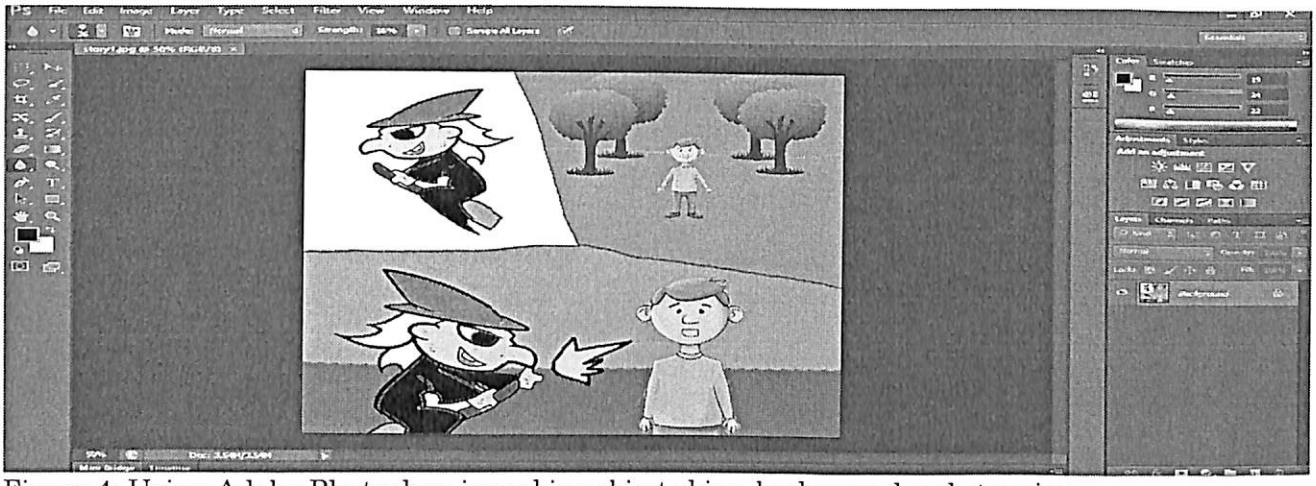

Figure 4: Using Adobe Photoshop in making object skins, background and story images.

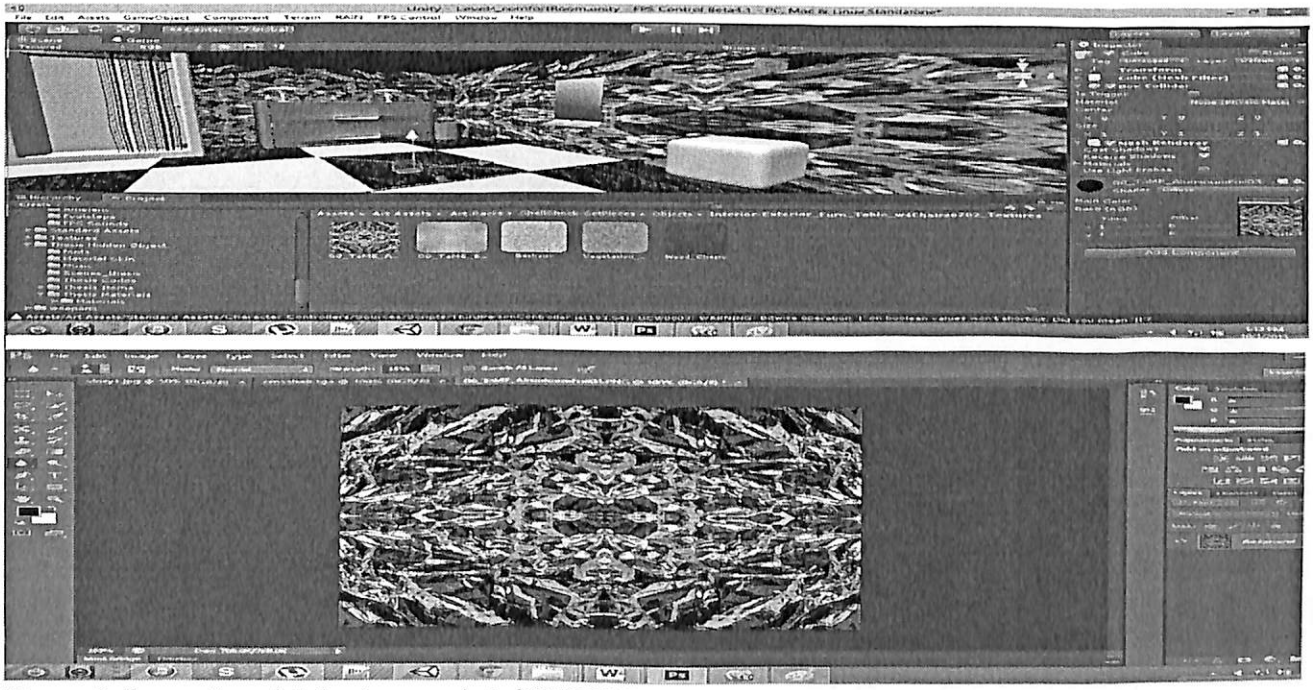

Figure 5: Importing Adobe images into UNITY Engine.

3.3.5 Background Music

The proponents downloaded audio files from freesounds.org and then import it to the iTunes for the conversion of the MP3 file to WAV file.

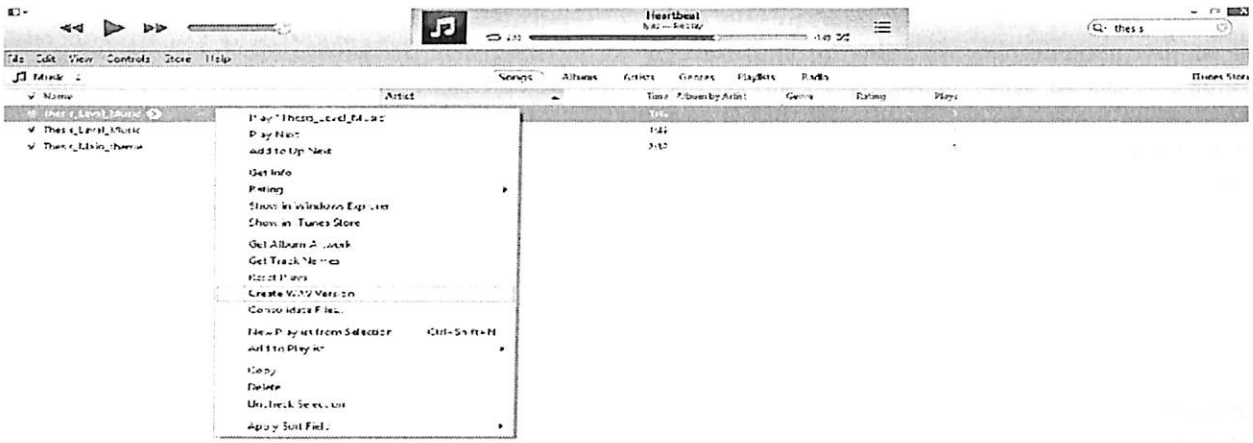

Figure 6: Converting mp3 music into WAV file using Itunes Converter.

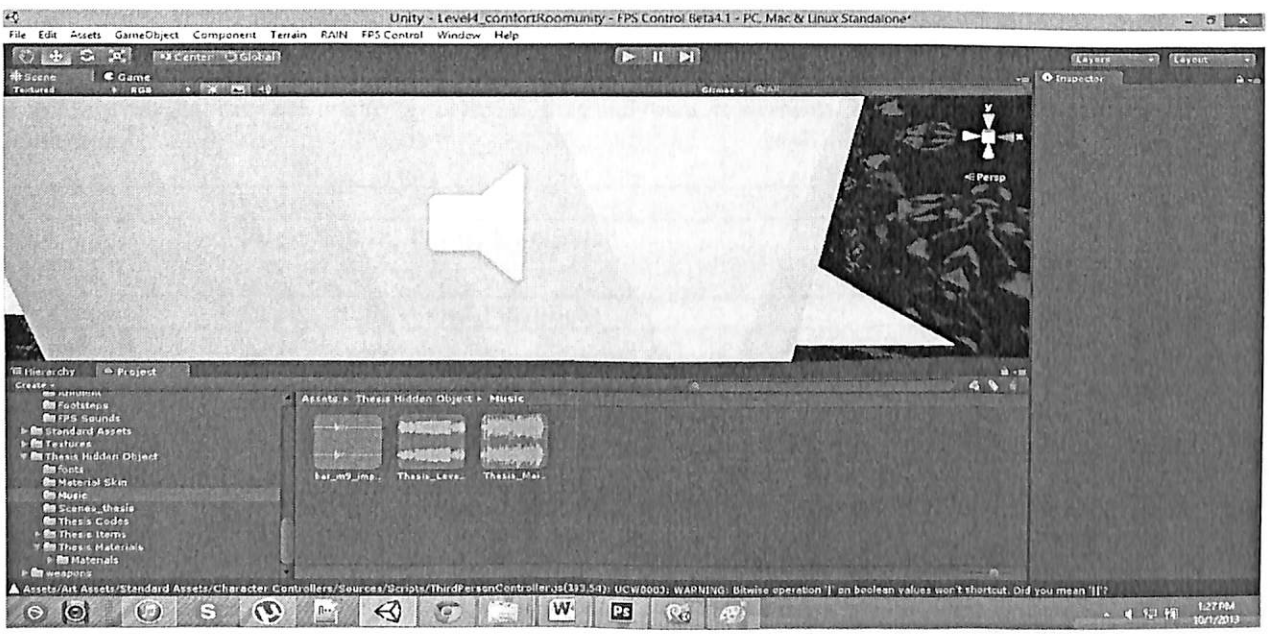

Figure 7: Importing WAV files from Itunes To Unity Engine.

4. TECHNOLOGY BACKGROUND

Unity is a cross-platform game engine and IDE. It is used to develop video games for web plugins, desktop platforms, consoles and mobile devices. Unity is primarily used to create mobile and web games. It is able to support code written in C# or javascript. Unity will be used in making object behaviors and coordinates which the character can interact with the objects and move around the room. **Blender** is a free and open-source 3D computer graphics software product used for creating interactive 3D applications or video games. Blender will be used in making 3d models of the object to be imported into the Unity. Blender will handle the appearance of the object which will look the same in a real world. **Photoshop** is an image editor which can manipulate images and save it into multiple formats such as, JPEG, GIF and PNG, which then be used in making skins for the objects made by the Blender. **Itunes** is a music player that can converts song which is WAV files that are needed for the sound effects of the game. And a required format for the sound effects and environmental music that the UNITY accepts.

5. RESULTS AND DISCUSSION

After the 3D hidden object game has been developed, the proponents conducted the testing phase. The testing was done through playing the game and answering survey for the user acceptance test. Since the target market of this research are someone who have played and experience the current Hidden object game which we surveyed to differentiate and give opinion about the emerging 3 Dimensional Hidden Object Game.

5.1 3D Elements implemented in the game to enhance gameplay and experiences are:

1. Adding (the third dimension of) Depth to appropriate game objects. This is evident in the objects of the game, example in level 1 – computer, table, chair....

2. Adding navigability actions to objects, i.e. drag and rotate movements. This is found in the game specifically in the following:

Level 1	Object	Action
Office	Filer, Chair, Table, Computer	Drag, Rotate
Hidden Objects	Paper, Ball, Wand Flashlight	Select

Level 2	Object	Action
Living room	Sofa, Vase, Bed, Chair, Lamp Shade, Books	Drag, Rotate
Hidden Objects	Motorcycle, Doll, Ball pen, Phone, Tablet	Select

Level 3	Object	Action
Dining Room	Vase, Sofa, Oven, Chair, Table, Fire Extinguisher, Trashcan, Stove	Drag, Rotate
Hidden Objects	Spoon, Fork, Glass, knife, Plate	Select
Level 4	Object	Action

Comfort Room	**Chair, Cabinet, Vase, Trashcan**	**Drag, Rotate**
Hidden Objects	**Soda can, Soap, Hanger, toothbrush**	**Select**

Level 5	**Object**	**Action**
Garage	**Box, Fire Extinguisher, Trashcan, Chair**	**Drag, Rotate**
Hidden Objects	**Wrench, Chisel, Saw, Screw Driver**	**Select**

Level 6	**Object**	**Action**
Police Department	**Box, Fire Extinguisher, Trashcan, Chair**	**Drag, Rotate**
Hidden Objects	**Paper, Flashlight, Ball, Screw**	**Select**

3. Implementing the First Person Perspective, such that a player has the ability to walk, jump, and collect the hidden objects. This has been implemented in the following:

Character	**Objective**
DORO	**Main Objective: Report the villain (Witch) to the police.** **Stage Objective: Retrieve the corrupted memory by collecting all the things that are starting to corrupt.**
Controls(On keyboard)	**W -Walk forward** **S -Walk Backward** **A – Walk Left** **Spacebar - Jump** **D – Walk Right** **Mouse Direction – View Surrounding.** **Left Click – Interact with Object.**

The proponents project is based on a 2d hidden object game will be improvised in 3d environment which the objects can be manipulated and free roam for exploring the hidden objects instead of point-click style. The objects of the game are not constant it means the object can be drag and rotate which you can explore every angle of the object which cannot be experienced in 2d hidden object game.