

Developing a game using the Unity game engine and Blender

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Abstract— Video games are an integral part of our lifestyle. Today, various types of video games are played in different parts of the world. They are a medium of communication, entertainment among people. It can make a strong impact on the society, good or bad, however it maybe. Gaming culture is a worldwide new media subculture formed by video games. Games are played in a variety of social ways, which often involve domestic gatherings or even in public places. A popular method of accomplishing this is a LAN (Local Area Network) party, which if hosted at a home involves family and friends, creating a social event for people friendly with each other. LAN parties are often held in large scale events conducted in public spaces and have a great number of participants who might not usually socialize. This paper discusses implementation of our video game prototype for Windows platform in a popular game engine Unity 5. The focus is put on using the built-in Unity components in a game setting, developing additional behaviors using Unity's Scripting API for C# and integrating third party components such as the networking engine, 3D models, and particle systems created for use with Unity and available through the Unity Asset Store.

INTRODUCTION

As computer and video games have exponentially increased in popularity over time, they have had a significant influence on popular culture [1]. Video game culture has also evolved over time hand in hand with internet culture as well as the increasing popularity of mobile games. In the current world where stress has become an important part of life, people of all ages seem to take to gaming as a stress buster [2].

The proposed game is adventure-strategy based; Puzzle (Questions) based a Multi Player Online game. It is a two player desktop game in which goal is to win the combat

happening at the end of the game. Each player has to solve puzzles which will be some questions to get a head start. Each player has to collect weapons hidden in the map, for the combat. If a player couldn't find any weapon, then at the time of the combat, a random weapon is dropped in the inventory of that player. The map used in the game is the 3D view of Vidyalankar College. And the area that can be accessed by the players increases as the level of the game increases.

Since every player has a different strategy while playing, choosing the right move is a strategic decision, which is essential for victory. A player's conscience of environment and to keep an eye at everything that is happening around him/her and exploring the amazing campus of Vidyalankar Institute of Technology are few anticipated outcomes.

The project will help the students to increase their speed of solving any problem in real time as the winning and losing depends on the time taken to solve the problem. It will help adults to stay in touch with the math world and puzzles, and will keep the rusting of the brain away.

I. EXISTING SYSTEM

There are not many games that are based on more than one category in the market. Each video game is included in a single category [3].

For example, Counter Strike- Global Offensive is a famous online video game which is of franchise Counter Strike is an objective-based, multiplayer first-person shooter game [4]. Two opposing teams, known as the Terrorists and the Counter Terrorists, compete in game modes to complete objectives, such as securing a location to plant or defuse a bomb and rescuing or guarding hostages. This game just focuses on MMORPGs (Massively Multiplayer Online Role Playing Games) with large virtual worlds.

Similarly, Criminal Case is a role playing game where you play as a detector and have to find and solve clues in order to win the game. This focuses only on one category, i.e. puzzles [5].

There are a number of papers covering Unity engine itself. This paper discusses how our game will be created using unity engine. Official Unity page also offers plenty of tutorials aimed at helping new Unity developers to get started and to understand basic Unity concepts [6]. Finally, there are plenty of video tutorials available on popular video sharing sites such as YouTube which explain how to use Unity to develop certain types of games [7].

II. PROPOSED SYSTEM

The proposed game is a multiplayer online game. It is a combination of puzzles, questions, that is based on IQ, and gaming skills, such as reflexes and weapon usage. The game will open with a series of questions for a headstart to the player followed by spawning the player into map with weapon and for the final combat.

We are implementing this game by using 3D map of our college, Vidyalankar Institute of Technology, Mumbai [8]. The region of the campus that can be accessed by a player is increased as the level of the game increases. The amazing campus of Vidyalankar is similar to a mall, that is entertainment, and learning in that comfortable environment is a piece of cake. In our game, a map will be shared by both the players since they have to use weapon and have a combat in the same map. The game will be designed using The Unity Game Engine - Unity 5 [9], Blender [10].

III. IMPLEMENTATION ARCHITECTURE

The game follows object-oriented style, Client-server style and shared style.

In object oriented, objects that encapsulate functions and data form components, which are instantiated before methods are called. Applications involve complex, dynamic structure use this style.

Our game has object oriented architecture. All the assets, characters and components have their own methods; some methods are common for few objects such as update method. Also, the objects which have interaction involved in their role, have interaction modules included in their data.

In Client-server style client makes request to server via Remote Procedure calls (RPC). Our game will use this style since it is a multiplayer online game. The game logic, state and environment simulation will be done from server side. Shared style is also called as rule based/expert system style. The shared memory is a knowledge base [11].

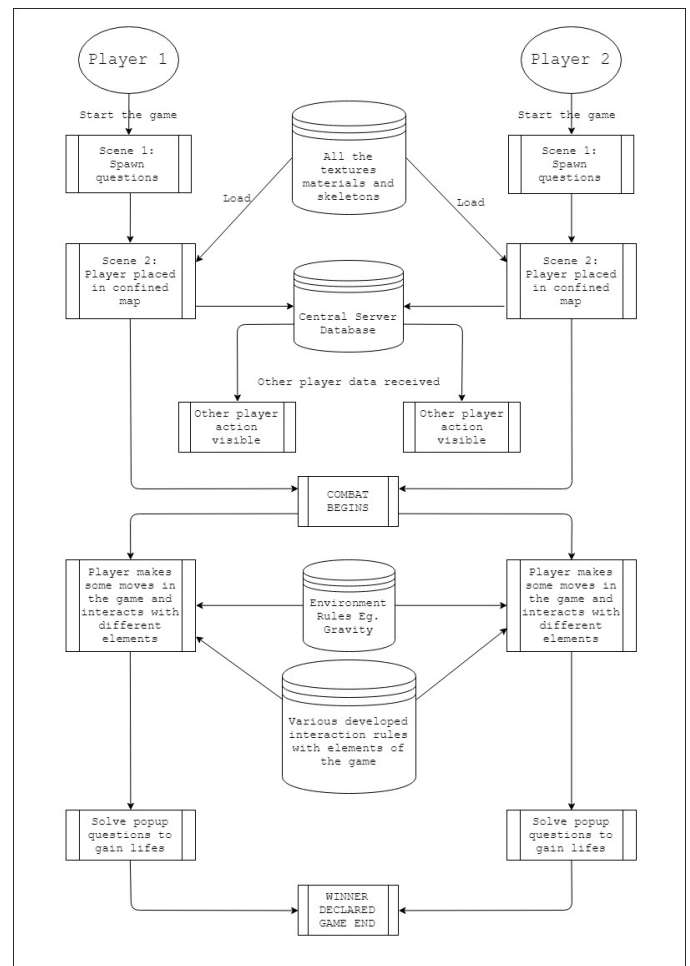


Fig 1. Architecture Diagram

IV. WORKING OF PROPOSED SYSTEM

Alive Till Death is a two player desktop game to be played on desktop. It is a combination of puzzles, questions, that is based on IQ, and gaming skills, such as reflexes and weapon usage.

We are implementing this game by using 3D map of our college, Vidyalankar Institute of Technology [8]. The region of the campus that can be accessed by a player is increased as the level of the game increases. The amazing campus of Vidyalankar is similar to a mall, that is entertainment, and learning in that comfortable environment is a piece of cake. As the level increases, players will be allowed to wander in the campus. For instance, at level 1, only first floors of A, B , C, D, E, F and G blocks of the campus. At the second level, second floors will be accessible too. At the third level, ground and X block will be made available. And so on.

The game will start with questions. A set of spawn questions will be displayed to each player, and whoever solves more questions in the given time will get a head start early and the other player has to wait for 2*his wrong answered questions seconds. For example, player A solves 4 questions correctly and player B solves 2 questions correctly out of 5 displayed questions in the given time, the waiting time to get spawned for them is 2 sec and 6 sec respectively.

After entering into the map, the player has a chance of gaining extra life using the extra random questions given to the player. The player can find this function under the "F" button. The extra lives give an advantage of getting re-spawned in the map even after getting killed by the opponent. The players have to find each other in the map in order to have a combat and win the game. The player will be provided with a weapon and features like thrust, views etc.

	STATIC ENVIR.	PLAYER 1	PLAYER 2	GUNS	BULLETS
STATIC ENVIRONMENT	-	1	2	3	4
PLAYER 1	1	-	6	7	8
PLAYER 2	2	6	-	10	11
GUNS	3	7	10	-	12
BULLETS	4	8	11	12	-

Fig. 2 Object Interaction Diagram

1. Player 1 belongs to environment, with motion and physical abilities.
2. Player 2 belongs to environment, with motion and physical abilities.
3. Guns is an object in static environment.
4. Bullets is an object in static environment.
5. Quest box holds the weapon and can be spawned anywhere in static environment with no physical abilities.
6. Combat will occur at the end between Player 1 and Player 2.
7. Player can use weapon through their inventory.
8. Count of bullets are known to player.
9. Player have to solve a question to open up the quest box.
10. Player can use weapon through their inventory.
11. Count of bullets are known to player.
12. Bullet belongs to magazine of gun.

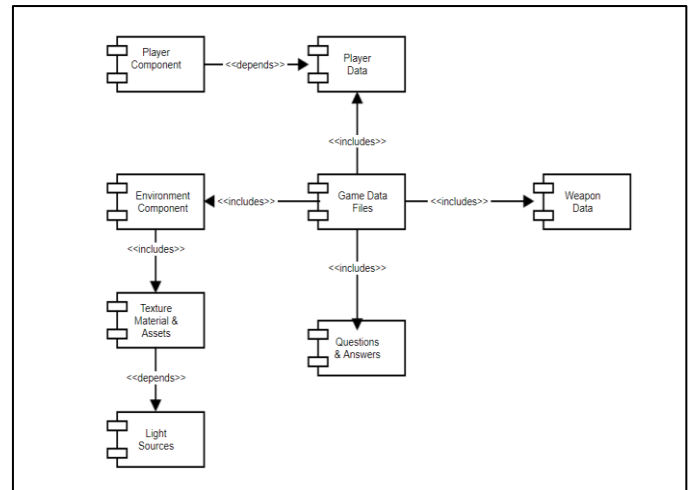


Fig 3. Component Diagram

V. BASIC UNITY CONCEPTS

This section explains the most important concepts and features in Unity. Since the implemented game is a 3D game, this section focuses on Unity features for 3D game development. The Unity Editor is a desktop application used to create games based on Unity engine [12]. The Editor user interface is composed of a scene view in the centre of the screen, a file explorer on the bottom of the screen, a hierarchy view on the left of the screen, a game object or an asset inspector on the right of the screen and a menu bar on the top of the screen (Figure 4).

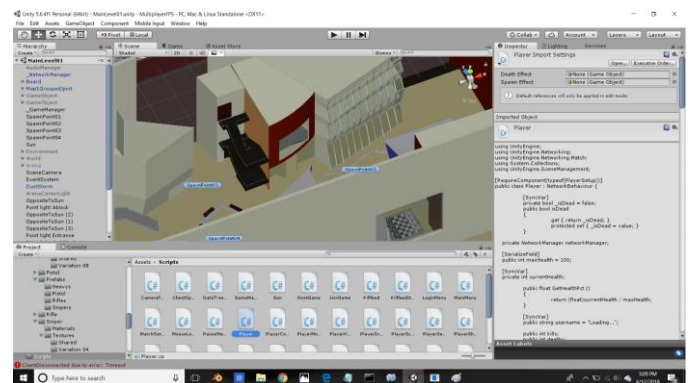


Fig 4. Unity

A. Projects

All work in Unity is stored within Unity Projects. When a new project is created, a folder with the same name is also created in the directory specified by the user. The newly created project will contain the Assets folder which contains all gamespecific data such as 3D models, sounds, scripts, etc.

B. Scenes and Game Objects

A scene is a 2D or 3D space that contains game objects [13]. Scenes can be menus, game levels or anything that is being shown to the player [13]. Creating a new project automatically creates the initial scene. New scenes can be

created through the menu bar. Scenes have a .unity file extension [13]. Game objects are objects that exist within a scene. When a new scene is created, it will already contain two game objects: a camera and a light source. Having at least one camera in a scene is necessary for the scene to be shown to the player. Users can add additional objects to the scene through the hierarchy view, the main menu or by dragging-and dropping objects from the file explorer on to the scene view. Another game object can be attached to a parent game object.

C. Components

By themselves, game objects don't do anything and they need to have components attached to them to have a function. This means that Unity by design enforces using the component pattern. The component pattern is a decoupling pattern that is used when a class interacts with many domains and it is necessary to keep domain-specific functionalities decoupled from each other or when different objects share same functionalities, but one doesn't strictly inherit another [14]. Unity provides an easy way to facilitate inter-component communication either through the Editor or programmatically.

D. The Scripting API

Although Unity ships with many built-in components, most games require additional game-specific behaviors. These behaviors can be implemented programmatically in special components called Scripts by using Unity's Scripting API. Scripts can be written in either C#, JavaScript or Boo. E. Unity Asset Store The UAS (Unity Asset Store) is a web marketplace that allows Unity users to buy and sell custom assets that can be used in Unity [15]. The UAS is available through the Editor. The Editor offers an easy way of importing assets obtained through the UAS. The newly downloaded assets are placed in their own folder within the Assets folder. Assets such as 3D models often come attached to game objects which can even have some simple scripts or other components attached to them. Other assets come in formats compatible with Unity.

VI. BLENDER

Blender is a professional, free and open-source 3D computer graphics software toolset used for creating animated films, visual effects, art, 3D printed models, interactive 3D applications and video games [10]. Blender's features include 3d modeling, UV unwrapping, raster graphics editing, rigging and skinning, fluid and smoke simulation, particle simulation, soft body simulation, animating, match moving, camera tracking, rendering, motion graphics, video editing etc [16]. It also features an integrated game engine [17]. For the proposed game, Blender software will be used for modeling game assets and then integrating them with unity i.e. creating the whole map.

VII. GAME SCENES MAKING AND SCRIPTS

1. ASSET DEVELOPMENT

We identified all the assets that we may require for the development of the game. Then we started creating the assets required. We followed the modular approach for creation of assets. So, we developed assets like blocks, box etc. In 3D computer graphics, 3D modelling (or modelling) is the process of developing a mathematical representation of any three dimensional surface of an object (either inanimate or living) via specialized software. The product is called a 3D model. We also created the 3D models for the protagonist i.e. player, telephone booths, maps etc. We then UV unwrapped the models; which is a method to convert a 3D model to 2D space; in order to prepare them for texturing. Next, we generated texture maps (Diffuse, Normal, Specular, Ambient Occlusion etc.) that are used in shader (materials) to specify how light will react to the different parts of the model. Following is the image showing the development of different models developed:



Fig 5. Player Model

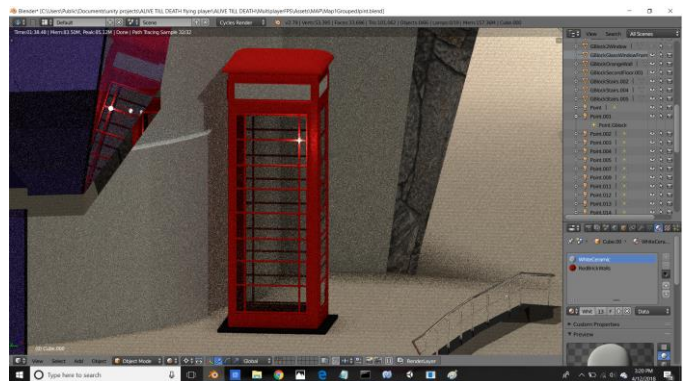


Fig 6. Telephone Booth

2. MAP DESIGNING

The map is one of the important factors in this game. The map is designed and made from scratch using the software Blender. We used different types of materials like metal, glass etc, textures for different components for designing the map. After the full development in Blender, map was imported into the

Unity software for connecting it into the game. Following is the image of map development in Blender:

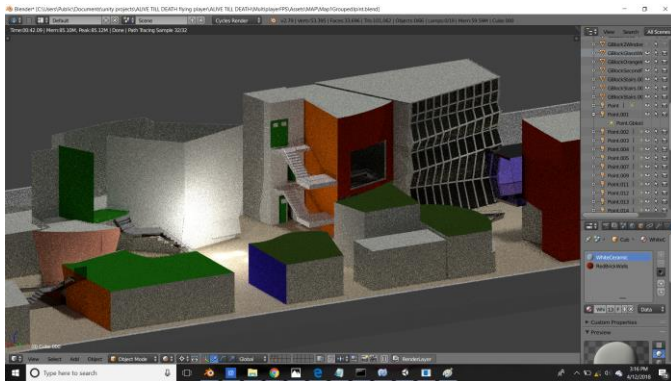


Fig 7. Map Development in Blender

3. GAMEPLAY

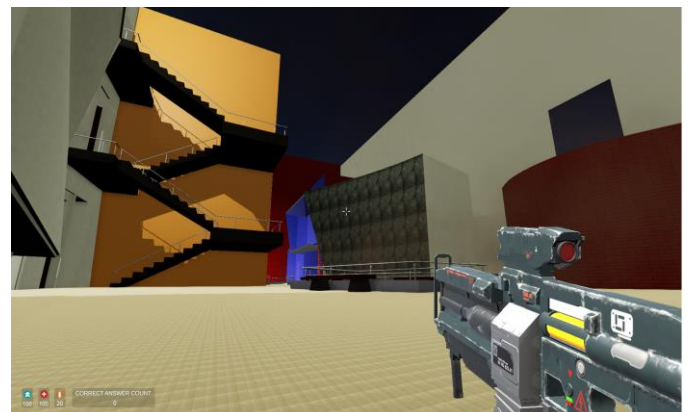
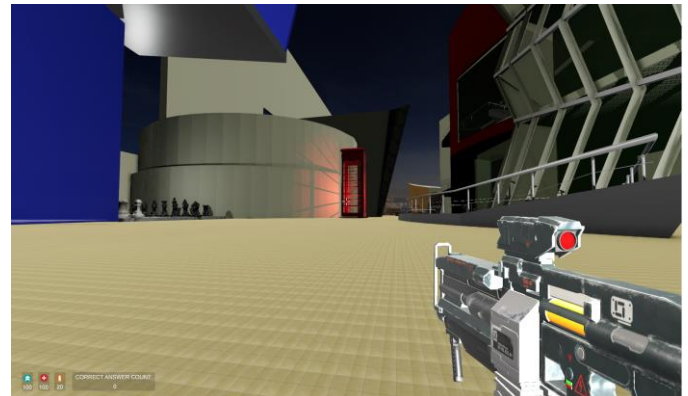
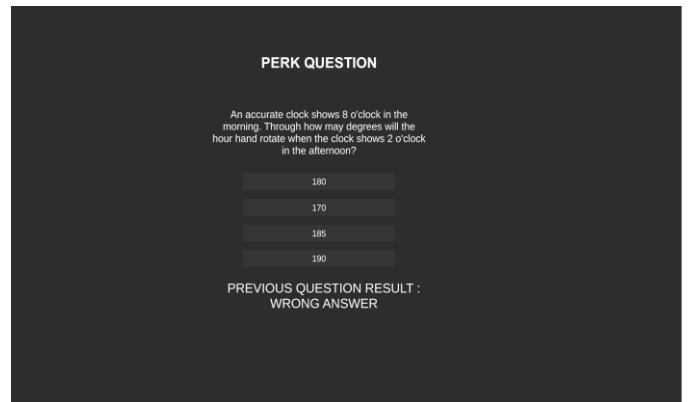
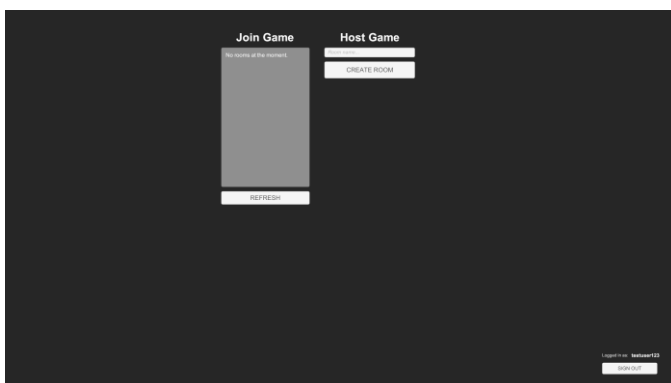
We focused mainly on the creation of gameplay that is interesting to play for all the players. We first created different scenes separately and integrated them at the last stage. The development of gameplay can be split up into the following scenes:

1. Scene 1: Main Menu
2. Scene 2: Login Menu
3. Scene 3: Lobby
4. Scene 4: Main Level

These scenes are developed in the Unity software using the C# scripts for player controls, weapon controls and for hosting the game. C# is widely-used to create games using the Unity game engine, which is the most popular game engine today. More than a third of top games are made with Unity, and there are approximately 770 million active users of games created using the Unity engine. Unity is also used for VR, with 90% of all Samsung Gear and 53% of all Oculus Rift VR games developed using Unity [19].

VIII. FINAL GAME

After integrating all the units i.e. scenes, after many testings, the final version of game was developed. The final game looks as follows:



IX. CONCLUSION

Although there are many games available in the market, each game specifies a single category. Our game focuses on merging two types into one and creating a product which is entertaining as well as an educational benefit. We created a question based, action based game that revolves around an interesting map of Vidyalankar Institute of Technology. We emphasized and worked upon better graphics and user experience for players. The project takes its concept from the previously existing games but many aspects have been added to improve the quality of the game. The game is a good choice for those who want to learn as well as for those who want to get entertainment, relaxation. The project will help one to increase the speed of solving any problem in real time as the winning and losing depends on the time taken to solve the problem. The game is equally fun for novice players as well as the masters; thereby increasing one's solving and thinking speed.

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