Year 4 Interactive Media Development Assignment 2

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In this report, I will be going through the research and development of my 3D Unity project. For this project, we were asked to develop a 3D pool game, much like billiards.

In this report, I will be going through the many different aspects and challenges I faced and how I overcame them. I will also be going through the various game features I have included within this project and how they compare to the real-world game.

**Features:**

Within the game, I have created I would like to believe I have replicated as realistically within the best of my abilities to the real-world game of billiards. I have included the two diverse types of balls, unlike the traditional spots and striped balls I have opted for red and blue balls as it was easier for me to keep track of and maintain through development, also they need only one material colour rather than a complete design. There is also a white and ball with their own functionalities.

My game works much like the real-world version where when the player begins they are set to the White ball and can rotate around the ball from the view of the cue, once they have their shot chosen they can then either choose to increase or decrease the force of their shot which will be indicated at the bottom left of the screen to whichever force they have chosen.

When they choose to place their shot the ball will shot forward and interact with the other ball on the table and react according the physics materials which have been made for the balls. When the shot is over the turn will end and the player will then chance to the second player. This will be indicated at the top left of the screen.

When a player has potted a ball, they will then be assigned to that ball colour. This will be indicated by their player name, i.e. Player1, changing colour to match the same colour of the ball they have potted, also the number of balls will decrease and this will show onscreen from the ball counter at the top right. When a player has alos potted a ball they will gain another shot much like the real game of billiards.

If he white ball is potted it will be reset to an appropriate position on the table so that the player can resume playing.

Once a player has potted all their balls and has then potted the black ball a message will appear onscreen informing them that they have won.

However, if the player pots the black ball without potting all of their own balls they will not win and will forfeit the match to the opposing player. A message will appear on screen informing of this loss.

As an added surprise, I have added in audio as well, when a player pots a ball they we receive a round of applause from the game congratulating them on a well-placed shot.

**Challenges and solutions:**

Listed below are various challenges I had faced during the development of this game as well as the matching solutions I came up with.

Challenge: Keeping the balls on the table

During the testing of this game I found a reoccurring issue was for the balls to bounce over the cushions some times and fall off into oblivion.

Solution: Creating a lid

A straight forward approach to a solution of this problem was for me to create a simple lid. This was a simple box collider with a rigid body that would make sure the ball would touch off this lid and maintain their position on the table. The collider had its mesh renderer removed so that it could be see through and allow the player to play on without being hindered. Also, the rigid body was made kinematic to maintain its position.

Challenge: Cue hitting table and balls

While it was needed that the cue hit the whiteball to interact with the key component of the game, the cue should never interact with the table itself or the other balls on it or it would disrupt the game.

Solution: Setting the collision matrix

By using the collision matrix, we were able to set the cue on a layer other than the balls or the table itself making sure it simple phased through them rather than connect where not needed.

Challenge: Ball physics

The physics of the ball was a big challenge the balls needed to act like billiard balls by bouncing of the tables cushions and one another otherwise the game would never function as intended.

Solution: Physics Material

Physics materials were materials we could attach to various game objects to make them act with the appropriate physics to replicate the needed outcomes for our game. Without them the balls would never bounce and act the way we need them too. So, by using them we resolved this issue.

Challenge: Pool Table

Getting the actual model for the pool table proved to be a difficult job since we had no genuine experience doing such a level of 3d modelling.

Solution: Research

Through research we could find models only of pool tables and import them into unity through the right format to achieve out needed pool table.

Challenge: Cue Rotation and Force

To allow the player to line up their shots we need to rotate the cue around the ball and implement force ot the ball the the appropriate direction

Solution Research and Development

Upon research, I found that there was little aid for the development of a pool game online, there were no tutorials of forum posts to help with this issue. So upon further thought I thought of mini gold games w=since the rotation and force implementation were very similar.

After some search, I found a tutorial online that helped solve this challenge with some of my own tweaks.

Challenge: Potting balls and Score Tracking

We needed to implement a system that allowed the balls to be potted and then scripts to keep track of the potted balls

Solution: Research and Development

Through research on unity references and trial and error I found the solution to this issue.

Box colliders were set just underneath the tables pockets that would have scripts attached to them. These scripts would keep track of the balls on the tables by finding the game objects with the assigned tags of red and blue and then tracking how many were on the table while the game was being played. Once a red r blue ball hit the collider another script would be active destroying the ball if it was a red, blue or black ball and resetting the white ball to a respawn position if it collided with the white ball.

Challenge: Winning the game

An end goal was need and I had to make sure that if a player did not pot the balls in the right order then they would lose and if they potted them in the right order then they would win and the winner would be shown in some way

Solution: Research and Development

Through trial and error and research the unity references, that by using the previous code of keeping track of how many balls were on the table for red, blue and black it was just a case of coding the correct sequence of possible outcomes within the game and assigning the winning text to text within a canvas of unity’s UI. The game would check to seei who potted what and set the winner to the winning message.

**References:**

Below are the reference for the different materials I used for this project.

Pool Table Model;

Title: Billiard Pool Table Free 3D model

Author: c9j555

URL: https://www.cgtrader.com/free-3d-models/sports/game/billiard-pool-table-4a97b4bb488c81810c3f044c2b44473a

Mini Golf Tutorial;

Title: Unity 5 - How to Make a Mini Golf Game (That Messes with Players)

Author: [Game Design HQX](https://www.youtube.com/channel/UCly65VLuV5IXet1DoszHgvA)

URL: https://www.youtube.com/watch?v=FJLxqF7yNuQ&t=4s

Unity References;

Title: **Unity User Manual (5.6)**

Author: Unity

URL: https://docs.unity3d.com/Manual/index.html