

Short Design Document for:

Play Ball in VR

Explore the virtual world

See what your virtual hands can do!

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1. Game Overview

1.1. Common Questions

1.1.1. What is the game?

In general 'playing with a ball' leads the imagination to something very typical, for instance playing basketball, football or volleyball. But what if the ball can do something out of the box, something uncommon but funny? This is what the ball will do in this game. An imaginary virtual world (a virtual room), where a single player will smash different characters by throwing the ball onto them. Which means, there are different characters (spider, mouse, dragon) and the player has to kill all of them in order to clean the room, hence win the game. There are few human characters which should not be targeted by the player to survive till the end of the game.

1.1.2. Why create this game?

Creation of something can always be considered as a learning curve. So we have developed our first VR game to get familiar with the virtual reality and to apply our imagination in practical field. Building up the first prototype helped us to take a note of our mistakes as well as limitations; which would be very essential for the upcoming work, so that we can enhance our skills and avoid the mistakes next time to have a better idea of the end goal.

1.1.3. Where does the game take place?

As it is a VR game, so the virtual room is the place where the game takes place. The user can play this game anywhere at home, but definitely has to be the ample opportunity to walk around and move hands freely. So wherever the game would be played, there should be some empty spaces. Since it is a computer game, it is not possible to play it everywhere.

1.1.1. What is the main focus?

The main focus of this game is to react quickly and kill the characters, be aware to not hit the human characters as well as few blue colored boxes. This will lead to "zero" score. Have fun by killing the spooky creatures in the room and make the room clear. Play with your virtual hands, walk around and earn scores while smashing the characters.

2. Story

2.1. Complete story

In our daily life we face different kinds of problems and we try to overcome it as soon as possible. There is a person (player of the game) who is facing problems with some unwanted creepy creatures. In our virtual world, there is a big room, where a person can sit on sofa, relax a little by watching TV. The room also functions as a dining room as well as a study room. But the problem always arises when the unwanted insects/creatures enter the room. Naturally the person becomes uncomfortable as these beings occupy the space which is super creepy. That is why the person in the room feels the instant urge to kill all the frightening characters. To kill them, the person in the room has only one option, the magic ball! So he simply grabs the ball and throws it at the targeted character. Once the ball hits the character, they get killed/ vanished. But it is not easy to kill them, because there are other two people in the room, whom are not supposed to be killed or hit by the ball. So, the player always has to pay the penalty if he hits them with the ball. Besides, there are some boxes which also act as an obstacle. So, the player faces some difficulty to kill those flying petrifying creatures. But till the end, he has to survive and kill all of the targeted creatures in order to attain peace and satisfaction.

2.2. Background story

Killing the unwanted characters is the necessity of the player, but earning scores while killing the objects makes it more interesting to the player. Yes, killing each individual character gives “one point”. Killing all of the characters leads to winning the game, confirming by a winning text notification. Playing this game in a normal 2D or 3D vision is still fun, But it brings more joy when someone can really see them in virtual world. Playing with ball in normal life gives us different winning options, but playing with the ball in virtual reality with virtual hands adds whole another level of immersive experience, whereas smashing creatures by hitting them with the ball gives a taste of satisfaction while earning scores.

3. Feature Set

3.1. General Features

3.1.1. VR game: A virtual world's room as the gaming environment, interacting with the real time hand's movement with unique plot, spine-chilling creatures and an amazing quest.

3.1.2. Single player game. At a time only one player can play the game on a computer using VR headset and controllers.

3.1.3. Exploring the virtual reality from home. The player moves and walks in the room to complete different tasks, for instance grabbing the ball, going closer to the targeted character and hit them with the ball. This provides a great opportunity to immerse oneself in the world of virtual reality.

3.1.4. Playing with different physics properties, such as gravity, kinematics, velocity, angular velocity, forces etc.

3.1.5. Hands on experience with grabbing, rolling and throwing the ball in VR.

3.1.6. Feasible to play: Action and adventure game playing with Oculus Rift HMD and touch controllers at home.

3.2. Gameplay

3.2.1. Survival character

3.2.2. Main player ball

3.2.3. Target characters

3.2.4. Obstacle characters

3.2.5. Game mode

3.2.6. Highest score

4. Gameplay

4.1. Gameplay description

4.1.1. Survival character: The player of the game who tries to kill the creatures and get rid of them throughout the game.



4.1.2. Main player ball: The ball which is considered as a magic ball is used to kill the characters. It is possible to throw it, roll it as well as bounce it.

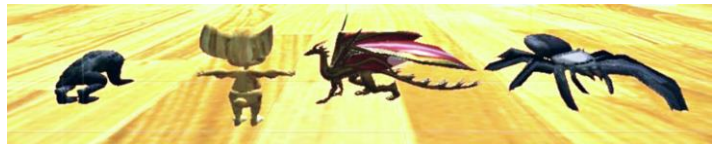


4.1.3. Target characters: There are mainly two different target characters.

a) Insects: Spiders

b) Animals: Mouse, Dragons, Beast

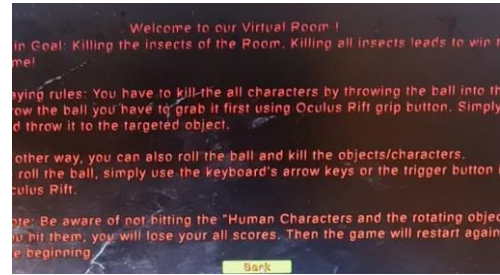
These creatures are supposed to be killed.



4.1.4. Obstacle characters: These are the human characters which makes the game difficult to play. Player should not hit them with the ball.



4.1.5. Game mode: There is only one game mode which is mono player mode. At the beginning a start-up menu will appear, which contains three buttons labeled 'Play', 'Instruction' and 'Exit'. As the name suggests, the 'Play' button leads to load the original game scene. The 'Instruction' button brings the instruction page, where the player can get the vital playing instructions. The 'Exit' button to quit the application.



After loading the main game scene, there are three more buttons. The 'Back' button is used to get back to the main menu, 'Pause' for pausing the game and 'Resume' for resuming the game. Besides, there is a simple score option which is displayed and named as 'Count', which counts the characters killed by the player. There is a limited number of characters, so when the player kills all of them, a notification text 'Congratulations! you have won the game' will appear.

The player can quit the game at any time by clicking 'Back' button or the 'Esc' button on keyboard.



4.2. Controls

Navigation control of the game is possible by both keyboard's arrow keys, 'Esc' key as well as the mouse. But the main control of the game is based upon the Oculus Rift Touch controller.

Move/roll the ball: Left Thumb stick

Ball bounces back: Left Y button

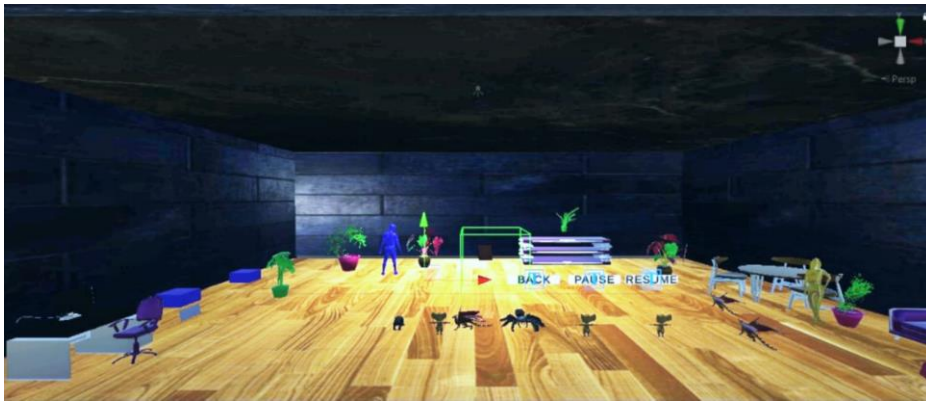
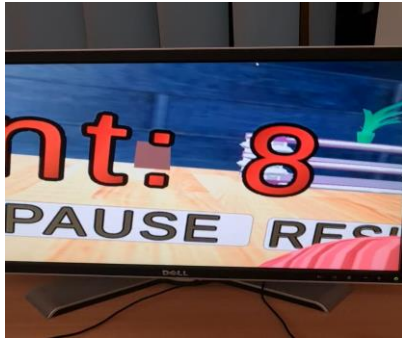
Rotate camera: By rotating the head

Grab and release the ball: (Left or Right) Grip Button



4.3. Interfaces

Since it is a computer game, so it should be played in a computer. It is recommended to use Oculus Rift only. The player should be able to play comfortably without engaging into many difficulties. Below are the brief visuals of how the real interface looks like in action:



4.4. Rules

4.4.1. The player should target the creepy moving insects/creatures and hit them by either throwing the ball at the floating creatures or smack them by grabbing the ball when they are too near to the player.

4.4.2. The player can also squish the crawling creatures on the floor by simply rolling the ball over them.

4.4.3. The ball should not collide with the human characters and three blue colored boxes otherwise the earned scores will become zero.

4.4.4. The player has to kill all the targeted characters in order to win the game.

4.5. Winning conditions

The player will win the game after successfully killing or clearing all the targeted creatures.

5. Game world

5.1. Overview

The 'play ball in VR' is considerably a beginner level game for the VR platform by featuring a single player mode only. With the features like grabbing and throwing the ball and virtual hands, it is really fun, walk towards the characters and kill them by throwing the ball at them. It is tremendously an atmospheric game with great pacing, a growing sense of dread and just enough resource scarcity to keep things tense till the end. Besides it is also absolutely packed with different scary characters and earning score by killing them is undoubtedly fun to do.

6. Game Characters

6.1. Overview

There are couple of different characters in the game as described earlier. The main characteristic of the game is the player ball and the moving/floating creatures. Apart from this, there are two human characters and three boxes which are the so called obstacle characters.

6.2. Enemies, Monsters and other Types

It is neither Enemies nor Monsters but they are some spooky animal characters(mouse, dragon, beast) and the spiders. These are the targeted characters and supposed to be killed by the player.

7. Media list

7.1. Interface assets

Unity asset store
Game view control bar
Creating gameplay
Oculus integration packages
Animation assests
Furniture assests

7.2. Environments

Indoor (Living room, VR studio, VR lab, etc.)

7.3. Characters

Animal characters, insect character, human characters, furniture, plants.

7.4. Animation

Maximum animations are taken from Unity asset store and few of them are taken from Mixamo.com.

7.5. Music and sound

Royalty free music and sound are used for the starting menu and also for the main game scene.

8. Technical specs

8.1. Technology analysis (risks/alternatives)

Since the game is based on Virtual Reality, the technology plays an important role here. A good VR hardware set up is necessary to play the game. A small error in hardware (sensors, USB connection) leads to unwanted/difficult situation. A weak cable connection between the HMD and PC can cause motion sickness while rotating the ball. Although in general there is no reason of motion sickness, but it happened sometimes due to the failure/ loss connection of the hardware.

8.2. Platform & tools

Unity 3D, Visual Studio, XR interaction Toolkit, Oculus SDK, C#, Computer.

8.3. Delivery

A game application ready to play for the users is possible to deliver.

8.4. Game engine

Unity 3D.

9. References

- 9.1. <https://assetstore.unity.com/packages/3d/characters/humanoids>
- 9.2. <https://www.mixamo.com/#/?page=1&query=crawl>
- 9.3. <https://learn.unity.com/tutorial/getting-started-with-vr>
- 9.4. <https://developer.oculus.com/documentation/unity/unity-tutorial/>
- 9.5. https://www.youtube.com/watch?v=sxvKGVDmYfY&t=169s&ab_channel=Valem