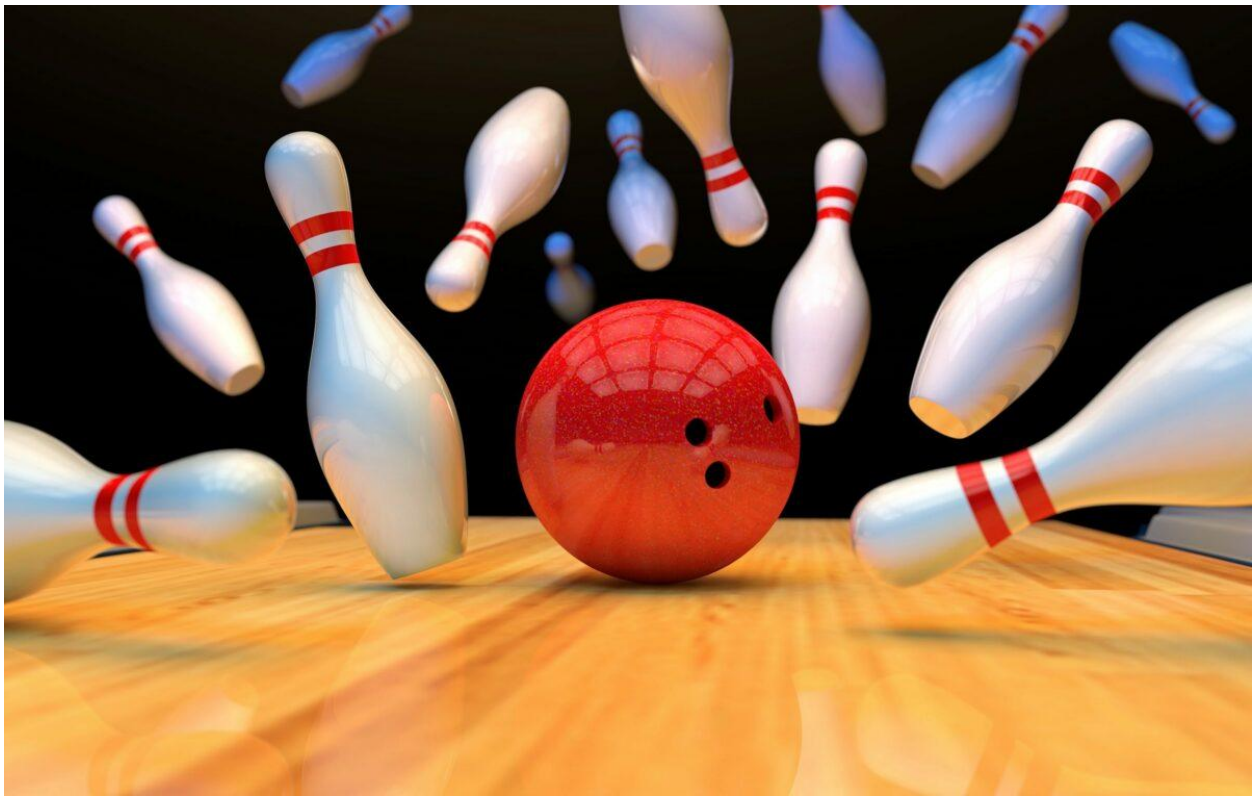
Software Engineering

Unit 3 Project

Bowling Alley (Virtual Reality)

Team -9

Date of Submission: 23-04-2022



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Team Information

Name (Roll Number)	Contribution (not limited to the mentioned)	Number of Hours
Aniket Chandekar (2021204001)	● Created UI of the game ● Added VR components to the game and made VR deployment. ● Added all the required assets to the game ● VR sketch	20-25hrs
Pulkit Gupta (2021201037)	● Created a file to store all the score details. ● Wrote a script to retrieve and store the high score details and display on the screen. ● VR sketch	20-25hrs
G Sai Teja (2021201040)	● Made the user to throw the ball for 10 frames(two chances in each frame) ● Wrote the script to calculate the score and to display the score onto the scoreboard. ● VR Testing ● VR Sketch	20-25hrs
Nalluru VSS Maneesh Gupta (2021201041)	● Created home scene and the exit scene and integrated with the game. ● Drew the sequence diagrams ● VR Sketch ● Documentation	20-25hrs
Stuti Saxena (2020201091)	● Wrote scripts for integrating the scenes. ● Added audio effects to the VR ● Flow Chart Diagram ● VR Sketch	20-25hrs

GitHub Repository Link

https://github.com/StutiSaxena01/Software-Engg-Unit3-Team9

Overview

Virtual reality based bowling simulation application built using Unity and the backend logic code using C#. It is a single user first person game. The game has 4 scenes. The first scene is the start menu showing the start game, about, top score, exit. The second scene is the actual game area where the pins are set and a ball is provided. The third scene shows the score board of the current game which has 10 frames of score displayed. The fourth scene is the top scores of the previous 10 games sorted in descending order.

In the start section, we are given one ball and 10 pins. The player is allowed to throw the ball and tries to hit all the pins that are standing.

In each frame the player has two chances to hit all the 10 pins. If the player hits all the 10 pins in 2 chances then it is a spare and he gets 10 points.If in the first chance itself the player hits all the 10 pins then it is a strike🎉🎉 and the player gets additional 10 points other than the actual 10 points. So a total of 20 points is given to the player. In this way each player is given 10 frames to play.

The rule for the 10th frame is different. If it is a strike/spare in the first 2 chances of the 10th frame then another extra chance will be given to the player to score more points otherwise the game ends.

Overall a player can get a maximum score of **220 points.**

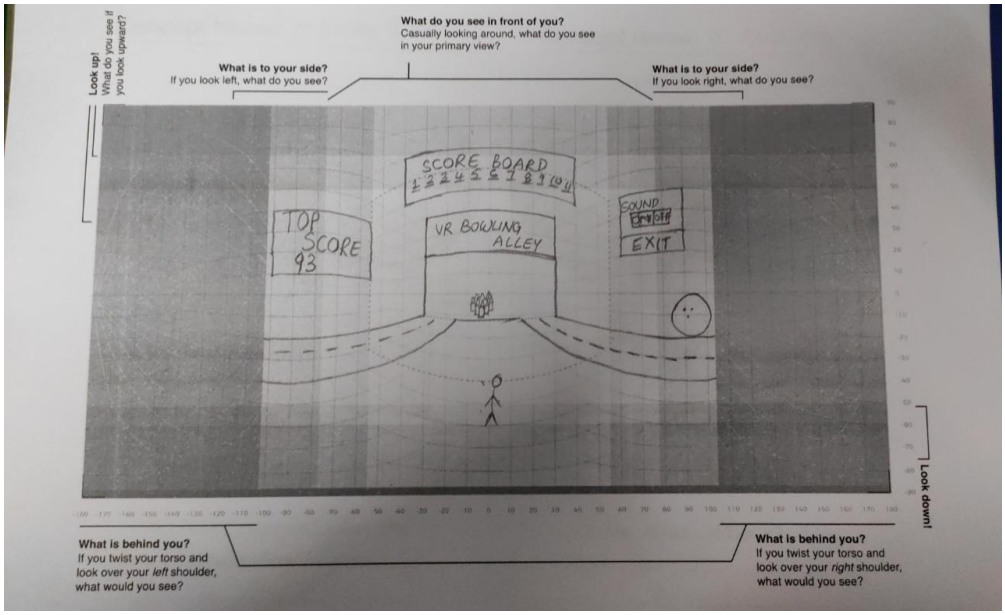
In the top score section the top scores of the previous 10 games are shown to the player sorted in descending order.

The about section displays the description of the game and the details of the team members.

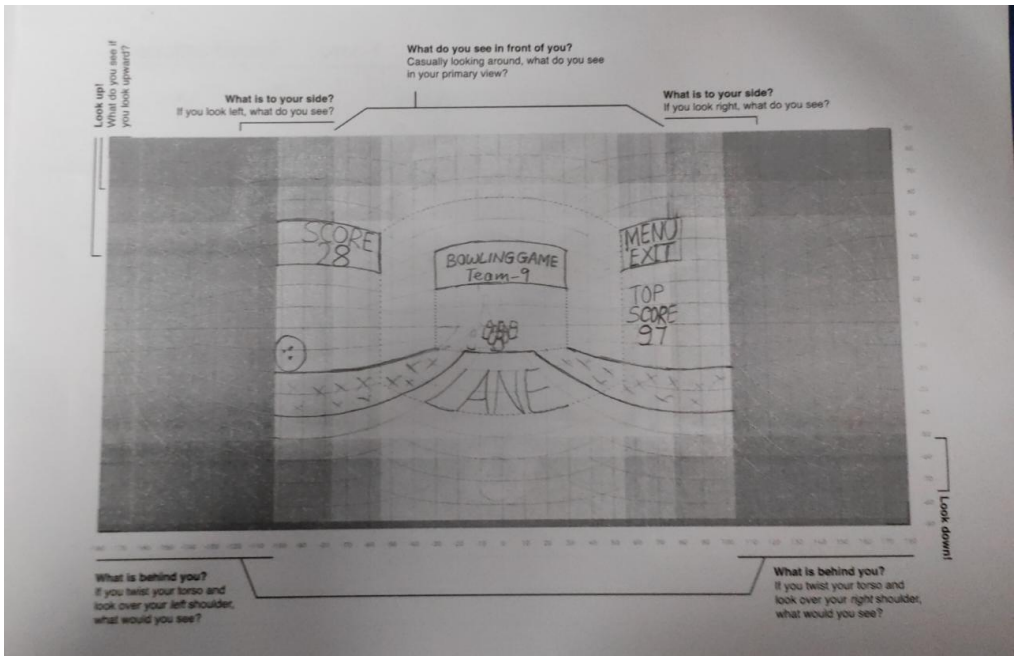
The exit section quits from the game.

VR Mockup Screens

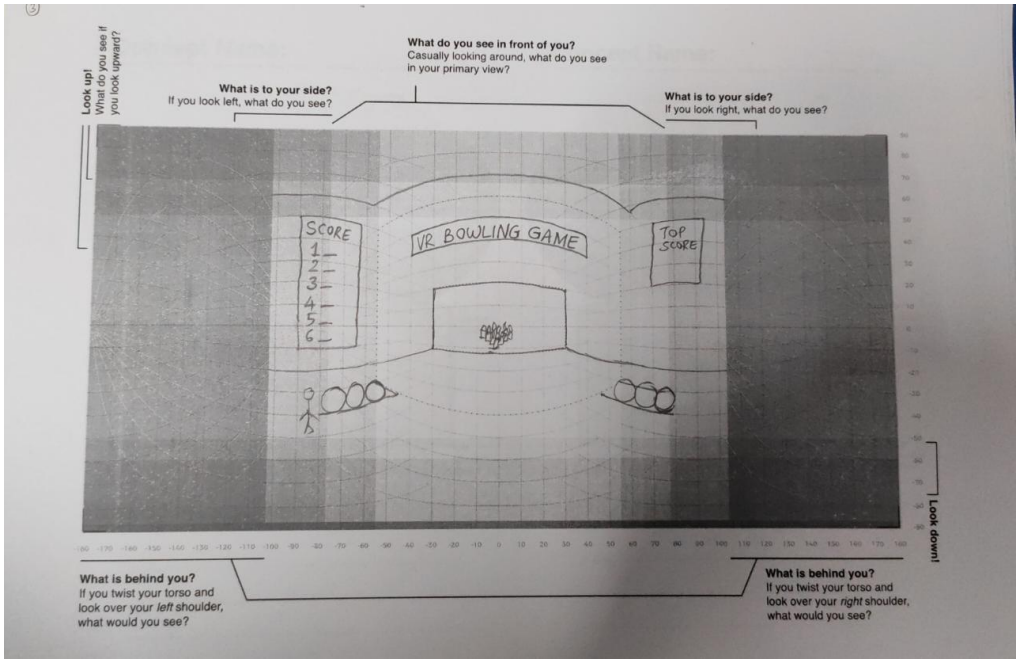
1. VR Mockup Screen 1



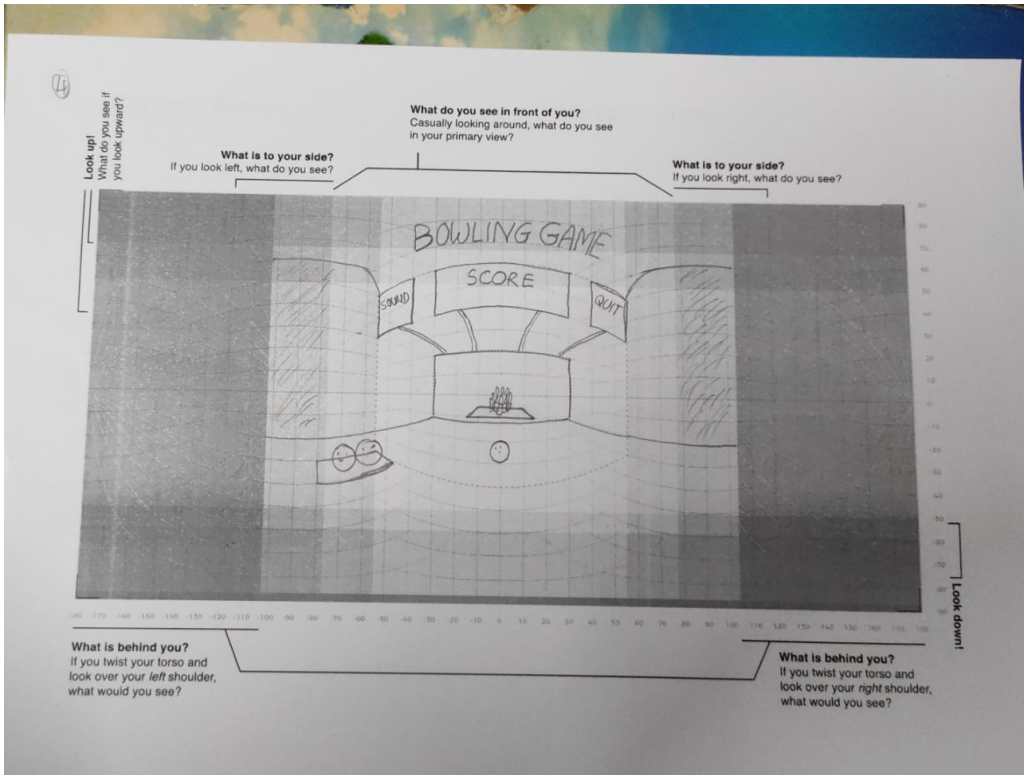
2. VR Mockup Screen 2



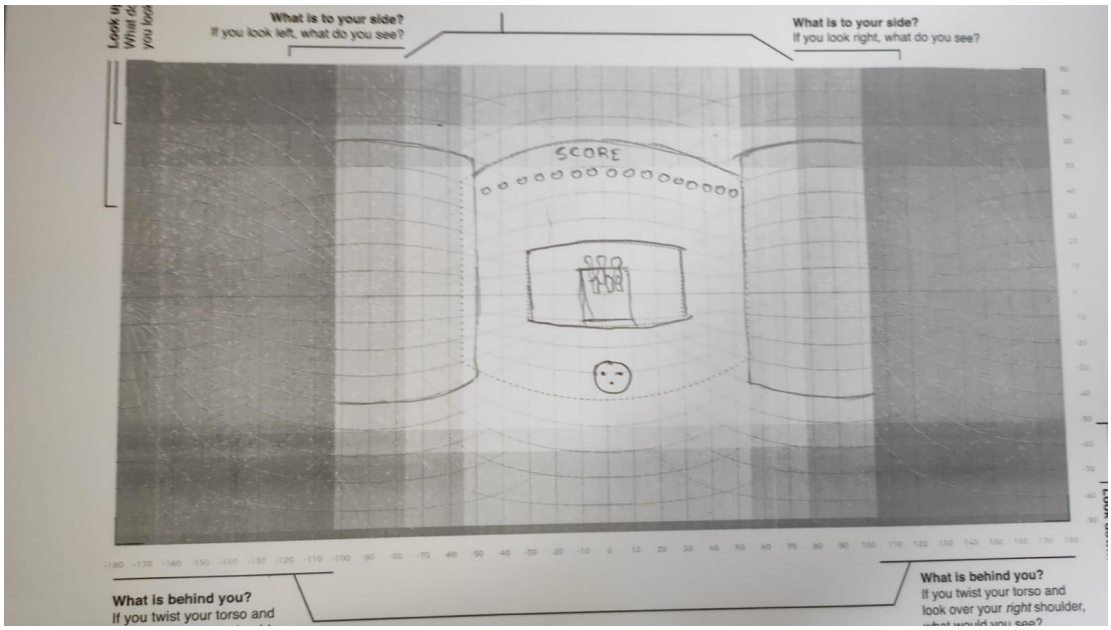
3. VR Mockup Screen 3



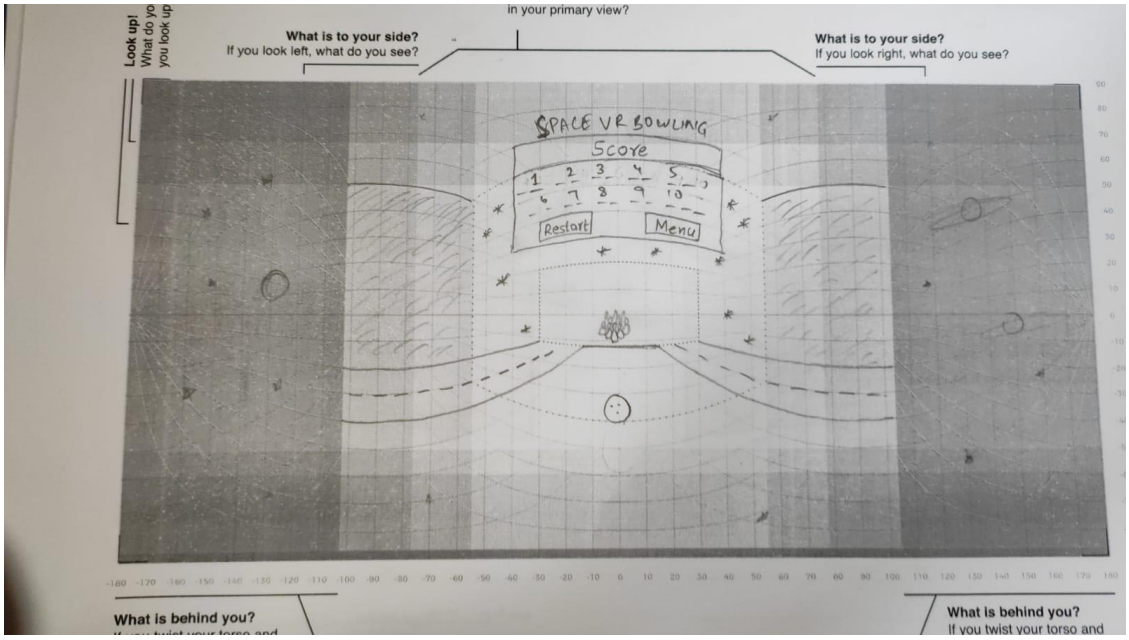
4. VR Mockup Screen 4



5. VR Mockup Screen 5

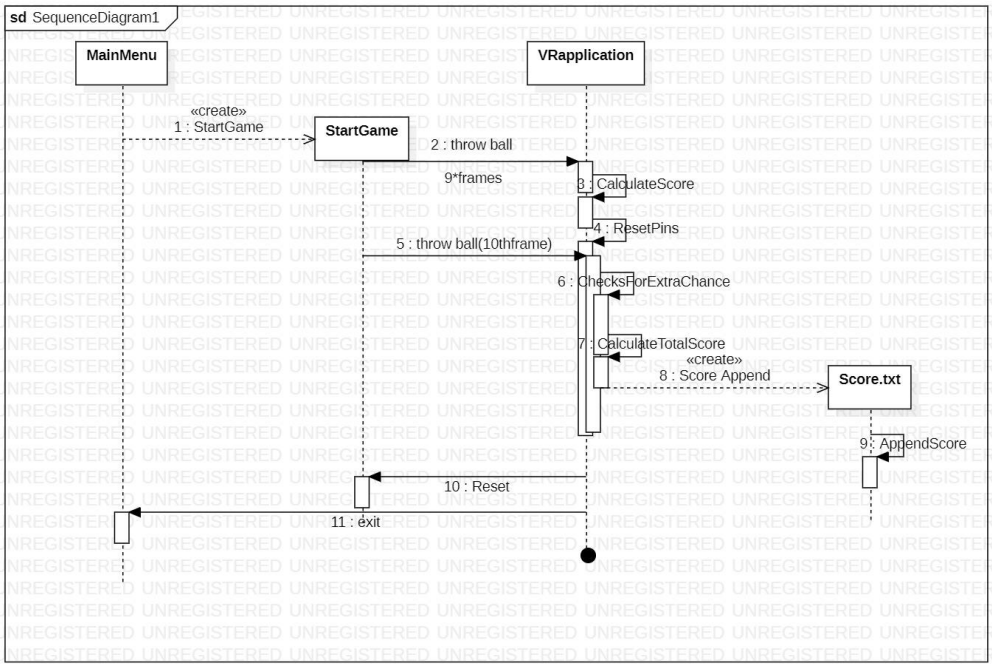


6. Final VR Scene

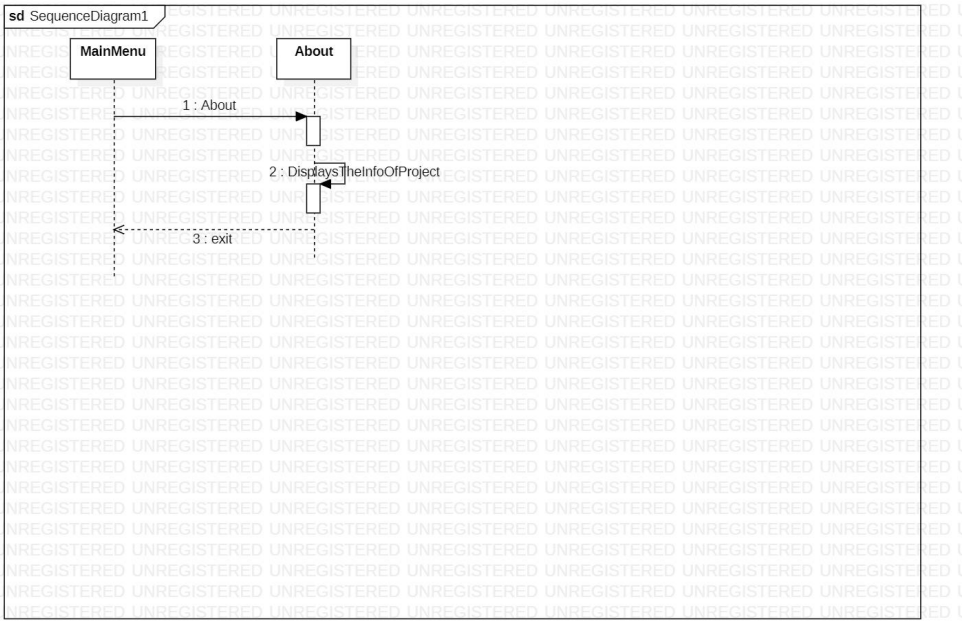


Sequence Diagrams

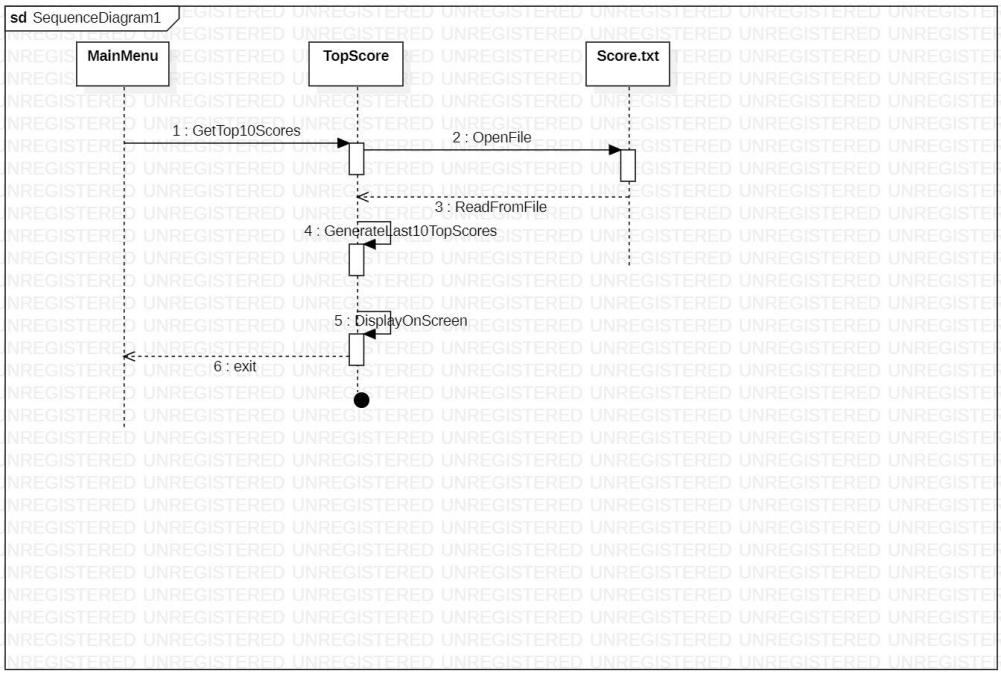
1. Start Game



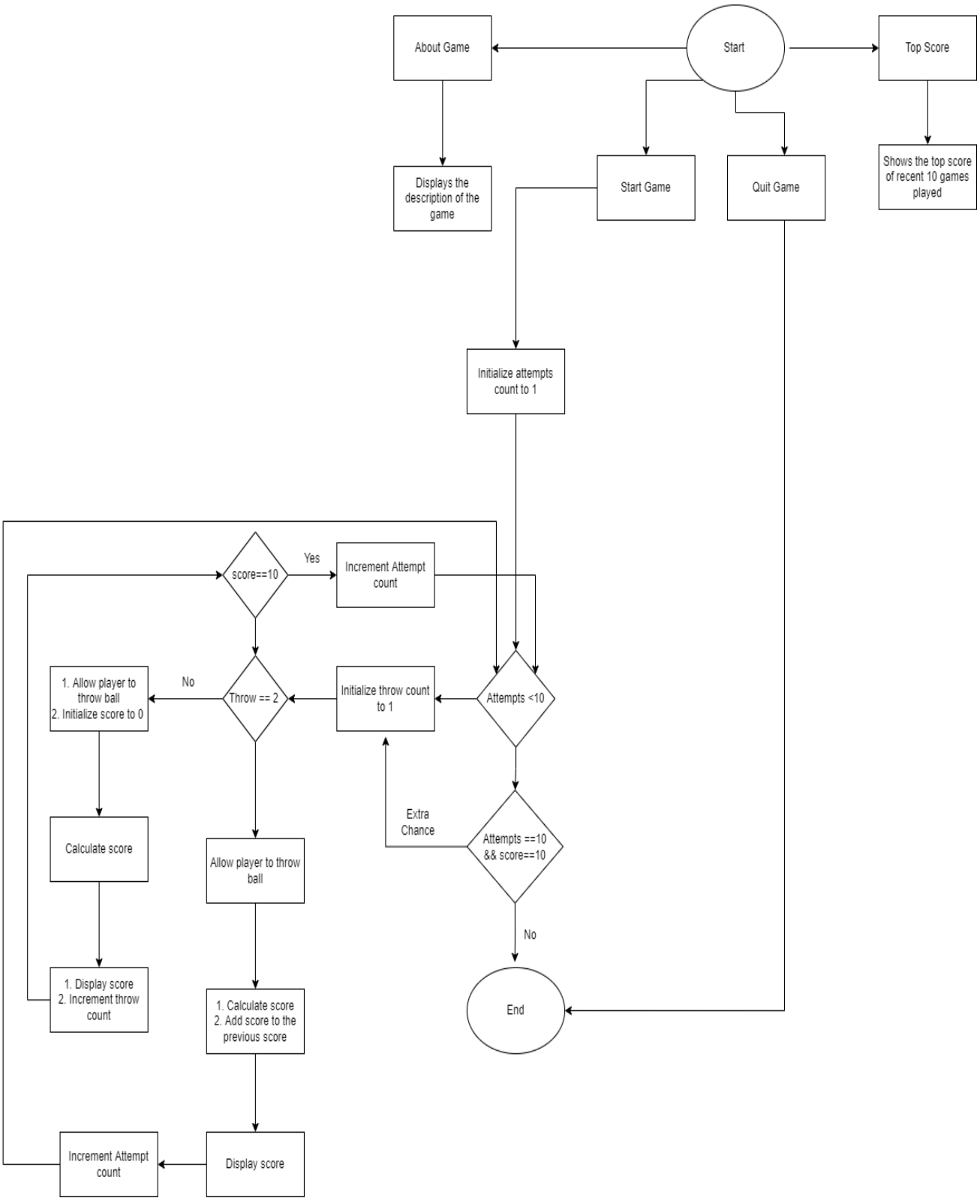
2. About



3. Top Score Retrieval



Flow Chart


About Game
Start
Top Score
Displays the description of the game
Start Game
Quit Game
Shows the top score of recent 10 games played
Initialize attempts count to 1
score==10
Yes
Increment Attempt count
1. Allow player to throw ball
2. Initialize score to 0
No
Throw == 2
Initialize throw count to 1
Attempts <10
Extra Chance
Attempts ==10 && score==10
No
Calculate score
Allow player to throw ball
1. Display score
2. Increment throw count
1. Calculate score
2. Add score to the previous score
End
Increment Attempt count
Display score

Functionalities

Requirement 1. Create a simple single user – first person bowling alley game. You may make use of the assets like Pins, Bowl etc. from the UNITY asset store.

Implementation

We created a simple scene for our bowling alley using Cube(Unity 3D object) and made this cube a floor but transforming its position and scale. Then we created a simple bowling alley lane by using the same approach. Later we created the bowling pins using assets present in Unity and scaled it to some factor.Similarly we created 10 pins and named that game object pins then we added some VR enabled functionality. Now, we created a sphere (Unity 3D object) and transformed it to a scale and changed some features. Then we were able to pick the ball and throw it towards the pins and when the ball hits the pins the pins drop. Setting up cameras was also one of the parts that we have done.

Requirement 2. The participant user should have 10 attempts to reach the end of the game

Implementation

We created a scoreboard that contained 10 frames and each frame consisted of 2 chances then we created each element for those 21 numbers and joined these game elements with a C# script which calculated the score and send it to the UI.

Requirement 3. There should be able to maintain a scoreboard for the single user*.*

Implementation

We have created an array (turn) of size 21 which stores the scores for each chance.Each element of this array will be shown in the scoreboard.

Requirement 4. Maintain Top score details for the last 10 games

Implementation

We created a text file to store the total score after each game using a C# script. Whenever in the main menu the player presses the top score button the scores of the previous 10 games(arranged in descending order) are sent to the UI and the UI shows the previous 10 high scores.

Requirement 5. Create a Home Menu to enter and exit game

Implementation

We created a scene named Main Menu which contains 4 buttons viz., start game, about, top score and exit. After clicking each of these buttons a new scene is rendered and the functionalities are done accordingly.

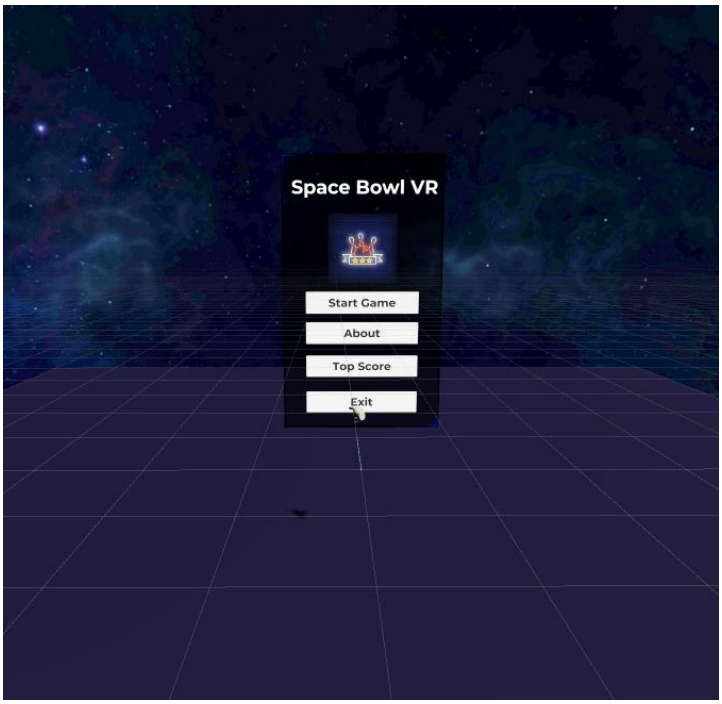
Requirement 6. Include at least one audio effect in the entire VR Scene

Implementation

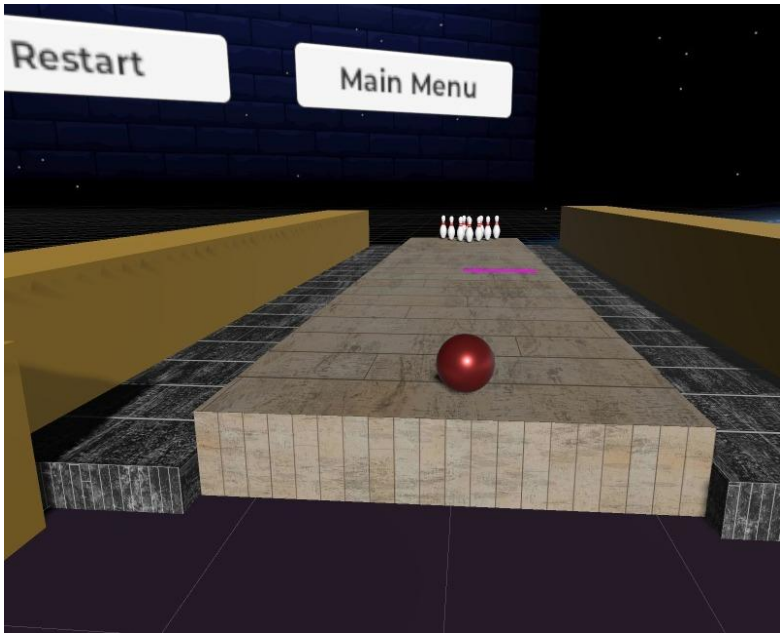
Whenever a desired event is happening we are calling a C# script to play the audio.

VR Simulation

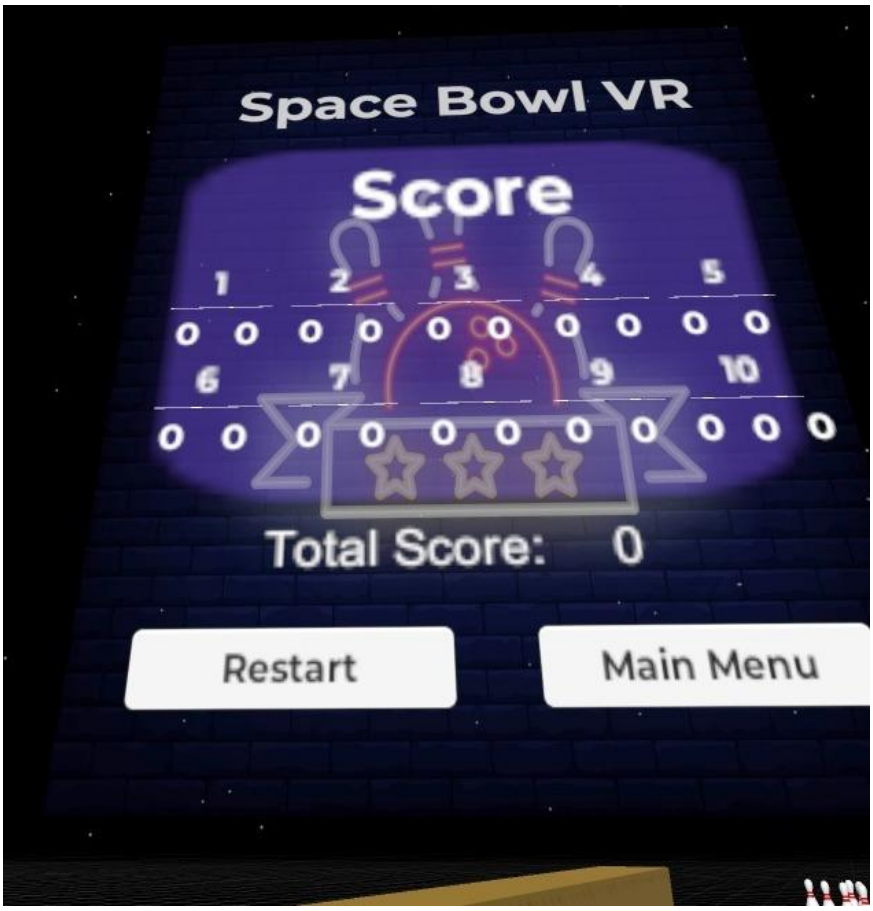
Main Menu



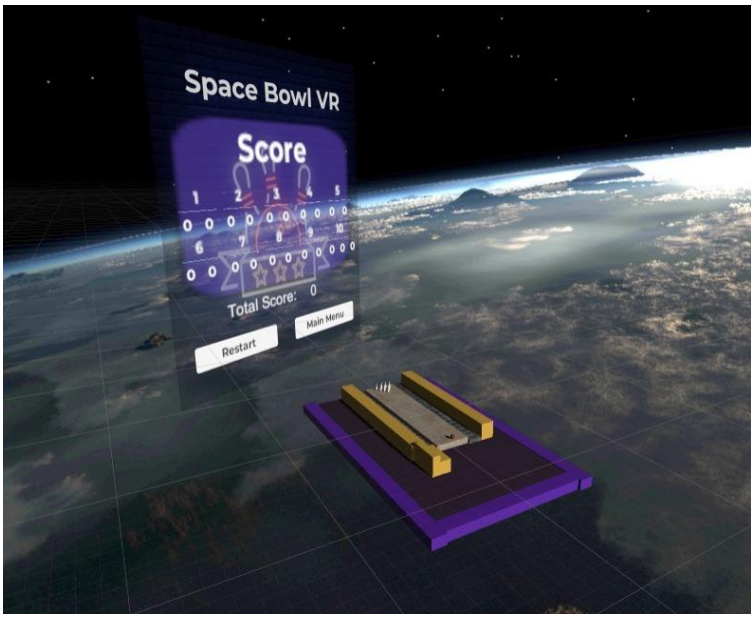
Game Area



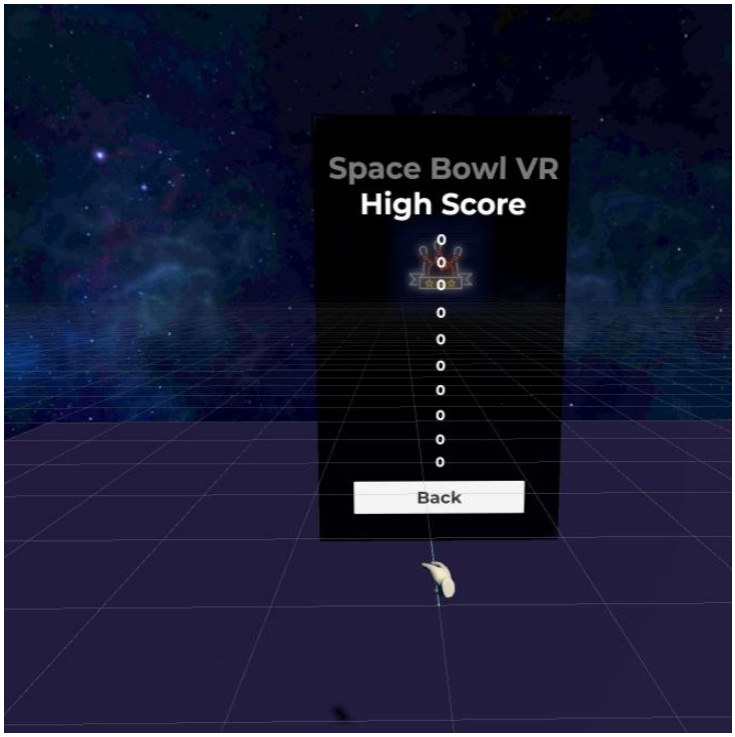
Score Board



Complete Scene



High Score Scene



Characteristics

Static Characteristics

Element	Description
Lane	The platform on which the ball moves and the pins are placed
Gutters	The gutter is a pit on each side of the lane that the bowling ball falls into.
Main Menu	The screen displayed after the game loads. It contains 4 options viz., start game, about, top score and exit.

Bowling Stand	The stand containing the ball. It is placed sideways to the player playing the game.
Space Scene	The panoramic view of the entire game area.
Main menu theme sound	Interstellar theme sound - No time for caution is the background theme that starts playing when we enter the main menu.

Dynamic Characteristics

Element	Description
Score	For every ball throw the dropped pins are counted and the score is shown in the scoreboard.
Pins	If the angle made by the pin is greater than some threshold after the ball hits the pin, the pin falls down otherwise not.
Ball	The ball is a rigid body which hits the pins according to the trajectory made by the player.
Strike Sound	Whenever there is a strike a cheering sound plays.

References and resources used

1. Bowling Game Rules and detailed description
2. Learn UNITY Engine - https://www.youtube.com/watch?v=MX6b7bS8JxY
3. Unity SDK Documentation - Manual: Basic Integration (SDK)
4. Guide for VR Mock Screen - VR Paper Prototyping. After you sketch a VR concept, how do… | by Saara Kamppari-Miller | Prototypr