

GOAL AND OBJECTIVES

Our objective is to create an immersive and exciting experience that not only entertains users but also helps to alleviate anxieties like Acrophobia(fear of heights) and Coaster Phobia(fear of rollercoasters). The experience will provide users with the ability to adjust the speed and direction according to their liking, providing a personalized experience that caters to individual preferences.

MODELING



Fig 1. Birds eye view of the game.

In the modeling section of our paper, we focused on creating the terrain and roller coaster for our virtual reality roller coaster simulator. The process involved several steps such as scaling, sculpting, and texturing. We utilized Unity, a game engine, to design the terrain according to our preferences. The terrain packages available in Unity provided us with a wide range of tools and features that helped us create complex and detailed terrains. The above figure gives us the bird's eye view of the map along with the water body that we added using water materials from the asset store. We used images of the sky to create a skybox as seen in fig.4

Using the plane feature we created the base for our terrain, the tool also has a drag and drop feature to add trees and other foliage. This can be seen the below figure Next, we used Unity's design tools to construct pillars that would serve as the foundation of the track. These pillars allowed us to shape and manipulate the roller coaster track, gradually building and refining it until we had a fully functional and captivating roller coaster track.

Project Report
Roller Coaster Simulation
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Finally, we used Unity's UI kit to create the user interface and its various elements for our virtual reality roller coaster simulator. The user interface was designed to be intuitive and easy to use, providing users with the flexibility to adjust the speed and direction of the roller coaster to their liking. This can also be seen in the figure below. Overall, the modeling process was crucial in creating an immersive and engaging virtual reality roller coaster experience for our users.

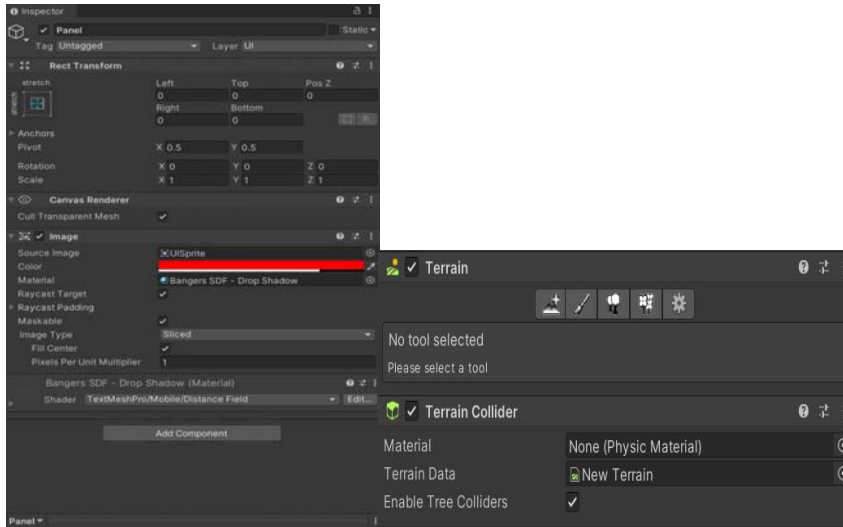


Fig 2. Screenshots of the Terrain Package along with UI Toolkit for Menu panel.

Sound

We incorporated sound effects such as the sounds of the roller coaster and ambient sounds. These sound effects were obtained from audio files collected from the asset store, which provided us with a wide range of high-quality sound effects to choose from. We used the Vorbis compression format to get the best results.

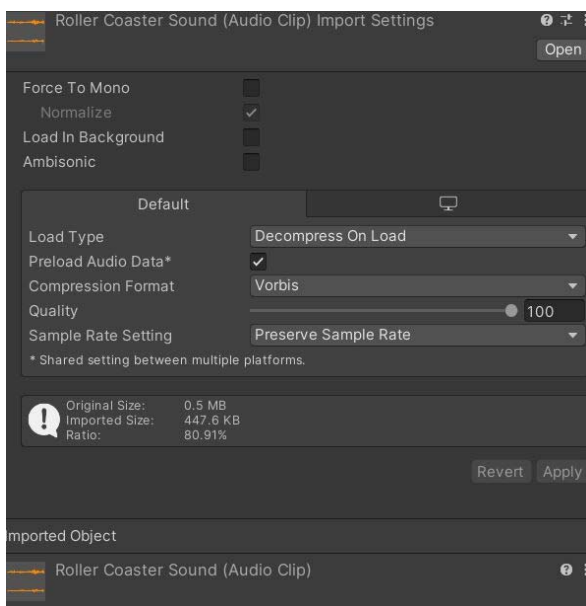


Fig 3. Rollercoaster sound and its settings.

Animation

In addition to sound effects, we also included several animations to enhance the user experience. These animations included birds, human avatars, and animals, all designed to add depth and realism to the environment. Below figures show us the objects that we animated. Some of them include a fox, a ferris wheel and a helicopter that we can observe right behind the wheel.

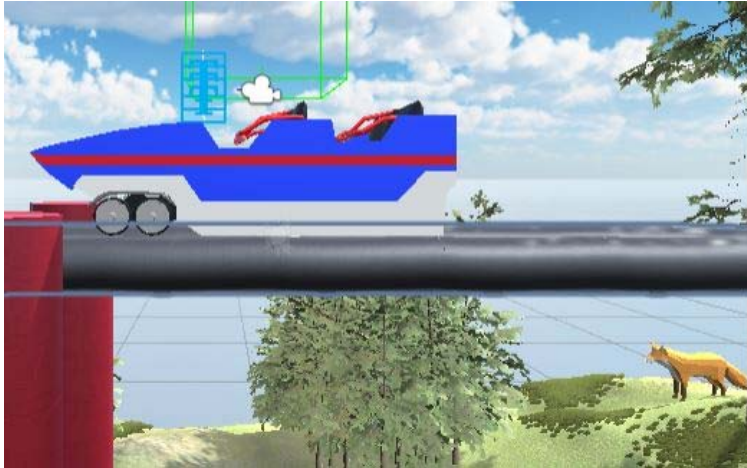


Fig 4. Blue Rollercoaster and a fox on the terrain.



Fig 5. Ferris wheel and a helicopter.

Avatars

Below we can observe that one of the avatars (of a child) is implemented from unity asset stores. The avatars have a predefined walking animation.



Fig 6. Avatar of a child

Interface and Interactivity

At the start of the simulation, users are presented with an interactive panel, which serves as the main menu. Users can choose to begin the simulation with default settings or adjust the options to their liking before starting. The options menu allows users to adjust the speed and direction settings. By default, the speed setting is normal, but users can choose to ride at a slower or faster pace. The direction option enables users to move in either a forward or backward direction. If users wish to adjust the settings again, they can use the return option, which sends them back to the main menu to start the game with their new settings.



Fig 6. Rollercoaster menu with a semi-transparent red panel.

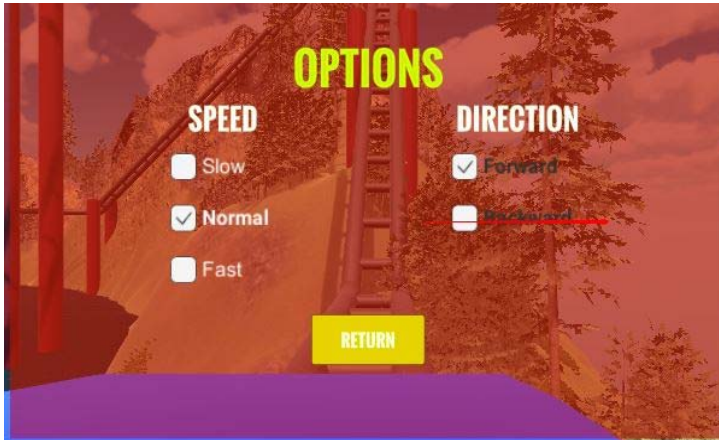


Fig 7. Options menu with speed, direction and a return button.

Methodology

In our methodology, we implemented a waypoint system to enable the roller coaster cart to move along the rails. Waypoints are predefined markers used to determine the navigation of the cart. We placed a total of 42 forward and backward waypoints on the terrain, which were imported as GameObjects in Unity to transform the position of the cart at different points.

To initiate the movement of the cart, we set an index variable to 0 at the start, which serves as the location of the cart on the rails. We increment the index along each waypoint, allowing the cart to move forward and track its location.

Additionally, we set a Boolean value to enable the forward and backward motion of the cart, as chosen by the user. The speed of the cart can also be adjusted by the user through the panel. Below we have the code that we wrote for coaster movement along with logic to switch the speed. Following this we can observe one of the 42 waypoints used on the track.

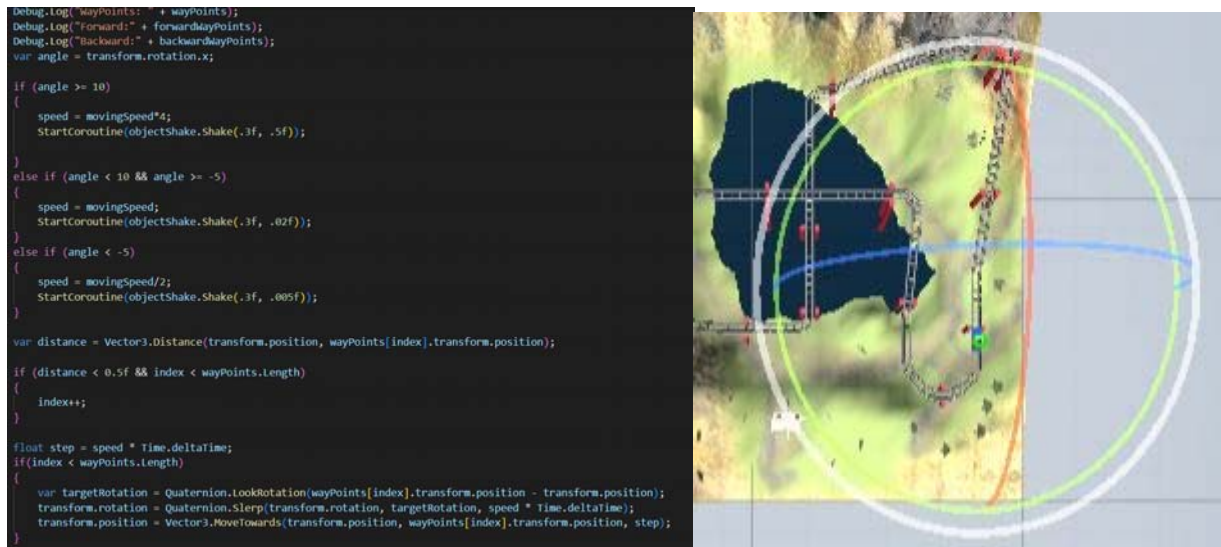


Fig 8. Code snippet of the coaster movement and waypoints.

Exploring the Usefulness of the Application and the Appropriateness of Virtual Reality Technology

The application of Roller Coaster VR is useful for individuals who suffer from acrophobia and are unable to physically experience a rollercoaster ride. With VR technology, they can safely and comfortably immerse themselves in a virtual roller coaster experience without any risk of injury. Additionally, if the virtual experience is still intimidating, users have the option to slow down the ride and adjust the intensity of the experience to their liking. With VR, users can explore the rollercoaster environment from the comfort of their own homes, without the need for expensive and time-consuming travel to an amusement park.

CONCLUSION

The goal of our project was to provide a user-friendly and accessible solution for individuals with anxieties to enjoy amusement park rides. We believe that virtual reality technology can play a significant role in ensuring that individuals, particularly children, do not miss out on the fun.

By incorporating interactive and animated elements that are commonly found in theme parks, we aimed to create an enriching and immersive experience for users. Furthermore, we believe that giving users control over the simulation would enhance their sense of safety and comfort, which is crucial in overcoming anxieties and enjoying the ride. Overall, our project aimed to make amusement park rides more accessible and enjoyable for individuals with anxieties through the use of virtual reality technology, interactive elements, and user control.



Fig 9. Screenshot of the gameplay..

FUTURE WORK

A potential future development for Rollercoaster VR is a user-generated content tool that allows players to design and share their own roller coaster tracks and levels. With this tool, players could select from a variety of track pieces and customize the speed, intensity, and special effects of their coaster. They could then save and share their designs with the community, providing a fun and creative outlet for players and extending the game's longevity.