Avoid The Red

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***Abstract*—Avoid The Red is an obstacle avoiding 3D game, fully based on JavaScript and Three.js(JavaScript library for 3D graphics). Players can interact with the game using keyboard. The main motive is to guide the green box for avoiding the red boxes using keyboard and avoid collision.**

I. Introduction

In this project we are building a 3D interactive game using JavaScript and Three.js. JavaScript is a high-level, interpreted programming language primarily used for web development.Three.js is a JavaScript library, that makes it easier to create and render 3D visuals in web browsers. It is constructed on web standards like HTML, CSS, and JavaScript,making it compatible with most modern web browsers across different platforms. While a 3D green box in on a 3D platform, red boxes will come simultaneously as obstacles. The players can control the green box's movement in order to avoid the obstacles. The score depends on the number of obstacles being avoided. The main motive for choosing this project it to utilize all the knowledge gathered from this course and to fulfil the main criteria which is to use Three.js.The user can also enjoy playing this easy and realistic game. This game also be developed very further in level complexity and graphics simulations to attract a huge amount of people. By using both JavaScript and it's widespread adoption and a robust library like Three.js,we can use the web platform to create visually impressive, interactive, and accessible 3D games that can be enjoyed across different devices and platforms.

II. Existing Work

Chrome Offline Dinosaur Game [1], It is a 2d game developed by members of the Google Chrome UX team in 2004.The player controls a rushing dinosaur in a straightforward side scrolling platform, which requires the dinosaur to hop over obstacles in order to avoid them and to get higher score.The game is built to be played when the browser detects that the user is offline and unable to access the internet. This game can be build using JavaScript and Three.js library as we are using in out project. 3D T-Rex Run [2],this game is a developed version of the traditional Chrome offline dinosaur game. While the original game is 2D, the 3D T-Rex Run introduces a three-dimensional environment, giving the game a more immersive visual experience. The player controls a running T-Rex character and must navigate through an endless desert landscape while avoiding obstacles such as cacti and birds. The player's objective is to survive for as long as possible by jumping or ducking to avoid colliding with the obstacles. The game still includes a scoring system to track the player's progress. The score typically represents the distance traveled by the T-Rex, and it increases as the player successfully avoids obstacles. Like the Chrome offline Dinosaur Game it can also be build on JavaScript and Three.js library.

III. Proposed Methodology

- Project Setup: We will install Three.js using CDN(Content Delivery Network)link, as it work only the script code is written in main HTML file. We are using the latest version(March 20,2023) of Three.js, 0.150.1.

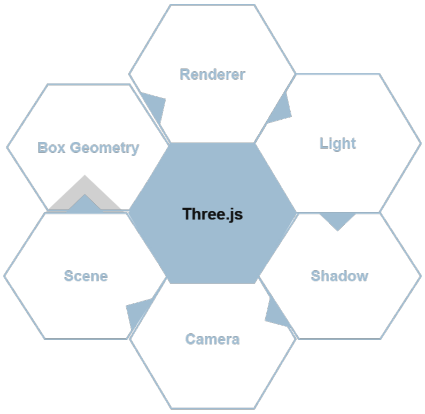

Fig. 1. Properties of Three.js

- Using Three.js: For making objects more realistic in 3D, many classes from the Three.js library will be used. Such as camera, renderer, Scene, geometry, material, customized mess class. Orbit control properties will be used to control the rotation of boxes. Shadow and lighting properties of this library will be added to make it more visually attractive.
- Gravity: Usually a constant downward acceleration is applied to an object's velocity to make it look like moving in the air and jumping constantly. To give the box realistic effects a constant wave velocity is added to the gravity velocity.
- Movement Control: In this part JavaScript will be used. Whenever an interactive game or animation is mentioned there must be some ways to control the movements of the objects using keyboard or mouse. Our game is no exception to that. There will be left and right movement

over X axis. We will also add backward and forward movement over Z axis. We will also add interaction jump function.

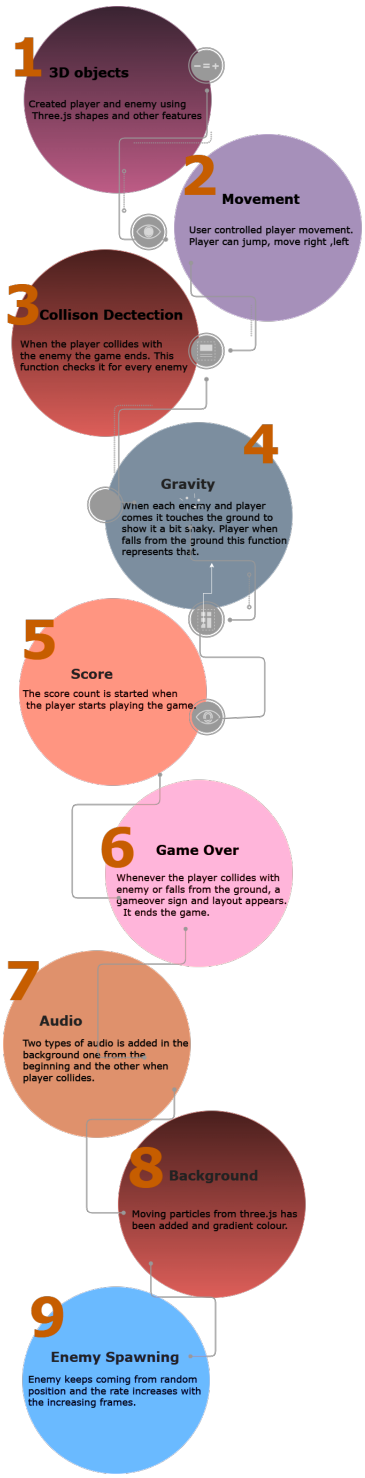

Fig. 2. Implemented Features

- Collision Detection: We will add changes in the parameters of X,Y and Z axis so that the box will fall whenever the box goes outside of the gaming platform. This collision detection feature will also be used for game ending criteria. The game will end whenever the green box collides with any red box.
- Enemy Spawning: In this game the obstacles are the red boxes which the green box avoid in order to get higher score. Red boxes will come simultaneously in the forward motion from the scene. They will come from different sides of the platform, such as the red box can come left or rights side the the current position of the green box.
- Score System: The more the green box will avoid obstacles the higher the score will be. We will try to add different type of red obstacle having different scoring criteria.
- Background: In this game, there will be a vibrant 3d background where particles have been added using three.js to give a galaxy like effect.
- Audio: Audion has been added from the start of the game and the audio changes when collision occurs.
- Game Over: Whenever the player collides with enemy or falls from ground the game ends, a layout appears and the animations stops also the audio.
- Overview: This project involves creating an immersive 3D interactive game using JavaScript and Three.js. Players control a green box, navigating it through a dynamic environment to avoid red.

Fig. 3. Starting Game Scenerio

Fig. 4. Ending Game Scenerio

IV. Limitations and Future Work

Sometimes the textures become unclear and it takes time to load the texture and music. So we would like to fix those problems. We want to replace the textured cube with a 3d model. We want to add more levels and critical obstacles to

this game. During the development of our 3D interactive game using JavaScript and Three.js, several noteworthy limitations emerged. Optimizing performance proved to be a persistent challenge, requiring meticulous fine-tuning to ensure smooth gameplay across various devices while maintaining visual fidelity. Browser compatibility issues necessitated thorough testing and adaptation to address discrepancies in rendering and functionality among different web browsers.

V. Conclusion

Avoid the red is a red coloured obstacle avoiding 3D game with a gradient background. The player can move right, left, forward, backward and jump. There are audio to make it more addictive to play. With the increasing time of the player's survival the score increases . Game over sign has been handled in both collision and when the player falls from the platform.In summary, the venture to construct a 3D interactive game through the synergy of JavaScript and Three.js encapsulates a harmonious blend of technical prowess and imaginative artistry. The amalgamation of JavaScript's adaptability and the potent graphical potential of Three.js unveils a captivating gaming experience that transcends device boundaries. This project stands as a testament to the acquisition of knowledge and the prowess to bring innovative concepts to life, with a promising trajectory towards further intricacy and visual opulence in the future.

References

[1] https://en.wikipedia.org/wiki/DinosaurGame
[2] 3D T-Rex Run//gaming.org
[3] https://threejs.org/
[4] https://devsnap.me/three-js-games