SAPIENZA
UNIVERSITÀ DI ROMA

SNAKE 3D

INTERACTIVE GRAPHICS

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A.S 2023/2024

AGENDA

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2. LIBRARIES
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01

DESCRIPTION

DESCRIPTION OF THE GAME

The Snake game in 3D, implemented with Three.js, offers a modern twist on the classic arcade game. Players control a snake navigating through a three-dimensional environment, aiming to consume objects and grow in length while avoiding collisions with obstacles and its own body.

One of the main innovations concerns the interface and game modes. In addition to the choice of three different color palettes, snow mode has been introduced. In this mode, the snake seems to slide on ice, increasing its speed, making the game more challenging. With the addition of the speed factor which makes the experience more dynamic and challenging.

DESCRIPTION OVERVIEW

- **3D Environment:** The game is set in a three-dimensional space rendered with Three.js, which allows for a immersive visual rendering.

- **Models and Textures:** Objects such as snakes, candy, mountains and obstacles (such as trees, rocks) are shaped and textured to enhance the scene so as to make it look like in a cartoon and the visual appeal.

- **Camera Control:** The camera is dynamically positioned to follow the snake's movement, providing players with optimal views of the playing area.

02

LIBRARIES AND TECHNOLOGY

LIBRARIES AND TECHNOOLOGY

- **WebGL** is a graphics library for the web. It is an HTML context that provides a 3D graphics API for web browsers.
- **Gsap** was used for the animations
- **Three.js:** for 3D graphics.
- **JavaScript:** for animation logic and implementation logic.
- **HTML/CSS**: for the structure and style of the web page.
- **Keyframe** for animation → **Snake 3D**

03

HOME PAGE

SCENES: HOME

On the game's home screen, you will find several interactive elements:

START: By clicking on this button, you will be redirected to the game.html page to start the game.

INFO: This button will give you detailed information about who developed the game and other related details.

VOLUME: By clicking on this control, you can activate or deactivate the game audio.

All these elements are equipped with animations to improve the user experience and make navigation more interactive and engaging.

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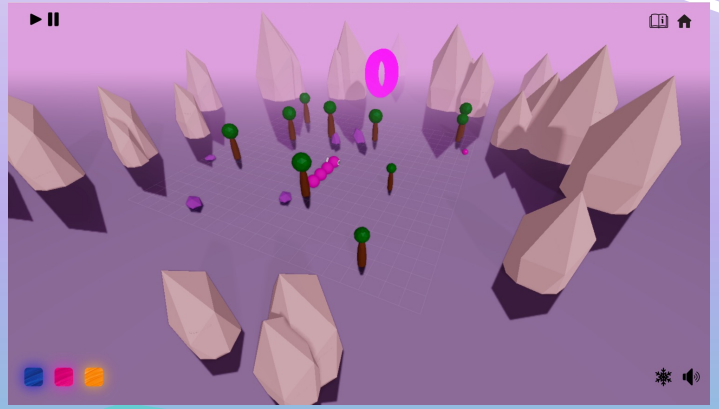
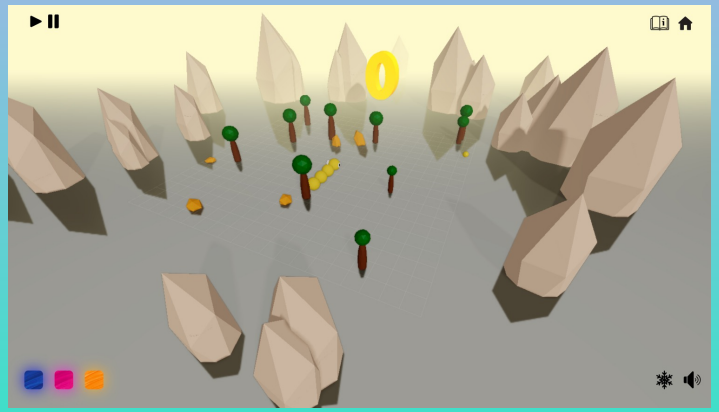
GAME PAGE

SCENES: GAME (I)

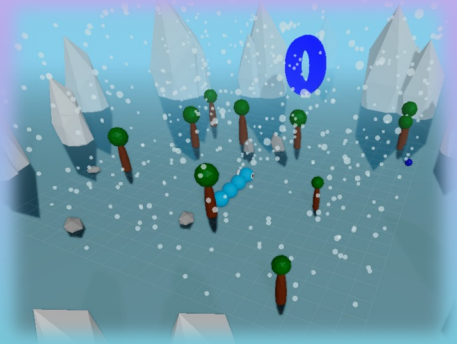


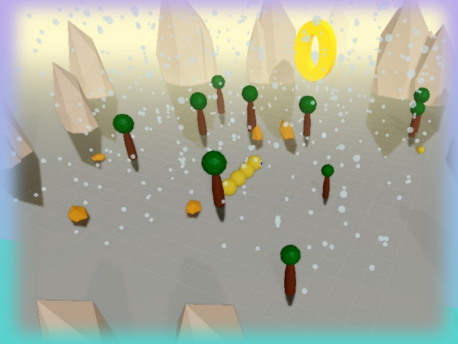


On the game screen we can choose between three different colors: blue (default), fuchsia and yellow

SCENES: GAME (2)

Snow Active:





SYMBOLS: GAME

- **HOME**: return to the home page
- **PLAY/STOP:** start and stop the game
- **SNOW**: the snake's speed increases
- **VOLUME**: enable/disable audio
- **INFO**: you read the instructions about the game.

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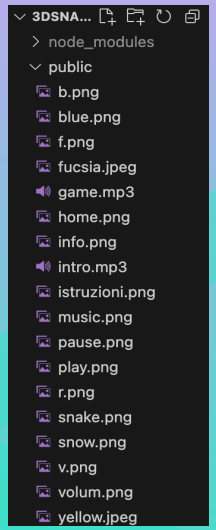
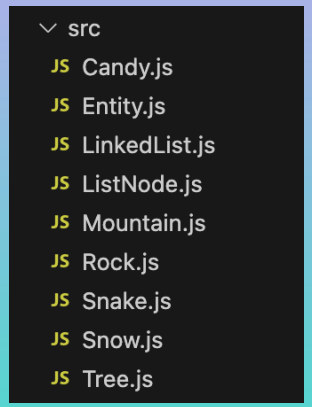
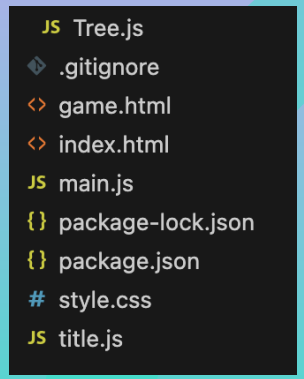
PROJECT STRUCTURE

OVERVIEW PROJECT STRUCTURE

Following a brief description of the files present in the project and how they contributes to the final result.



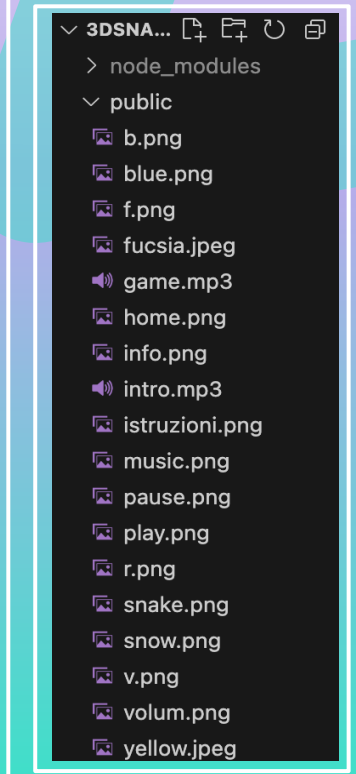




PROJECT STRUCTURE: PUBLIC

PUBLIC

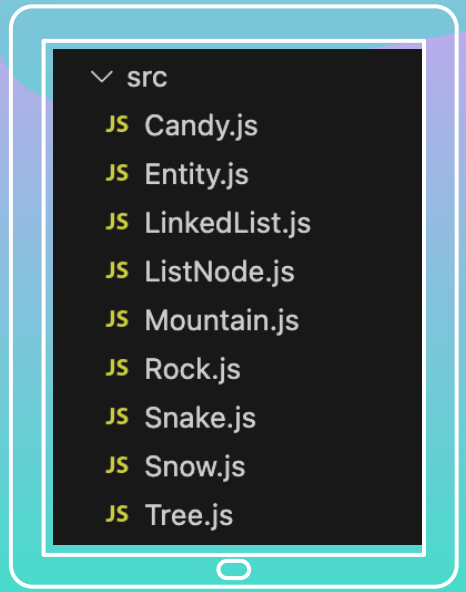
The folder that holds all the static resources like images, sounds



PROJECT STRUCTURE: SRC

SRC

The folder that contains all js files for game implementation such as entity, mountain, rock, tree, candy, snake, snow, listNode and LinkedList



PROJECT STRUCTURE: OTHER

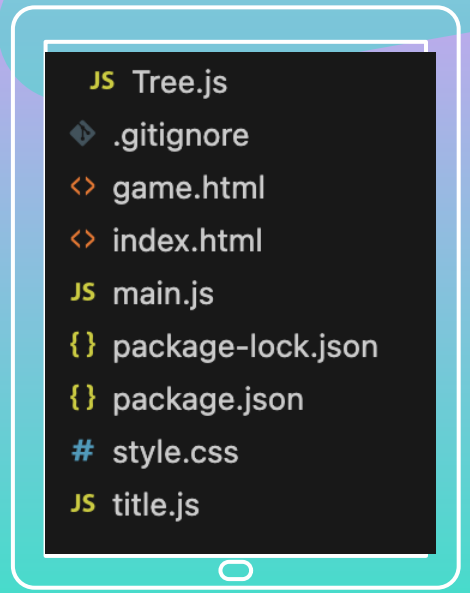
OTHER

The folder contains the main html and js files, as game.html, index.html, main.js and title.js.

index.html→ we have the implementation of the Home Page. Connected to **'title.js'**

game.html → we have the implementation of the game. Connected to **'main.js'**

In both index.html and game.html, we've integrated GSAP animations to enhance the visual appeal and user experience. Also have mp3 audio.



PROJECT STRUCTURE DETAIL: INDEX.HTML

- **Global Animations:** GSAP animations are applied universally across all elements of the page to create a cohesive and engaging interface.

- **Mouse Interaction:** Upon mouse hover, specific elements like flowers, the snake, and the Start button feature dynamic effects. Flowers enlarge and rotate gracefully, while the snake and Start button subtly scale up to attract attention.

- **Element Transitions:** Buttons and PopUps fade in smoothly upon entry, ensuring seamless transitions and improving user interaction.

PROJECT STRUCTURE DETAIL: GAME.HTML

- **Screen Loading:** When game.html loads, it initiates with a captivating GSAP animation to draw users into the gaming experience.

- **Element-Specific Animations:** Various elements such as the score, mountains, rocks, trees, etc., are animated using GSAP. These animations not only add visual interest but also contribute to the overall immersive feel of the game.

- **Interactive Elements:** User interactions with game elements are enhanced through GSAP animations, providing responsive feedback and maintaining engagement throughout gameplay.

06

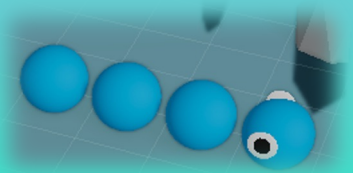
GAME MODELS

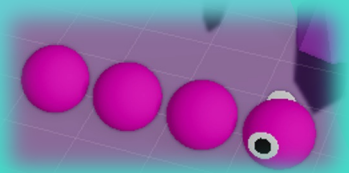
GAME MODEL

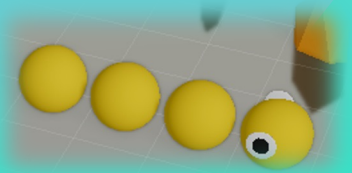
Several models have been implemented in the game, including a snake, trees, mountains, candy, and rocks. These models enhance the scene's visual appeal and are integrated with collision mechanics to enrich gameplay. Here's a brief description of each model.

GAME MODEL: SNAKE

- **Snake Movement**: The player controls the movement of the snake using arrow keys. The snake moves continuously in the direction it is facing.
- **Growth**: When the snake consumes an object (e.g., a candy), its length increases, making the game progressively challenging.
- **Collision Detection**: Collisions with the rock or tree of the game area or with the snake's own body result in game over.

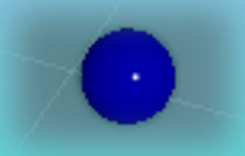


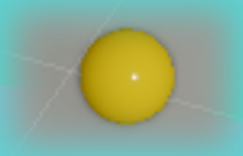




GAME MODEL: CANDY

Candies are randomly appearing objects in the game space. When the snake consumes them, its length increases. Candies are modeled with vibrant colors and textures that make them visually appealing.

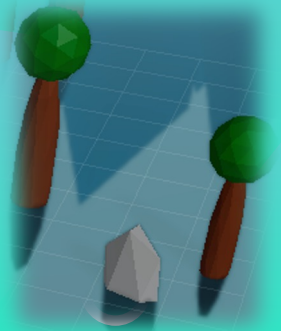




GAME MODEL: TREE AND ROCKS

Both Trees and Rock in the 3D Snake game serve as both aesthetic elements and strategic obstacles. They are intricately modeled with realistic details such as textured bark, lush foliage (tree). Positioned randomically throughout the game environment.

Trees and rocks act as stationary obstacles that the snake must avoid to prevent collisions. If the snake collides with a tree or a rock, the game ends, emphasizing the importance of precise maneuvering and spatial awareness.



GAME MODEL: SNOW

When snow is activated, the snake moves faster than normal. This effect simulates the sensation of sliding on a snowy surface, increasing the difficulty of the game.

The increase in speed requires faster reflexes and careful planning on the part of the player. Snow adds a new dimension of challenge, as players must adapt to the increased speed to avoid collisions with obstacles such as trees and rocks.

The presence of snow is represented by falling snowflakes, creating an immersive winter atmosphere.

OTHER: SCORE

To make the game a bit more competitive, I add a score that shows how many points the player has scored.



REFERENCES

- https://threejs.org/docs/

THANKS!