

# **Report for the Final Project of Interactive Graphics**

Mattia Pannone 1803328

## **1. Introduction to the mini-game**

The simple game I realized refer to an exploration of different worlds to collect a serie of stones. In particular there are four worlds to explore and six stones to collect: in the first two worlds you have to find two stones, in the other two worlds there is one stone for each of them; when all the stones of a world are found, will be open a portal and crossing it you will be bring in the next world to explore. There is a character (Spiderman) that perform some actions, however it will no walk to find the stones, but you will find them moving the camera.

### **1.1 How to play**

The game start with a page containing two boxes corresponding to two buttons to take an action, with one the game start and with the other you get the info of the game. To select one of the it is needed to move the camera and reach the position of one of the two boxes (so crossing them), when the correct position is reached an alert message will appear and the corresponding action is executed. It is possible to move with the arrows of the keyboard (Up, Down, Left, Right), moreover with “A” and “D” it is possible turn right and turn left a little bit the camera. This commands will be used for all the game.

With the start, the gamer is bring in the first world where first Spiderman execute an action and then it is possible to move the camera to search the stone; when each stone is found, also in this case we have to reach the same position to collect it, you are sure that have collected it because an alert message appear and then it is removed from the scene. When all the stones of that world are collected, an alert message appear and also Spiderman appear and execute an action with which open a portal, so a portal appear and you have to cross it reaching its same position such as for the others object; when the portal is crossed, it is loaded a new different world and operations to execute are the same.

Arrived at the last world, when all stones are collected and you have to cross the last portal, this one will bring you again to the home page, so you can restart the game.

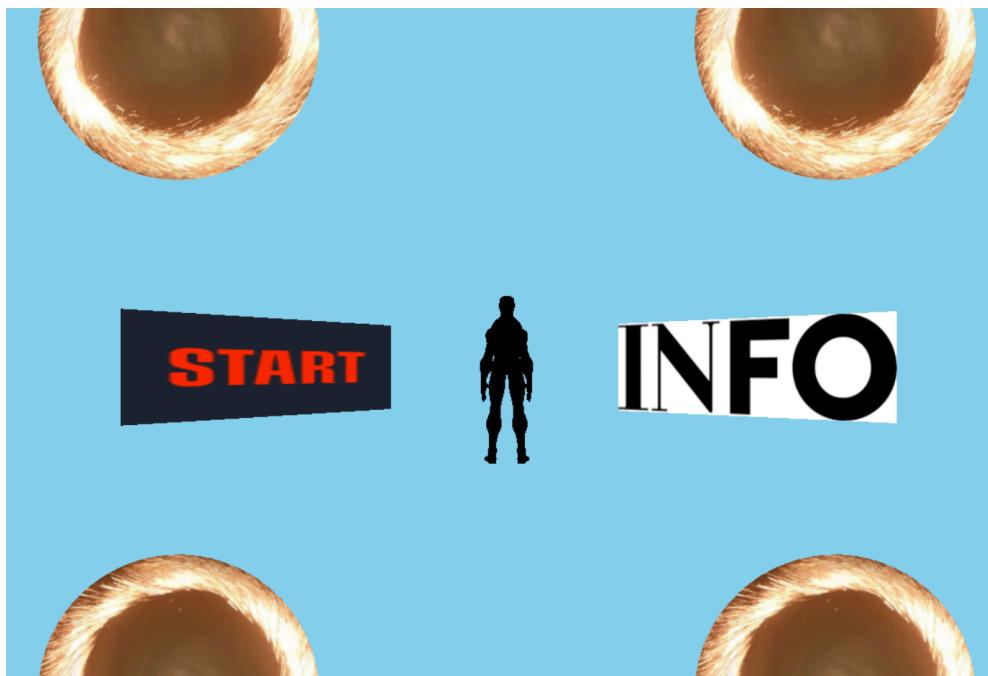
## 2. Tools used

This mini-game is coded using “HTML” and “Javascript”, in particular I used “Three.js”, a 3D library and application programming interface (API) that provides tools needed to project and design a 3D environment with 3D animated objects. The objects are rendered based on meshes from which different geometries are build, moreover there are loader classes to load external 3D models and other tools such as textures and lights. I also used Tween library for animations.

## 3. Scenarios created

All the scenes are created with a specific object oh the Three.js library, which allow to create a scene containing (loading on it) objects, cameras and light. All the worlds described are a instance of the Scene object.

### 3.1 Home Page



This is the home page where I used two box geometries attaching them two different texture with a write to realize the two “Buttons”, then I loaded four portals. I also loaded the Spiderman character, which is animated to reach the displayed position. As described before the “Start” box allow to start the game, while the “info” box allow to get more information about the game. The camera used here and fore all the game (so in all the following worlds) is a Perspective camera.

## 3.2 World 1



This first world is realized with a floor initializing a plane geometry where I attached a terrain-like texture, then I loaded two kinds of model of trees in a for-loop (for a total of forty trees) positioning them in random positions. There are two sphere objects (the stones to find). I used an ambient light and an Hemisphere light to render the world. Also I added a grey fog (can see the background in the distance).

## 3.3 World 2



In this world, after a plan geometry to render the floor, I attached on in a 3D model of a city as in the figure. Here I used an ambient light and an Hemisphere light to simulate a sunset but with a cloudy sky changing the background of the scene. Also in this scene there is Spiderman that perform an action, moreover the stones to found.

### 3.4 World 3



This third world is a dark world where I inserted only 3 spotlights that illuminate only a restricted zone, such as a street lamp, the ambient light is black so to obtain darkness. The floor is always a planar geometry where the texture simulate the railways, then I added a series of walls (loaded 3D objects) leaving only a few spaces for passage. Also in this scene there is Spiderman and only a stone to find.

### 3.4 World 4



This last world have a martian atmosphere, setting the color of the background and adding also fog with the same color (not seen here). This world include some cities (loaded as external 3D object) and a planar geometry as floor with a brick texture. Also here there is Spiderman and a stone. When this latter stone is collected, the portal that will be opened will bring to home page.

### 3.5 The portal



For this object I created the class Portal where I realized them with CircleGeometry and I attached it a texture with the corresponding drawing.

When displayed, they are rotating, in fact I animated them incrementing the rotation on z axis.

This object are present in all the worlds and are added to the scene when all the stones are collected.

### 3.6 The stones

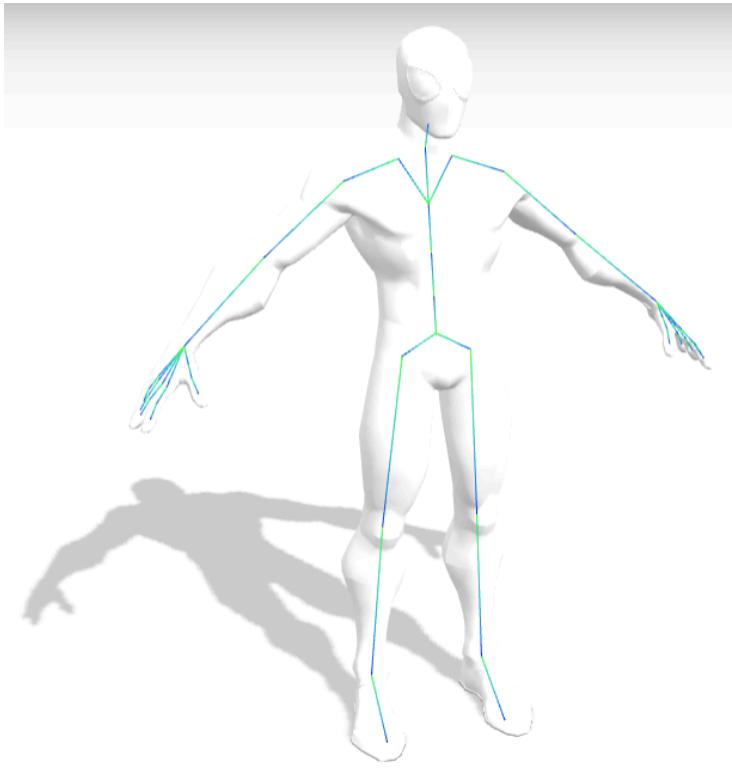


For this objects I created a class Stone and I realized them with a SphereGeometry and loaded on each one a texture of different color, so to have six different colors.

When displayed, they rotate on itself and move their position up and down (I done this modifying y position and y rotation in the animation function), so to be more visible.

When they are captured, they are removed from the scene.

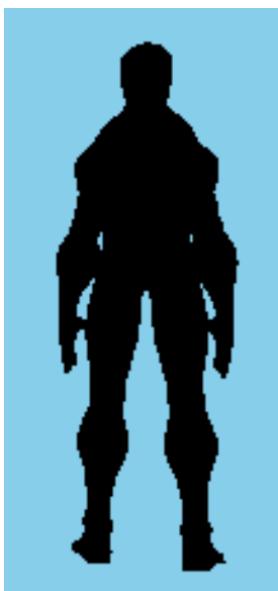
### 3.7 Spiderman



The Spiderman character is a 3D object constituted by a skeleton (that in an object of Three.js) from which we can access to the bone and move them to animate the model. In particular this skeleton is constituted from the following bones: Spine, Spine1, Spine2, LeftLegUp, LeftLeg, LeftFoot, LeftShoulder, LeftArm, LeftHand and related fingers, same for the right part of the body; the neck and the head. This is an hierarchical model and let to deal with different kind of animations because bones are related between them.

## 4. Animation

The animations of 3D object created by me with meshes, are animated in the `animate` function of the relative class by changing its position and rotations. For the Spiderman character I deal with the rotation of the Euler XYZ Angles of the different bones to reproduce three different animation: an initial pose (different from that in the image of the previous one section), a jump animation and an animation used when a portal is opened. To do these in a smooth way, I used the Tween library.



## **5. Conclusions**

All 3D models are download from the site Scketchfabmodels.  
This mini-game is inspired by the marvel films.