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Final project

Interactive Graphics : Schaerf Marco

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1 Abstract

The target of this game is to find the key ,hidden in one of the most chest, therefore we have to moving the character in a garden and find chests to open them, until the key is found, after that open the black gate to escape or win that game.

There are two assets, the first is the character composed by most parties of a human body as Hierarchical model like in homework 2, the second model the parties is considered as a single model composed between them. In codes folder there are all library used for project. The main.js file loads all models, font, controls and physics rules. The standBy.js is defined the breath motion when the character stay in pause, if she begin running "running.js" stop to standBy and move all parties of the body to run straight on or turn left or turn right. While running check if the arrow up keyboard button is still pressed, if not come back to relaxed pose and restart to breathn motion, otherwise keep on running.

2 Tecnologies

The project is based on three js where to create the scene , perspective camera , colors , geometry etc... that is general setting for create interactive graphics. OrbitControls library is used to controls the camera to orbit around a target. Physics Ammo.js is just used for adapt the character to ground. FontLoader and TextGeometry needed just for the starting and end of the game. finally GLTFLoader load all model to import in the project, where the model has been created with Blender application.

2.1 Three JS

Three.js is a cross-browser JavaScript library and application programming interface (API) used to create and display animated 3D computer graphics in a web browser using WebGL. The source code is hosted in a repository on GitHub. The aim of three js is to create an easy to use, lightweight, cross-browser, general purpose 3D library. The current builds only include a WebGL renderer but WebGPU (experimental), SVG and CSS3D renderers.

2.2 Physics Engine: Ammo

To use Ammo physics we have to understand certain things:

Physics World: There has to be a world that obeys the laws of physics.In ammo.js this world is called a Collision World and has among its derivatives the Dynamic World. The physics world has options to set gravity and exposes functions and objects for the following to be possible.

Rigid Body Dynamics: The force, mass, inertia, velocity and constraints of the World. In a snooker game you take a shot, the cue ball rolls and knocks against ball which gradually rolls before coming to a stop. Or you shot a hanging sign post and it swings around. Where for a static body the mass is equal to zero, instead a dynamic body differently to zero.

Collision Filtering and Detection: Collision Filtering sets which objects should collide and which should not. Like a 1Up appearing and the enemies can pass through without absorbing it, but your character passes and picks it up. On the other hand Collision Detection is about detecting when two objects collide, for example, so that you can deduct the health of a monster when your sword slashes through it.

2.3 FontLoader and TextGeometry

To achieve a 3D text on the web fig.1. FontLoader class for loading a font in JSON format. Returns a font, which is an array of Shapes representing the font. This uses the FileLoader internally for loading files. The textGeometry is a class for generating text as a single geometry. It is constructed by providing a string of text, and a set of parameters consisting of a loaded font and settings for the geometry's parent ExtrudeGeometry.

Figure 1: 3D Text

2.4 GLTFLoader

GL Transmission Format is an open format specification for efficient delivery and loading of 3D content. Assets may be provided either in JSON (.gltf) or binary (.glb) format. External files store textures (.jpg, .png) and additional binary data (.bin). A glTF asset may deliver one or more scenes, including meshes, materials, textures, skins, skeletons, morph targets, animations, lights, and/or cameras. Then for a simple programming i have use gltf files that make us to better understanding codes into the file. In other world, glTF is a specification for the efficient transmission and loading of 3D scenes and models. The 3D models used in the project can be easily created using Blender.

2.5 Blender

The Freedom to Create and user friendly. Blender is licensed as GNU GPL, owned by its contributors. For that reason Blender is Free and Open Source software, forever. It supports the entirety of the 3D pipeline—modeling, rigging, animation, simulation, rendering, compositing and motion tracking, even video editing and game creation. We can download models from Sketchfab and importing into blender to obtain every model that you prefer, the model can be created also by modelling cubes in blender, the choice is to you.

3 Animation , motion and constraints

The motion applied on character is breath pose and running move, it's done taken all parties of body with functions getObjectByName and getObjectById, instead for the physics rule the mass is equal to 1. The plane model and every other object there is not motion and the mass is equal to 0.
The collision between character and other objects it's like a box, when the character "box" crash with another static rigid body "box" fig.2, then she can't move anymore to that way. If the colliding box is
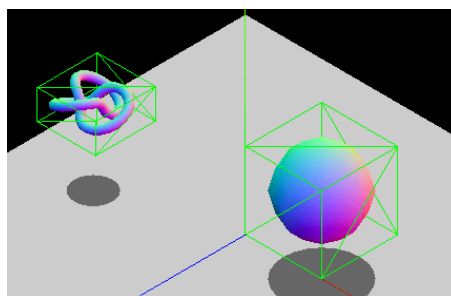

Figure 2: Rigid body as Boxes

between character and chests or black gate, then can press x on keyboard to open it, if that chest contain the key, then will appear the key, take it to open gate.

4 Controls

To move the camera position, we can press shift plus hold mouse left click and drag it, instead we want to rotate the camera, hold mouse left click and drag it.

Moving the character, if she's standby press arrow up keyboard to run. When she's running if arrow up is still pressed keep on running, otherwise return to standby pose. Note that while she's running can't turn left or turn right, indeed the character can turn from a side just when she's in standby pose.