# Project - Interactive Graphic

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## 1  Introduction

The goal of the project is to implement an interactive application that make use of basic WebGL or advanced libraries, as in our case ThreeJS. The project cover the main aspects treat during the course, such as lights, textures, hierarchical models and animations.

## 2  The Game

We decided to develop a 3D version of "Duck Hunt", a famous game from the 80s, in which the objective is to hit as many ducks as possible. We designed the scene as a first-person game, where the player is located in a tall grass field and controls a rifle. Thanks to the help of his dog, that frighten the ducks hidden in the tall grass, the hunt can start. The game ends when the player miss five ducks. In addition, our game provides other functionalities like enable and disable sounds, pause the game or restart it.

The above described scene is depicted in the following figure:



Figure 1: Starting scene of the game.

## 3  The Scene

The scene shown in Figure 1, which is a ThreeJS object, has been obtained adding textures, lights, and different 3D models. The dog and the ducks are hand-made models while the other are taken from SketchFab. We used perspective camera to make the scene as realistic as possible to let the center of projection coincide with the user's eyes. The prospective uses as parameters: *fovy, aspect, near and far*. *Fovy*, which stands for "field of view y-axis", identifies how wide the eyes open along the y direction. *Aspect* represent the ratio between the width and height of the canvas. *Near* and *far* are any positive numbers representing the minimum and maximum distances of the object, with the restriction that near is always less than far. For the camera is defined also the *lookAt(x, y, z)* method, where the *x, y* and *z* are the coordinates of the scene. The texts on the bottom right corner instead, have beed modeled using

TTFLoader of ThreeJS, where through a Mesh the relative colors have been applied. Moreover, in order to make our application responsive we add a dedicated Listener to adapt the window size based on the device resolution. Finally, to improve the user experience antialiasing has been used.

## 3.1 Lights and Textures

The ground texture was created by repeatedly applying a texture on a plane, using a TextureLoader. Then, the texture is added to the scene through the use of meshes that map texture coordinates into world coordinates. Three directional lights have also been added to the scene. Two of them were placed on the left upper and bottom right corner respectively of the scene to reproduce a sunny day, otherwise using only one of them we obtain either dark clouds or dark objects. The third one has been introduced to illuminate texts because they are ahead of other elements and so the previous lights were not able to light up also them.

# 4  3D Models

The models we have included in our project can be divided into two categories: linear models, mainly models taken from sketchfab and hierarchical model, modeled for animations.

## 4.1  Linear Models

## 4.2  Hierarchical Models

# 5  Animations

# 6  User Interaction

## 6.1  Sounds

# 7  Conclusion