

Interactive Graphics

Homework 2 (works fine only in Google Chrome browser)

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1 Hierarchical model

I started from the model of the homework 2 and I have modified, the angle, position and size of the parts of the sheep, I also added the tail.

Figure 1 Hierarchical model of the sheep



In order to build the sheep, I use a hierarchical model, in which I have the root node that is the Torso and then I have the siblings that are the other parts of the sheep. In order to access to the different part of the sheep I can use the function and in particular I have a function for each elements of the sheep (i.e. torso(), leftUpperArm() ecc...).

The main point of strength of using a hierarchical model is that it is simpler to work with animation.

2 Grass field

For the grass field, I added a new hierarchical model composed only by a cube and I positioned it under the sheep.

Then I decide to add a texture to the surface and a normal map in order to give the grass effect.

In order to obtain the normal map, I use an online tool that, given an image, allow to automatically generate the normal map.

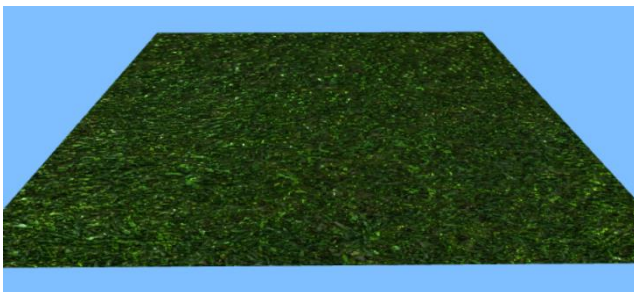


Figure 2 Grass field with light source

Since I decide also to add the bump map to the grass field, I added a light source, so I decide to add a new hierarchical model composed only by a cube that represent the environment light.

I also set all the needed parameters (light and material).

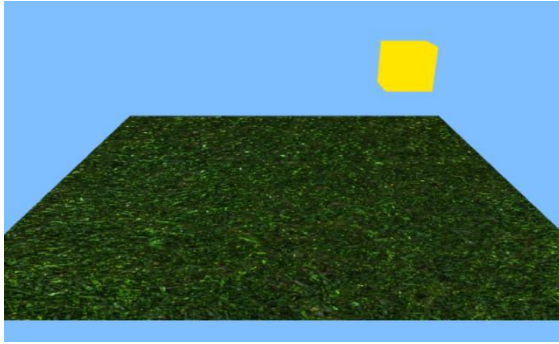


Figure 3 Grass field with texture and bumpMap

3 Sheep textures

At this point I added two texture and one normal map that I generated with the online tool.

As we can see in figure 4, with the normal map the advantage is that we can see better the wool effects of the sheep.

In detail, I use a texture and the normal map for the body of the sheep and the second texture is used for the face of the sheep.



Figure 4 sheep without and with bumpMap

4 Fence

To create the fence, I added a new hierarchical model composed by 7 elements.

Furthermore, I added a texture image to the fence to make it more realistic.

The fence is positioned at the center of the environment and the sheep is at left of the fence.

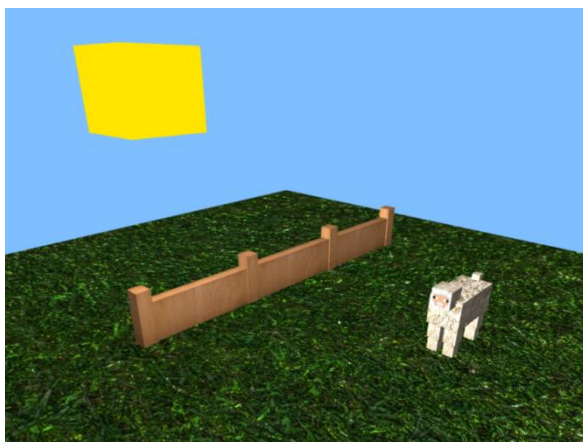


Figure 5 Enviroment composition

5 Animation

For the animation, I decided to add 3 buttons:

- One for starting the animation;
- One for stopping the animation;
- One to reload the web page.

For the animation, I decided that the sheep does a circle path in order to create a loop animation.

Once the animation is started, the sheep starts to walk by moving the four upper legs and by folding the two front lower arms.

As soon as the sheep approaches the fence, the sheep start the jump animation in which the sheep stretches all his legs. When the jump animation is finished, the sheep starts again the walk animation.

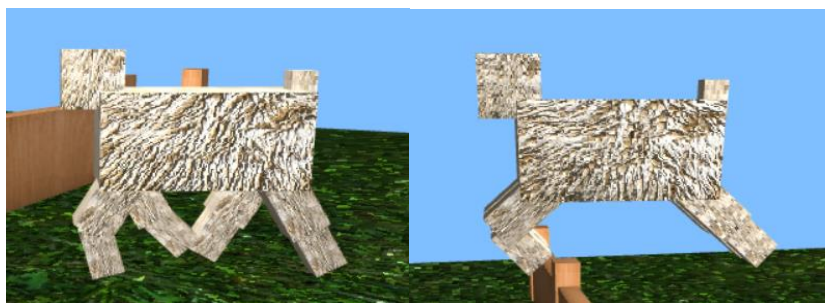


Figure 6 Walk animation and Jump animation

6 Move the camera before and during the animation

For this point, I added the rotation matrix for the modelView and for the projection. I decided to use as projection a perspective and not the ortho.

The user, in any moment, can move the camera with the sliders and in addition he can move the view also by using the mouse and the mouse wheel.

I decided to allow the user to move the view also with the mouse to make it easier, more user friendly and more interactive.