Three Kings

Mohamed Radwan

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matriculation no: 1028275
email: radwan@cg.tuwien.ac.at

1 Treatment

A trial to mimic a real life view of the Giza pyramids and the Sphinx.

2 Effects

1. Shadow Mapping [1] : The shadows of the pyramids and sphinx objects are projected on the ground. Figure 1 shows this effect.

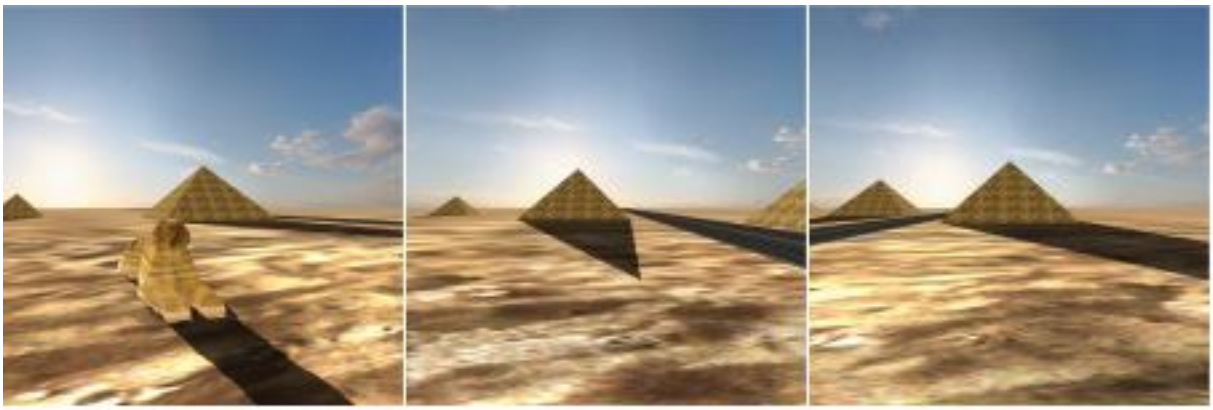

Figure 1: *shadows.*

2. Normal Mapping [2] : The normal vectors of the texture on the pyramids sides are read from a normal map. This enhances the lighting of the pyramid surface and gives a realistic look to it , though still flat.

3. Parallax Mapping [3] : A height map is used to emulate a 3D look for the pyrmaid texture by modifying the texture coordinates of each pixel. Figure 2 shows normal mapping and parallax mapping effects.

Figure 2: *Left: no effects. Center: normal mapping only. Right: normal mapping and parallax mapping.*

3 Problems

The shadows suffered from what is called "Peter Paning", which means they are slightly apart from the occluders. The small space between the big pyramid in particular and its shadow looked like it is blinking. To overcome this problem, I slightly moved the objects backwards during building the shadow map.

The normal and tangent vectors for the pyramids and ground were set programmatically, which was not so hard as they consist of planes. For the surrounding outside enviroment, I used a sphere that wraps around the scene, textured by a panoramic image. The vertices and normal vectors of the sphere were programmatically generated. The sphinx data were loaded from a model on the internet [4].

References

[1] Peter Houska Slides. https://cg2.cg.tuwien.ac.at/wiki/doku.php?id=students:slides

[2] http://www.ozone3d.net/tutorials/bump_mapping.php

[3] Terry Welch. http://www8.cs.umu.se/kurser/5DV051/VT09/lab/parallax_mapping.pdf.

[4] http://sketchup.google.com/3dwarehouse/details?mid=7ee790a94d0c7d57ae504fdbdb5a7e96&prevstart=0