GAME READY 3D MODELS

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Abstract: This paper describes detailed modeling procedure of game ready 3D model using blender software package. The aim is to define and describe all procedure, step by step, that provide the final result. One model has been created in this paper: with detailed instructions of techniques used to create a game-ready model. Since it is possible to create a model in number of ways, the theoretical part of the paper outlines the basic guidelines for understanding the modeling process for its more quality and more realistic implementation.

Keywords: blender, 3D model, 3D modeling, Texturing, texture mapping.

1. INTRODUCTION

The beginnings of computer graphics date back to the early sixties of the last century. First results and graphical representations were confined to the line and curve and objects were represented with their silhouettes. Rotating in space, a new silhouette would take place of the old one, thus creating the illusion of three-dimensional object. This type of graphics was called "vector graphics" and can be considered as the forerunner of today's 3d computer graphics. Later, in 70`s and 80`s, algorithms for mathematical representation of surfaces have enabled internal shading of objects and made them respond to light placed inside a virtual 3D space. Nowadays, 3D computer graphics (3D modeling) have wide range of usage that extend through models that we can see in various PC games, animated and special effects films, medical software, various web presentations as well as a presentation technique in architecture and urbanism. The aim of all forms of presentation is to provide as much information about the project. This information should be readable not only for expert architects, but for wider public, which are not from this profession. The most common way to represent models in architecture and urbanism is done through digital technology. There is a wide range of software for 3D modeling: Autodesk 3ds Max, AutoCAD, ArchiCAD, Solid Works, Sketchup, Autodesk Maya, Blender, LightWave 3D, Autodesk Softimage, CATIA, etc. Utilization of these software provides to creators to have simpler modeling possibilities and also understandable, detailed, conceivable and photorealistic project representation. One of the most popular software is Blender. It is open-source software and now it is also coping with industry of 3D and 2D world visualization.

2. 3D MODEL

Three-dimensional (3D) model represents a physical body using collection of points in 3D space, connected by various geometric entities such as triangles, lines, curved surfaces etc.

Being a collection of data (points and other information), 3D model can be created manually, algorithmically (procedural modeling), or by scanning. The surface may be further defined by texture mapping.

2.1. Polycount

Polycount is a term to describe the number of polygons used to create a 3D model.

Number of polygons in a mesh is important factor to optimize for performance.

2.2. Types of 3D models

Before actually creating any model for a game, it is important to know different types of 3D models and which to use for what purpose.

These 3D models are divided according to the poly-count they have.

- Low-poly model is a 3D model with relatively small number of polycount. It is mainly used in real-time applications like games, web-browsers etc.

- High-poly mode is a 3D model that have relatively high number of polycount. These patterns appear smooth and highly detailed. Photorealistic models tend to leverage high-poly models when needed
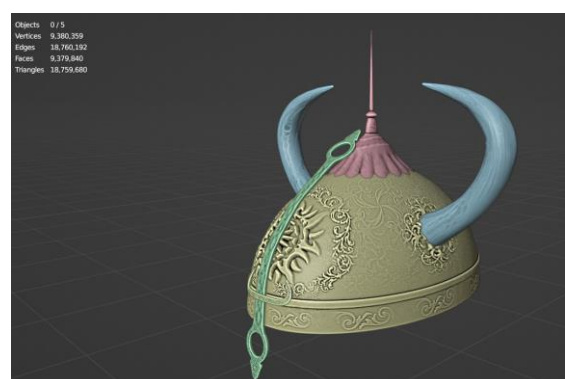
3. TEXTURE MAPPING

Texture mapping is a method of defining high frequency details, surface texture, or colour information on a 3D model. Texture mapping originally referred as diffuse mapping, a method that simply mapped pixels from texture to a 3D surface. In recent decades, advent of multi-pass rendering, multitexture, mipmaps, and more complex mapping have made it possible to simulate near-photorealism in real-time by vastly reducing the number of polygons and lighting calculations needed to construct a realistic and functional 3D scene.

3.1. UV Mapping

It is a method to project image texture onto a 3D geometry. U and V represents x and y axis respectively of an image texture. We have to carefully do the process so that we can decide which part of the model will get the maximum details and which should get least and do not waste much of the available space as we only have limited space in the texture to map.
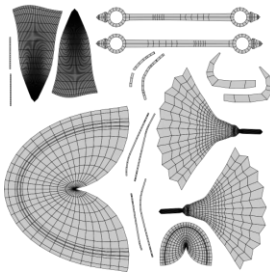

3.2. Types of textures

We use different combinations of textures to make a 3D model look as photoreal as possible in a real-time render engines like games.
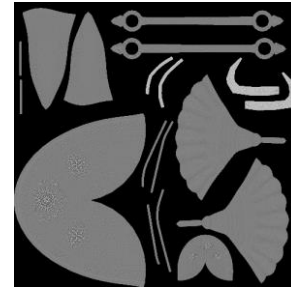
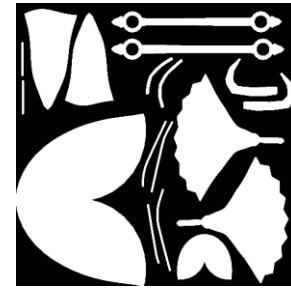- Albedo Map it a texture map which determine the colour of a 3D model.

- Ambient Occlusion is a texture map that determine the point of intersection with itself or with another object. The area which is not intersecting is represented as white and area which is intersecting is represented as black.
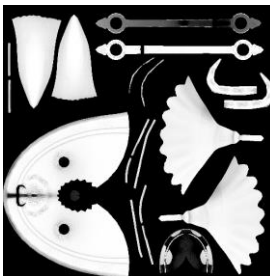

- Cavity Map is a texture map that determines the crevices of the 3D model. It is also called small-scaled ambient occlusion.

- Metallic Map determine the metallic values of the model. The part which is white is metallic and the part which is black is non-metallic

- Roughness Map is a texture map which determine the roughness of a model. Black part represents 0 or smooth area and white part represents 1 rough area.
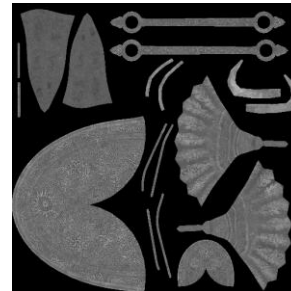
- Normal Map is a special texture map which calculate light values according to the vector values stored in texture and give the impression of fake height or dents.
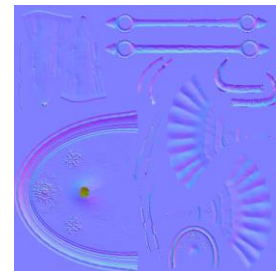
3.3. Texture baking

It is a technique use to create texture maps for low-poly model from high-poly model. Through this we can display high-poly model details onto low-poly models without the expense of large number of polygons isnd hence can run smoothly in games. All the textures mentioned above can be created by baking process.

4. CONCLUSION

Creating a high-quality game-ready 3D model is more than just creating a simple model or complex high-poly model. It requires both, artistically creating a detailed high-poly model and a low-poly model with effective use of topology to create a silhouette with minimum number of polygons. After creating high and low poly models then creating UV map for low-poly model and baking details from high-poly model into textures for low-poly model.

Hence it requires artistic and technical care to create a high-quality 3D model which can run smoothly in a game.

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