MMA 1 Final assignment:

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Introduction

For the final assignment for MMA 1 we chose to learn Maya. We think Maya is the program to use for 3D animation.
Our assignment was to create a 3D animated character in Maya. We chose to create a humanoid werewolf.
This document contains the steps we took and can also be seen as a short tutorial.

First of we set out to find an original type of character for this assignment. We didn't want to make a character totally based on our imagination, because this could effect the skills we would gain in modelling. We decided to build a werewolf.

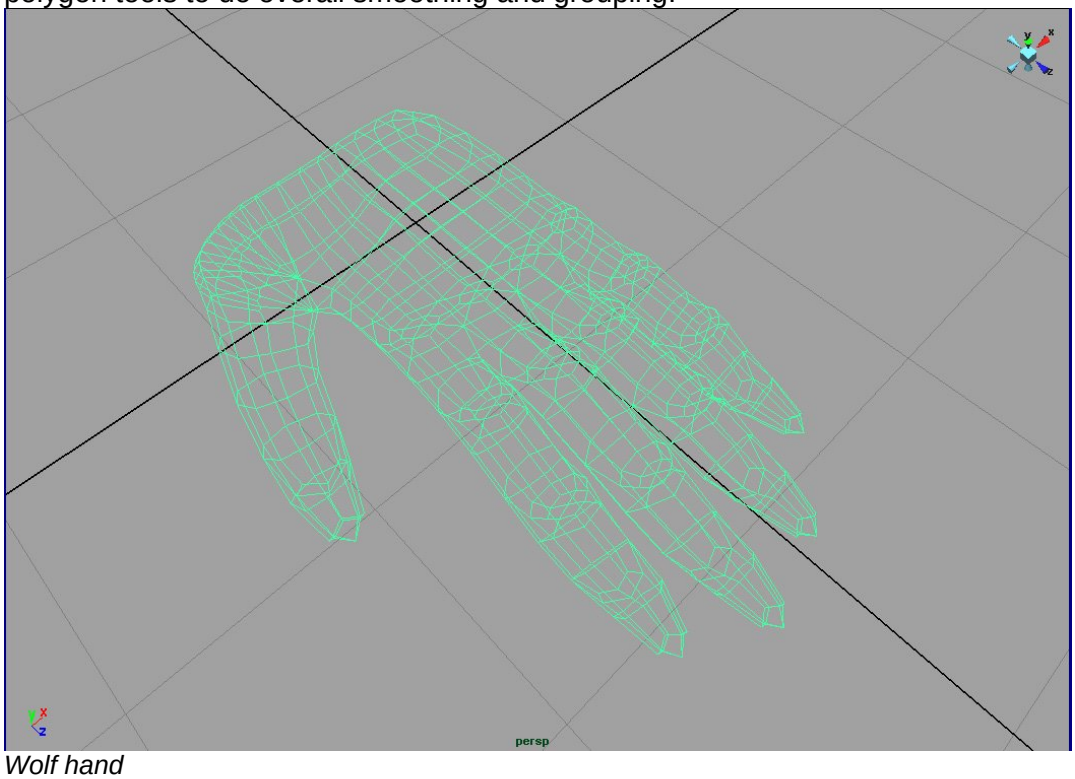
After researching a lot of pictures and movies about werewolves we knew what we wanted to make.

Modelling

First step in creating a character is modelling. In order to access the modelling tools select the modelling section in the slide down menu on the top left of the application.

In Maya there are three ways to model: Using polygons, using NURBS and using subdivision surfaces. The later being and advanced technique.

We chose to build our werewolf using polygon modelling. This because we found it easier and better suited to “build” a character. Using polygons is like a mixture of using clay and Lego. You start with a basic shape, for instance a cube with a number of faces. You then manipulate (for instance extrude) some of these faces and their edges to achieve the desired shape. Different polygons can be grouped thus becoming building blocks for our character.
We started of building a hand for our wolf. We used a guide from the Introducing Maya 6.0 book to learn the basics of polygon modelling. We used the tools that can be found in the polygons and edit polygons menu’s in the modelling section of the Maya application. The tools we used most are: Extrude face, Wedge face, Subdivide, Split polygon, Poke face, Cut Face in the edit polygons menu. With these tools you can manipulate basic polygon shapes into whatever shape you wish.
From the polygons menu we made a lot of use of the Combine, Create and Smooth polygon tools to do overall smoothing and grouping.

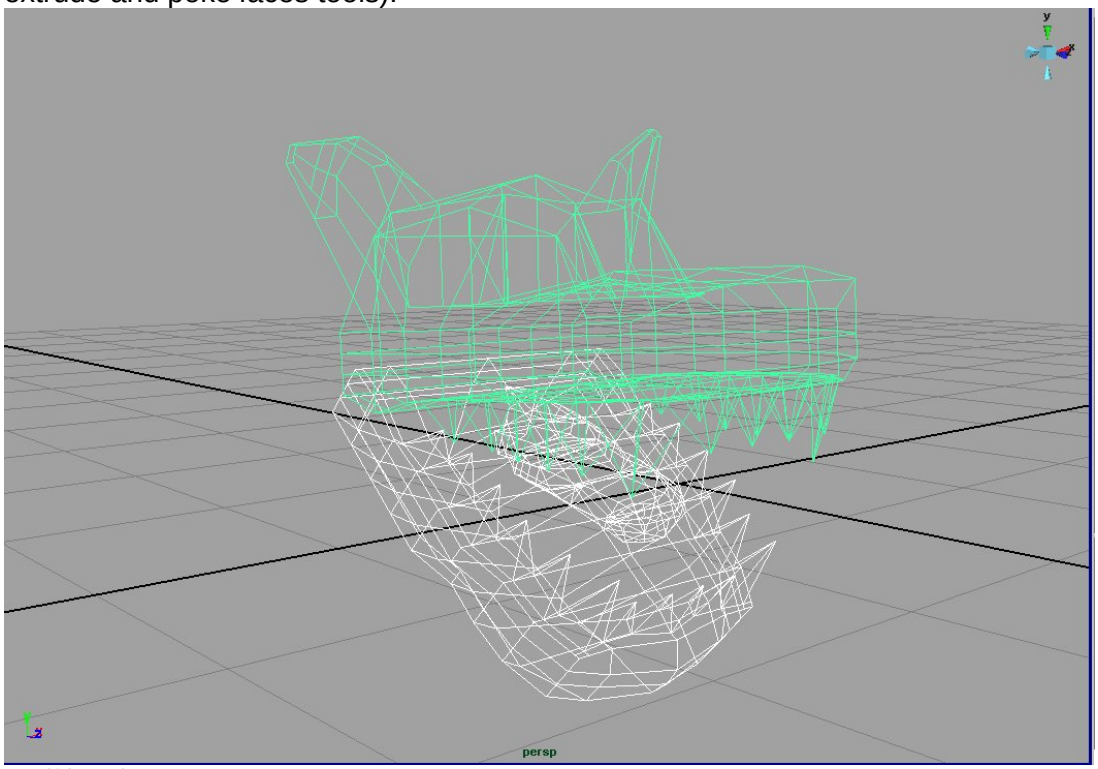


Wolf hand

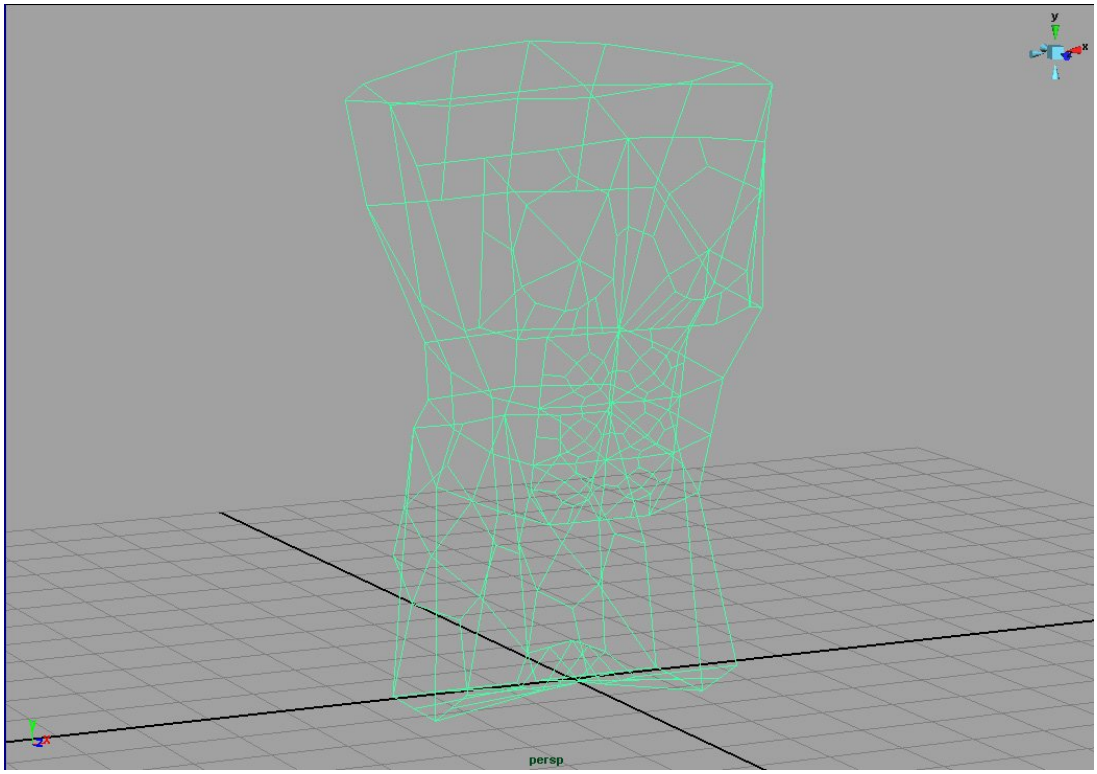
Once we finished the hands and we got used to the basic modelling interface Maya offers we started building the most difficult parts of our character, the head and torso.

The head is build up form 2 cubes. Using the extrude faces and poke faces tools we created the teeth, ears and the top of the head.

We used separate shapes for the eyes and tongue (spheres and cylinders using wedge, extrude and poke faces tools).



Wolf head



Wolf Torso

For the torso we took one big polygon cube and manipulated this till we got the wished result. We subdivided different faces to get the desired sizes and shapes. You can do endless tweaking in modelling, often not turning out for the best. Knowing when to stop is one of the hardest lessons in Maya.

The legs and arms are made up form 2 different cylinders each, manipulated using the same tools as stated above.

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Animating the werewolf

Skeleton Animation

To let the werewolf move we used a pre-made skeleton (called dreamwalk). With a script all specification of the walking could be altered. The script should be entered in the script editor (window/general editors/script editor). We moved the shoulder somewhat more to the front which bowed his back. Also the amplitude of its arms and the springiness of the walk itself was increased. This gave the skeleton a more werewolf like walk.

Now the different objects modelled were imported into our skeleton and sized and placed correctly. Once that was done we switched to the Animation section in the drop down menu and used the Bind Skin tool in the Skin menu to attach the objects to the skeleton. We choose to use smooth bind, since then the objects deforms naturally when moved.
When all objects where bound to the skeleton some adjustments where made to make the body parts fit more naturally. For this you should unbind, reshape as you like and bind again.
The biggest problem is that it's only possible to attach objects in the 'bind pose'. This is the pose before any deformation occurs. There's an option 'Go to Bind Pose' in the Skin menu. Unfortunately this option did not work.

To complete the scene a 'polygon plane' was inserted as an underground. 2 Gravestones where imported to at character to the scene.

Adding Colour to the scene

Basis Material Types

For color up the objects Maya has some standard materials. These materials have different attributes for how they react to sources of light for example. This is not always easy to detect and the difference can sometimes only be seen when rendering an image on high quality with different light sources. However it's very important to use different materials to make the scene as realistic as possible.
The standard material is grey Lambert. To assign a material simply select the part you want to alter (Right click and then Material). You can chose to assign an existing or new material. Also you can select the material attributes.
It's important you name the materials clearly so you can easily reuse when needed.
For the skin we used Anisotropic, blinn for the eyes, Phong for the mouth, tooth and nails

Image as Material

For the gravestones we used a stone texture from an image. To do that you should click on the button next to the colour attribute of the material. Here you're able to select some 2d and 3d textures. First you'll have to define that you're going to use a file for the texture by selecting 'file' in the different premade textures (strangly this is located as if it's also a texture called 'file'). The next thing you should do is define which file and load.
Caution: Maya does not store the file in the scene. You'll probably have to copy and redefine the file every time you change from machine.

Lambert

Lambert is a flat material type that yields a smooth look without highlights. It calculates without taking into account surface reflectivity, which gives a matte, chalk-like appearance. Lambert material is ideal for surfaces that don't have highlights: pottery, chalk, matte paint, and so forth. By default, any newly created object gets the Lambert shader assigned to it. If the object should have highlights, though, it's a good idea to assign another shader. You'll want to see highlights even during the modeling stage, to see whether they are breaking across the model (indicating a seam in the surface).

Phong

The Phong material type takes into account the surface curvature, amount of light, and camera angle to get accurate shading and highlights. The algorithm results in tight highlights that are excellent for polished shiny surfaces, such as plastic, porcelain, and glazed ceramic.

PhongE

PhongE is a faster rendering version of Phong that yields somewhat softer highlights than Phong. Most artists use regular Phong for objects with intense highlights and Blinn for everything else.

Blinn

The Blinn material type calculates surfaces similarly to Phong, but the shape of the specular highlights in Blinn materials reflects light more accurately. Blinn is good for metallic surfaces with soft highlights, such as brass or aluminum. Because Blinn is a versatile material type and generally renders without problems, it's the primary material type we've used in these tutorials.

Anisotropic

The Anisotropic material type stretches highlights and rotates them based on the viewer's relative position. Objects with many parallel micro-grooves, such as brushed metal, reflect light differently depending on how the grooves are aligned in relation to the viewer. Anisotropic materials are ideal for materials such as hair, feathers, brushed metal, and satin.

(Source: http://www.peachpit.com/articles/article.asp?p=31330&seqNum=3)

Fur

Fur is one of the features Alias Software is proud of, so we wanted to experiment with that. Select the part you want to grow hairs on and select in the fur menu which one you'd like. Sounds easy, but we came to some problems. First we wanted to have the whole body of the wolf furred, however we where not able to fur surfaces. On some surfaces the fur didn't act like we wanted and grew for example on wrong ways or only on 1 side (this is the reason why our wolf only has fur on his front).
When the correct fur was inserted, density and scale where important characteristics to change. Some furs did not look like the correct fur before scaled appropriate based on our model.
In the end we grew 'grass' on the polygon plane, 'Gorilla' on body and eyebrows and 'Lion Mane' on the tail.

Special Effects

To make the scene more spark some effects where added.
In the material attributes of the gravestones a glow was added to make the graveyard somewhat spookier.
Using 'Paint Effects' some bushes, flowers and grass were added to the plane.

Background

A background image in Maya is connected to the camera (so it's always in view).
Insert a camera in the 'Create' menu. In the 'Environment' characteristic of the camera select 'Create image Plane'. Define the file you want to use as a background.
We used this option to insert a night sky with stars.

Creating a result

Adding a camera

In the create menu you can create a camera. I used a camera with an aim point. However still it's not very easy to get a good shot with the camera. Every small movement changes the shot a lot, and this can only be seen by rendering the shot (which takes again a few minutes). Patience is needed.

Moving the camera

The next thing we did was moving the camera through the scene. First find a good beginning shot and make sure you're on the beginning of the timeline. Than select 'Set Key' in the Animation Tab. Next select another time in the timeline and start moving the camera to a new viewpoint. Check by rendering the shot if it's a nice shot. 'Set Key' if satisfied and the camera will move from place x to y in time a to b.
These movements can be given more character in the 'Graph Editor' (Window/Animation Editors/Graph Editor). Here you can see and alter the changes of the axis over time. This is a very powerful tool to enhance the animation. You can smooth changes in direction of the movement or speed up the movement at time needed.

Rendering

Rendering an animation can be a time consuming process. Every mistake can cost you another 2 hours (at least) waiting. These mistakes are not always clearly seen before rendering and can cause a lot of annoying moments. However the result of seeing the animation come to life is also rewarding.
First of all you should set the 'Render Global Settings' correctly. Select .avi as file type, select the right camera. Select the right end frame to ensure you're not rendering too long. To start rendering the render tab and select in the render menu 'Batch Render'.
In the first phases we only used a resolution of 320x240 to speed up the rendering. However some specific features could not be seen (blur instead of fur). In the final rendering we used a resolution of 640x480. This is still not a very high resolution for the options Maya offers, however this took over 2 hours to render a 8sec movie clip of 300mb (on a AMD 3200+, 1024 mb memory, 128 mb videocard).

The project

Difficulties

During the process we faced a couple of difficulties. Some which we could solve, but some where much easier to walk around.

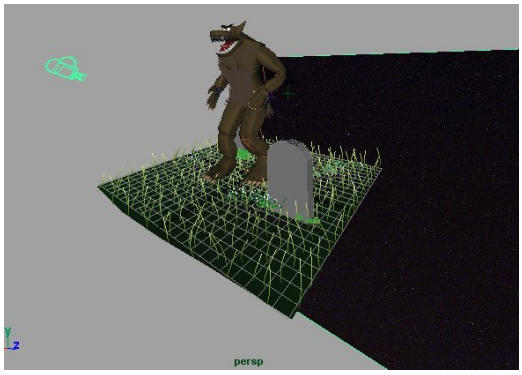
Finding resources: for many programs it's very easy to find good tutorials online. However because of a combination of complexity and the business world of Maya these tutorials are mostly only acquired commercially. Almost for every problem you search you can order a dvd, you can pay for .pdf files or membership to a user forum. Free websites can be found, but usually don't offer you enough information.

Dislocated centre of an object: The centre of an object is important to turn around and use for scaling. However sometimes this option took the centre of the scene instead of the centre of the object. This resulted in more difficulty when moving the object.

Adding Fur: You should think that when an object is selected it's very easy adding for on all surfaces. However this proved not to be the case with Polygons. Nurbs can be furred with ease, however not polygons. As an example fur added to the total head resulted in the wolf having a moustache instead of covering all surface. This should be improved in the latest Maya, since we used Maya 5.0

Unclear user interface: because of the extreme number of options this program offers the user interface if very complex. First you'll have to get to get used to the basic working tools. After that you'll be able to find your way through the menus. However sometimes problems occur which are unclear in the interface. Abstract error could be given, but no solution is suggested through a wizard or something. Sometimes the location of buttons is totally unclear.

Making an animation: capturing an image is not very easy. To get a right shot in a 3d world is very much based on guessing the right position (see image on the right). After enough guessing and adjusting you can have a nice single shot. However when the movie is made the result might be else then you expected. There's no 'what you see is what you get' in this process. It's more something like 'what you guess is what you might have within a few hours'.



2d Painting: There's a paint effects tool to draw 2d on 3d objects. This again was only possible with Nurbs and not Polygons. Our choice to use polygons turned out to have some disadvantages.

You can convert Polygons to Nurbs fairly easy, but unfortunately the result differs a lot from the original Polygon model. Next to this it almost always turns out to be inconsistent and ugly.

Own Experience

Niek de Moel: “Maya is a great tool, however with a very high learning curve. Patience is an important demand. And after all this work you’ll have to live with the fact that you’ve still only made a movie a few seconds with less quality than movies like Ice Age. It’s nice to have some knowledge of an industry that’s still growing.”

Evert Visser: “ Learning the basics of Maya was a great experience. Maya is a great tool for 3D animation and modeling, however it is also a very complex one. Especially when you don’t speak the 3D modeling language yet. Therefore it was very time consuming but in the end pretty rewarding, even though I don’t see our movie winning any Oscars.”

Resources

www.highend3d.com
Introducing Maya 5.0
Introducing Maya 6.0, Dariush Derakhshani, Sybex/Alias 2004
http://www.peachpit.com/articles/article.asp?p=31330&seqNum=3 (about textures)
http://www.maxschoenherr.de/animation/Maya/MayaPit/pitIndex.html (useful tips)