Assignment 2

Dylan Character

Rationale and overview

Following from the success of his head from assignment 1, I asked Dylan if he wanted to participate in a full-body shoot.

The shoot took 10 minutes, and as a result Dylan's arms lowered from fatigue. This caused RealityCapture to entirely omit them. To fix this, I simply did another shoot next to a table.

One of the main appeals of photogrammetry for me is the ability to use a rough generated model as a base for retopology, just like how a digital sculptor would when using ZBrush for instance. This eliminates the need for front and side reference images.

Having Dylan recreated in CGI form would be useful for the short film or render I have planned for next semester.

Assignment 2: Dylan Character

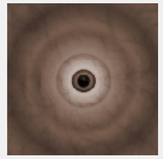
Generating the reference model

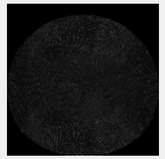
Like with assignment 1, I took many photos around the subject covering all areas. I asked Dylan to look his best, and we used the area behind campus as it seemed like a good place to get even lighting.

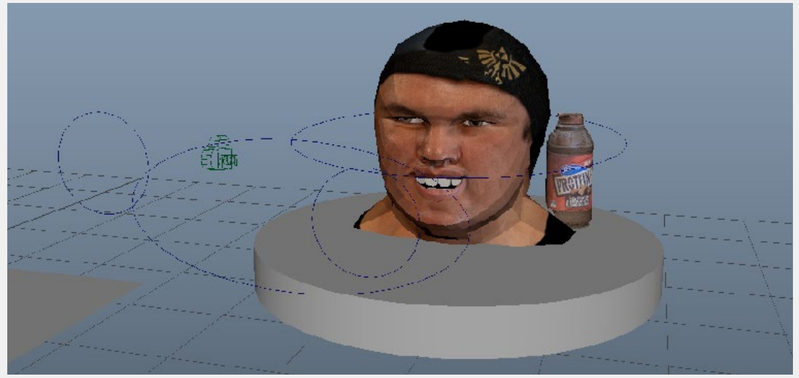
The model was generated in RealityCapture with 107 high-quality images.

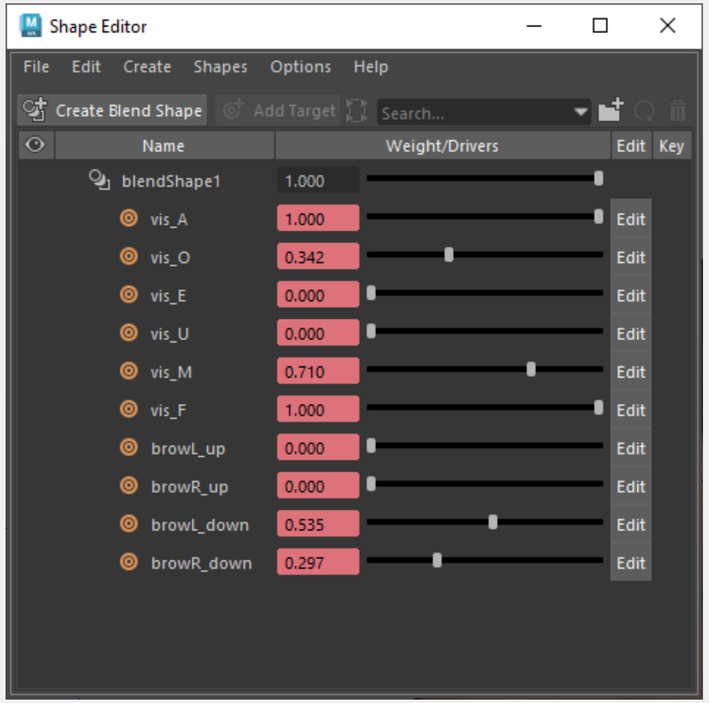
Specs:
- Nikon D5600 with 18-55mm lens
- 1/100s shutter
- f/5.6 aperture
- ISO 400

The images were taken around 10:30 in the morning on the 11th of May.









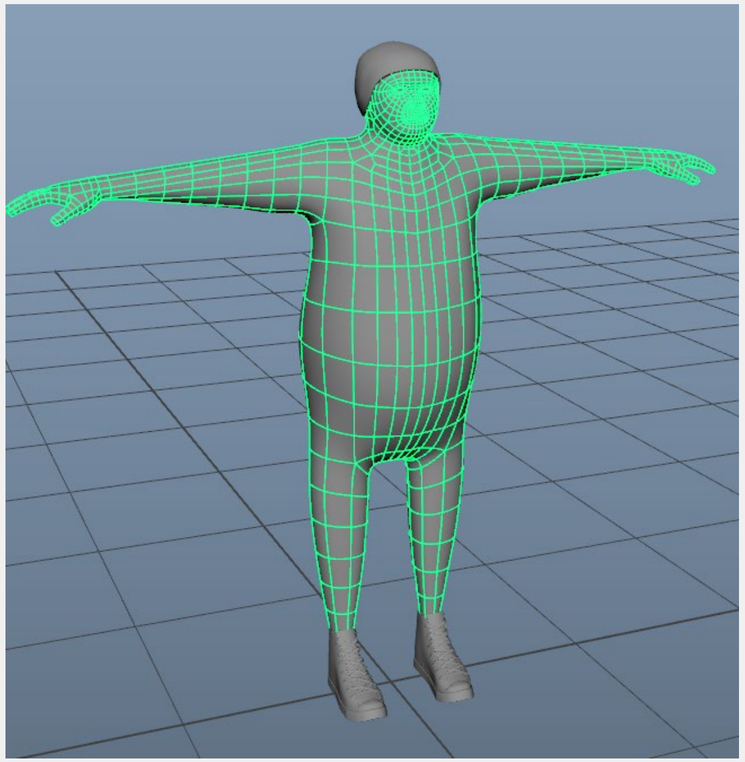
Assignment 2: Dylan Character

Uncanny animation prank

To test my facial animation skills, I created clean topology of Dylan's head and applied an edited texture from the RealityCapture model.

The only form of rigging used were NURBS circles to rotate the head and point the eyes. All other movement was used with blendshapes.

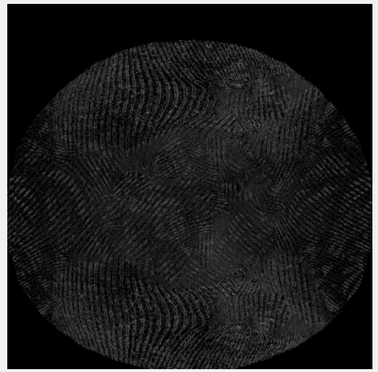
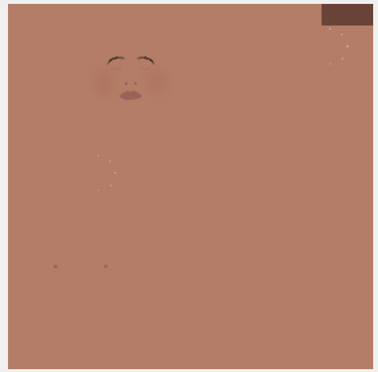
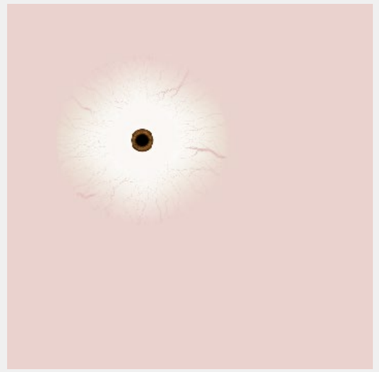
The result is a very disturbing short animation. Viewer discretion is advised.

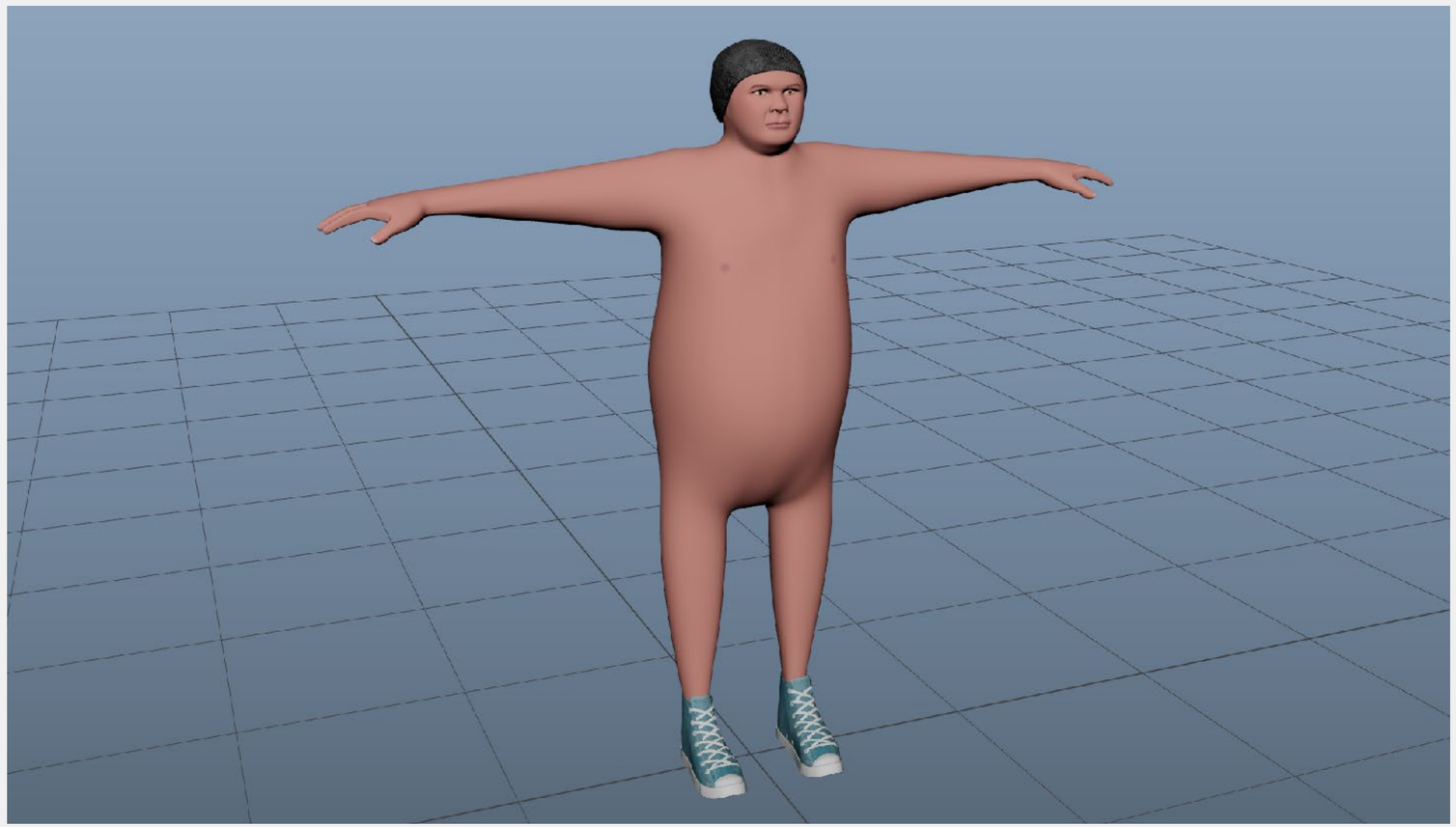


Assignment 2: Dylan Character

Retopology

I used Maya's Quad Draw tool to create sensible humanoid topology based on Dylan's shape, so that the character could be easily deformed and textured. Some areas were rushed for time, namely the elbows, knees and neck.



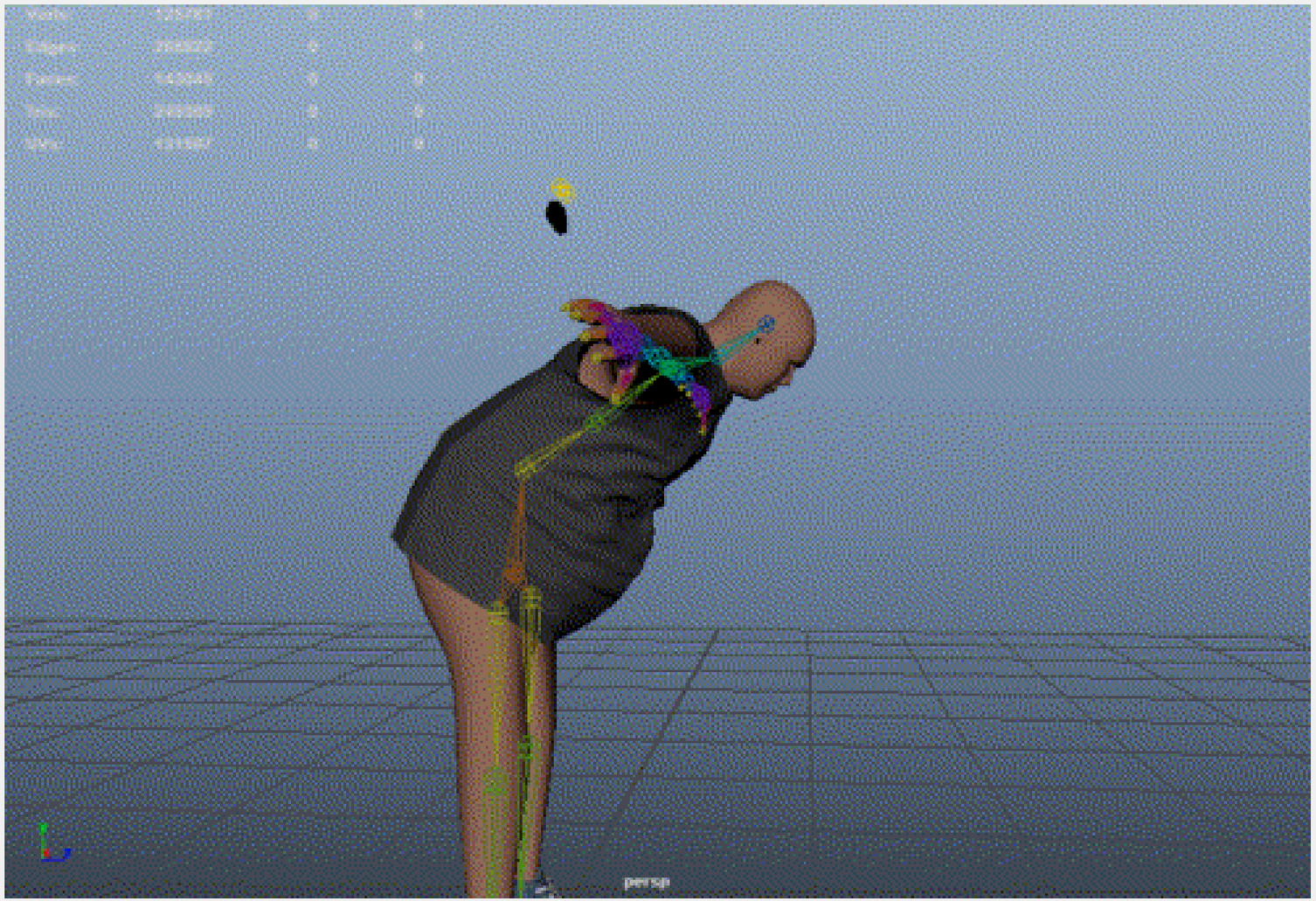
Assignment 2: Dylan Character

Texturing

For the sake of this assignment, I kept the textures simple, creating only basic diffuse maps for the beanie, body, eyes and shoes.

The body texture features eyebrows, eyeliner, cheeks, nostrils, lips, fingernails and nipples.

Cloth simulation



I experimented with simulating fabric using nCloth, a feature in Autodesk Maya.

Not much else to say here.

Final render

Here’s the final render of Dylan in a simple showcase environment. Compared to Uncanny Dylan, this version is much less frightening.

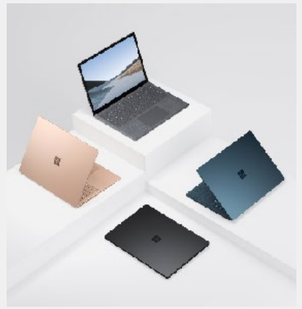
Assignment 2

Mount Victoria Environment

Rationale and overview

This assignment required a full 3D environment, and while it could be something simple, I decided to really put in the effort to recreate the scene pictured to the left, located at Mount Victoria, roughly a 5 minute walk south of the summit.

Before getting started, I was discouraged by the complexity of the trees and bushes in the background. How would I recreate all of them?



Assignment 2: Mount Victoria Environment

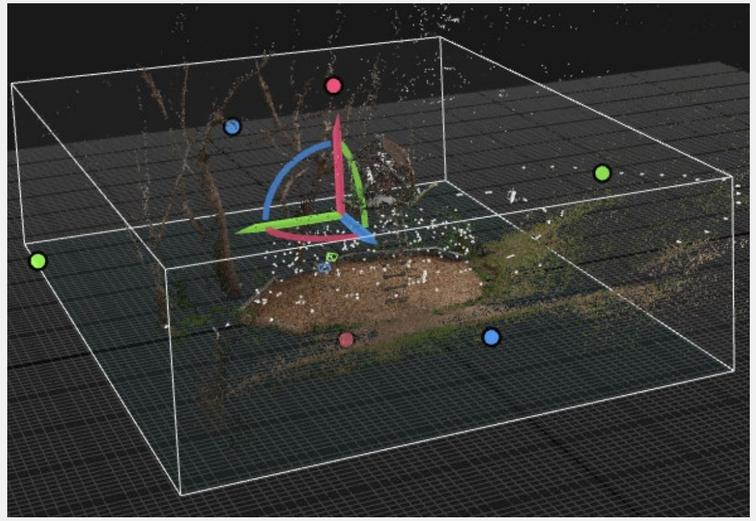
Visual moodboard

Here are two images created by Microsoft.

The top one is reminiscent of Windows XP's well-known Bliss wallpaper, albeit with softer lighting and colours. The level of detail left me unsure of whether it was a render or a real photo, but regardless, the style is the reason I included it.

The bottom one was released alongside Microsoft's Surface Laptop 3 (a product I do not recommend). This stands out more as a render due to the unrealistic nature of it. Interesting to note is the colour of the grass, which aligns with the colours the laptop was released in.

Together, both images share characteristics that are soft, calm and simple.



Assignment 2: Mount Victoria Environment

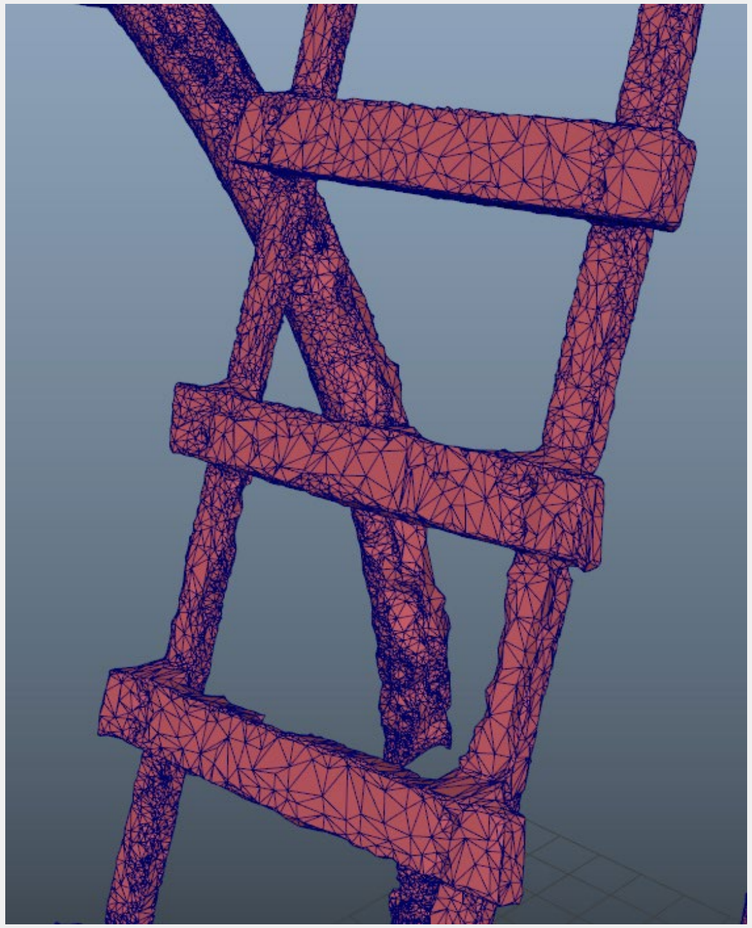
Generating the reference model

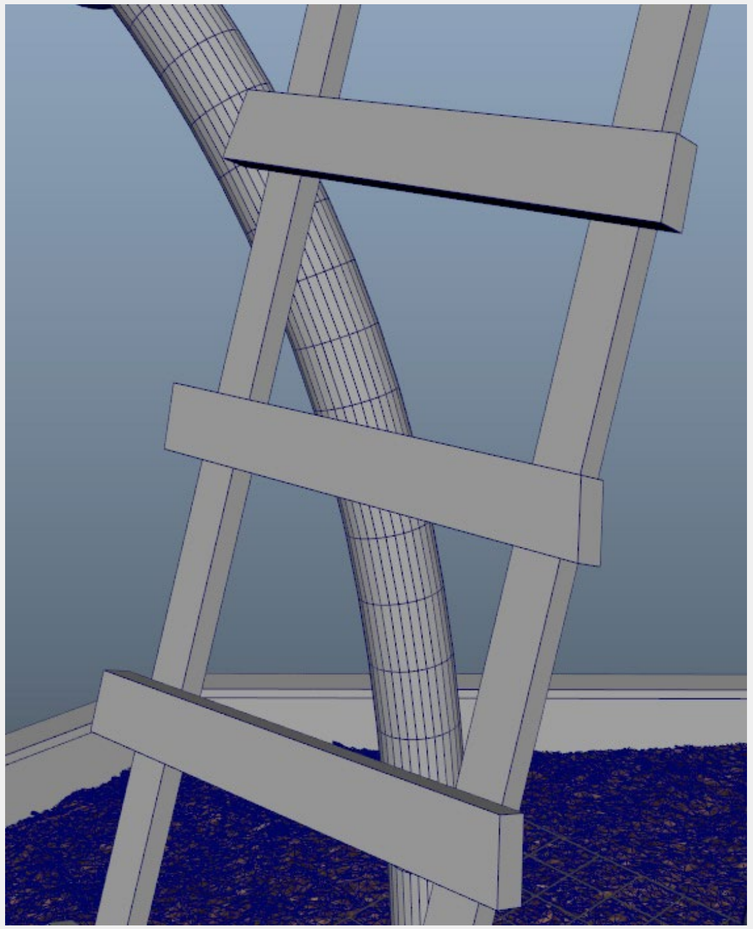
Working with such a large scene required capturing every inch of the location. Over a thousand raw images were taken, but not before maxing out my camera's 32GB card, resulting in me having to return another day.

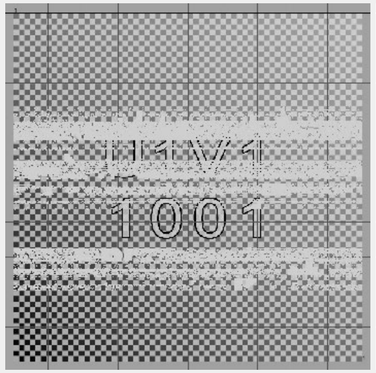
Bringing the photos into RealityCapture worked, but it took a very long time to process, and required simplifying the model before I could even export it!

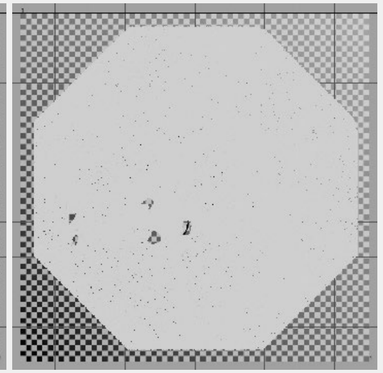
Remodelling

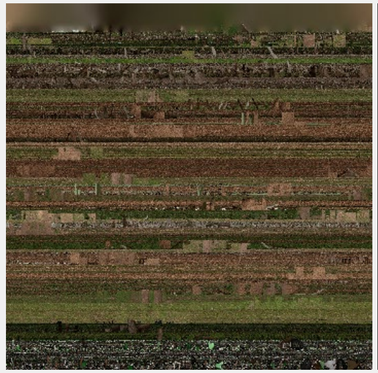
Like I demonstrated in an earlier page, this model required clean topology before it could pass my standards. Considering the ladder pictured, you can see just how much lower the polycount is, reducing the strain on my computer while fixing the model's shape and structure.

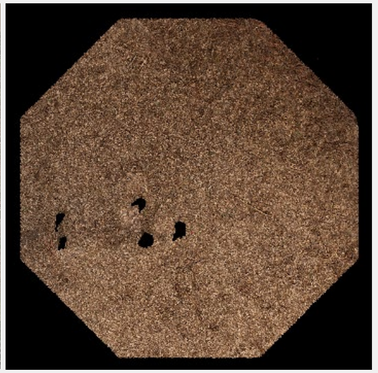


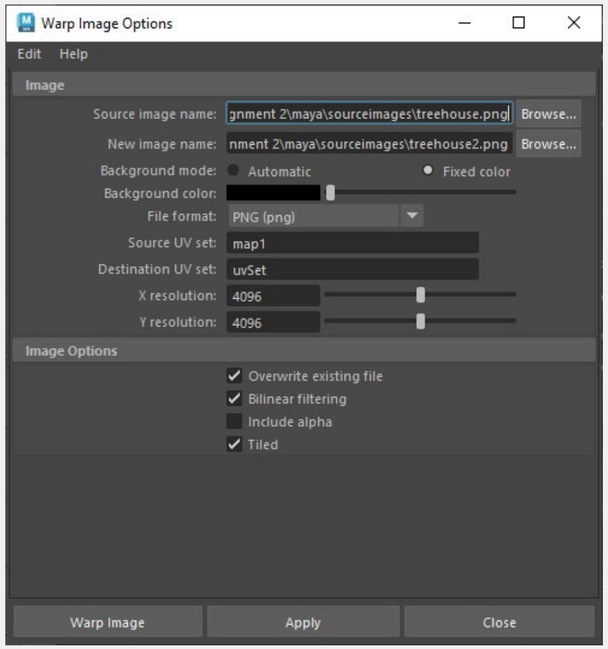


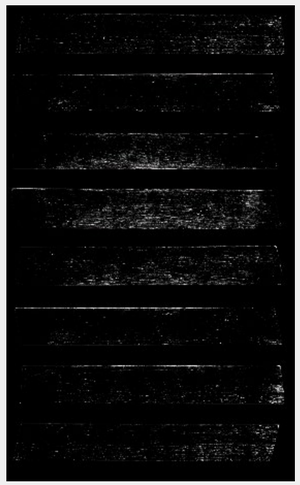


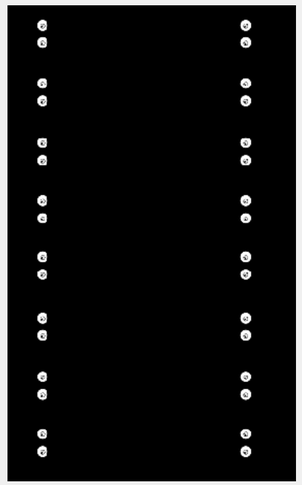












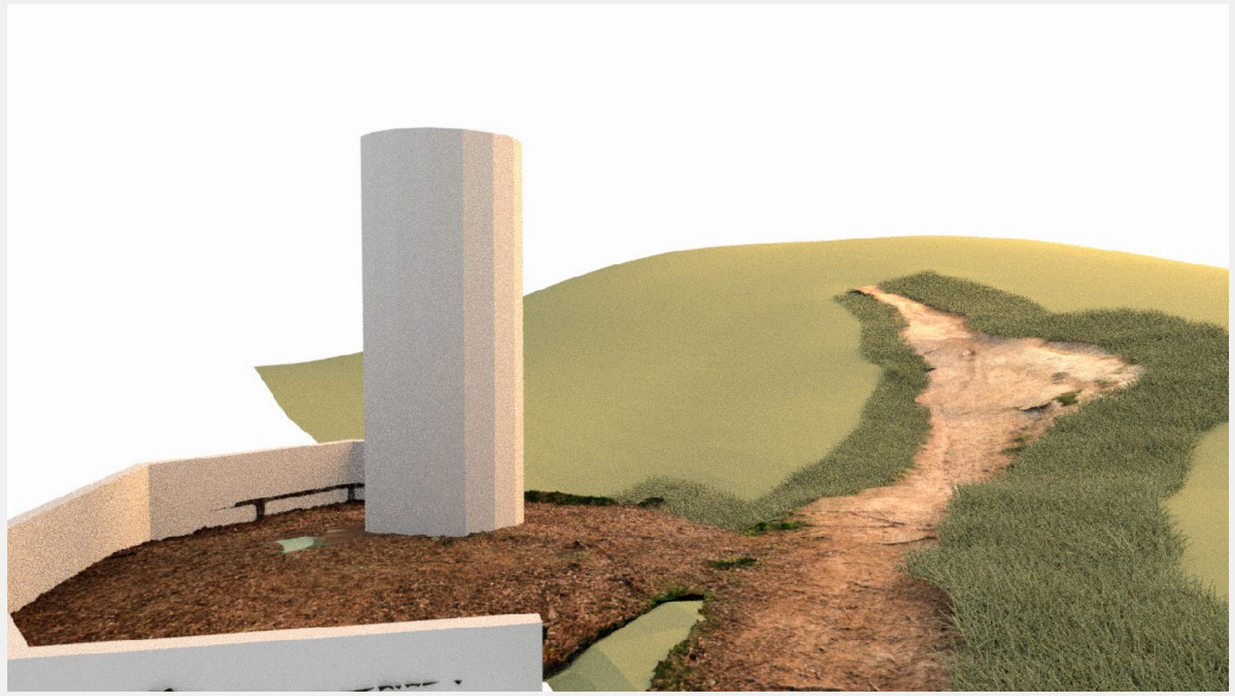
Assignment 2: Mount Victoria Environment

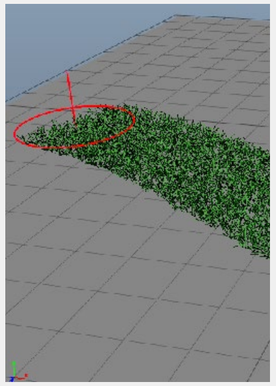
Texturing tricks

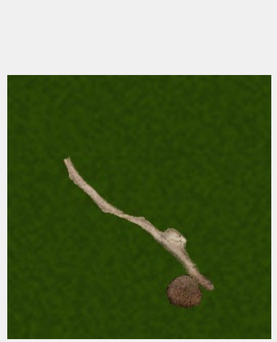
I found a neat feature hidden in Maya's UV Editor window called Warp Image. The gist of how this works is you create a second UV Set with different layouts to the first (top-left screenshots). Maya uses this information to rearrange the source image data (top-right screenshots). I used this specifically to create a tidy bark texture.

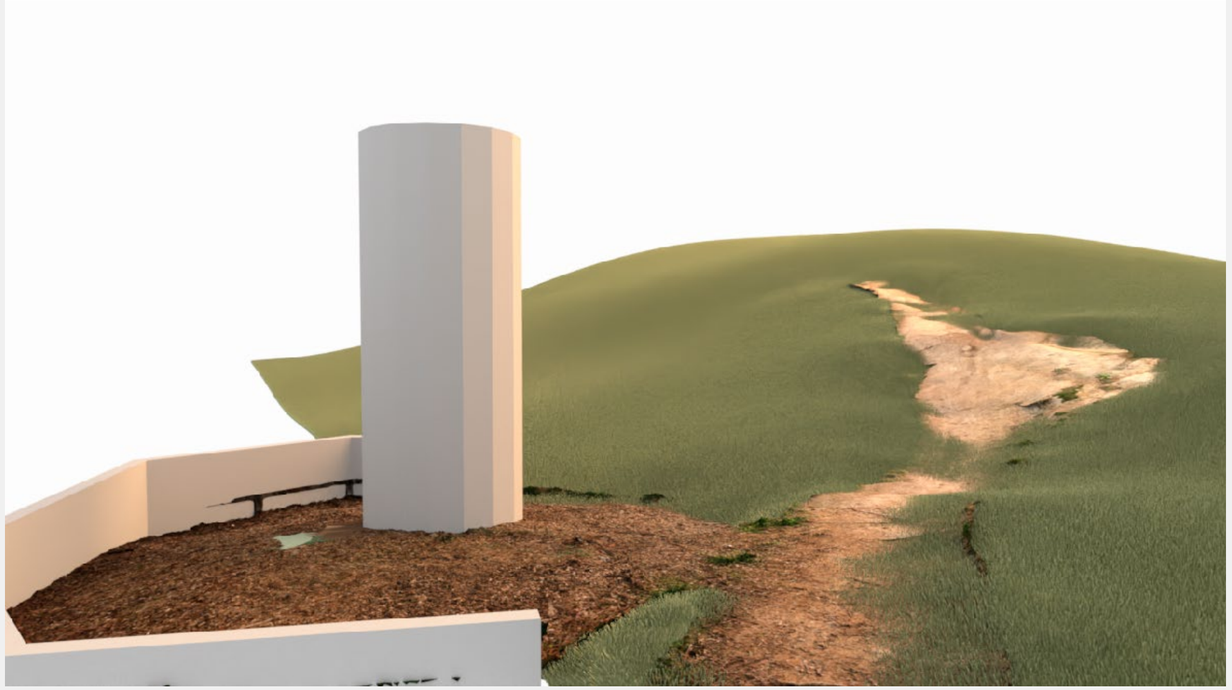
I also edited the texture for the ladder's steps to create specular and displacement maps for the wood polish and studs respectively. Small things to add detail.

Grass: PaintFX or XGen?









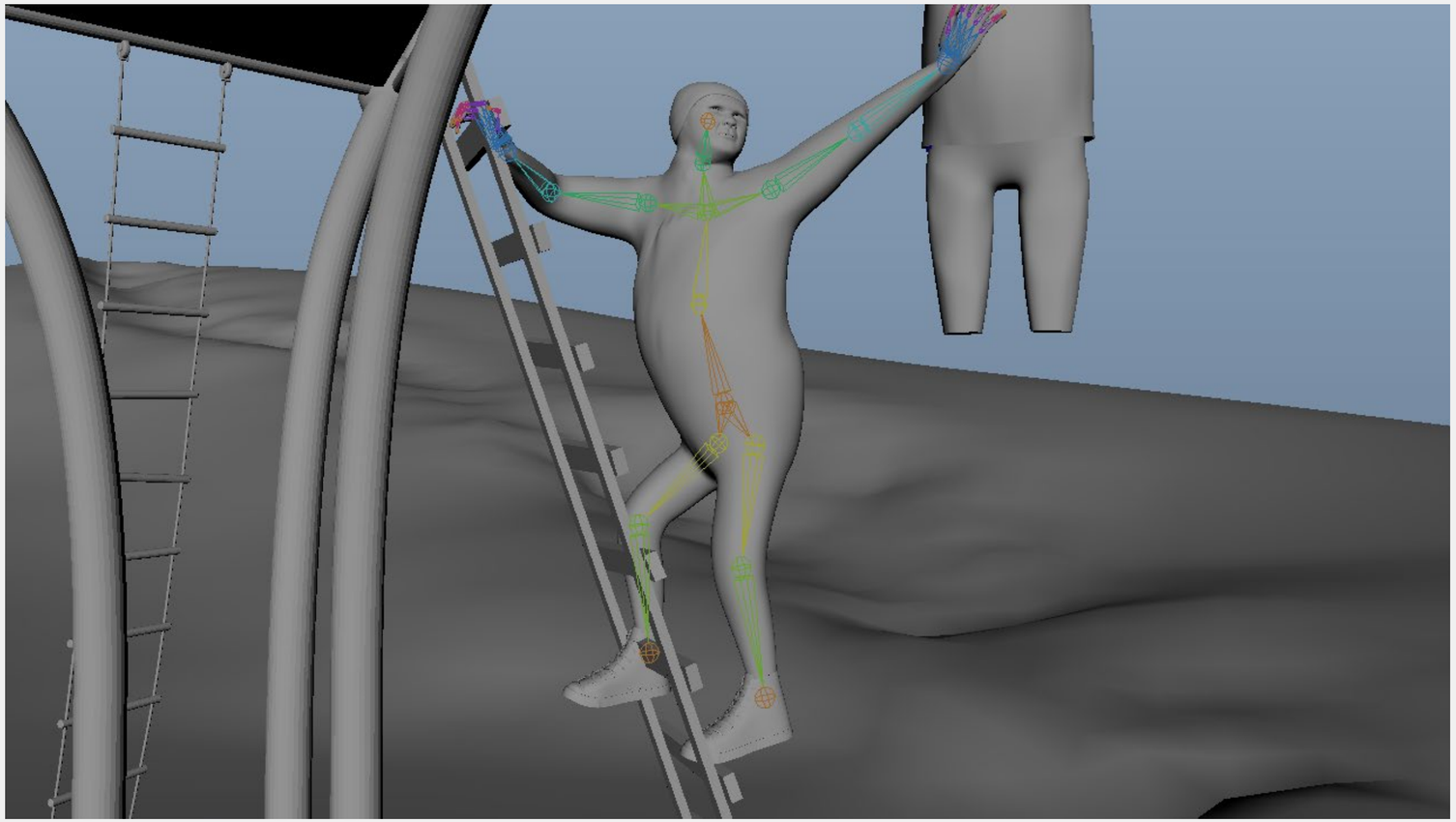
When it came time to create the grass, I had 2 methods at my disposal which work different ways.

The first method, PaintFX, involves choosing a pre-built mesh and painting it on the surface of the hills. Various attributes of the grass could be changed, but my understanding is this method leaves the grass stiff and hard to animate, if not impossible.

The second method, XGen, involves dynamically generating hair, fur or in this case grass, by controlling various attributes through ramps, expressions and texture maps. It can also be connected to a nHair system to make it respond to wind.

I decided to go with XGen. I used an edited version of the hill texture and assigned it to the density and length attributes, resulting in the dirt path being free of grass. The white areas of the texture indicate presence, while the black areas indicate absence.

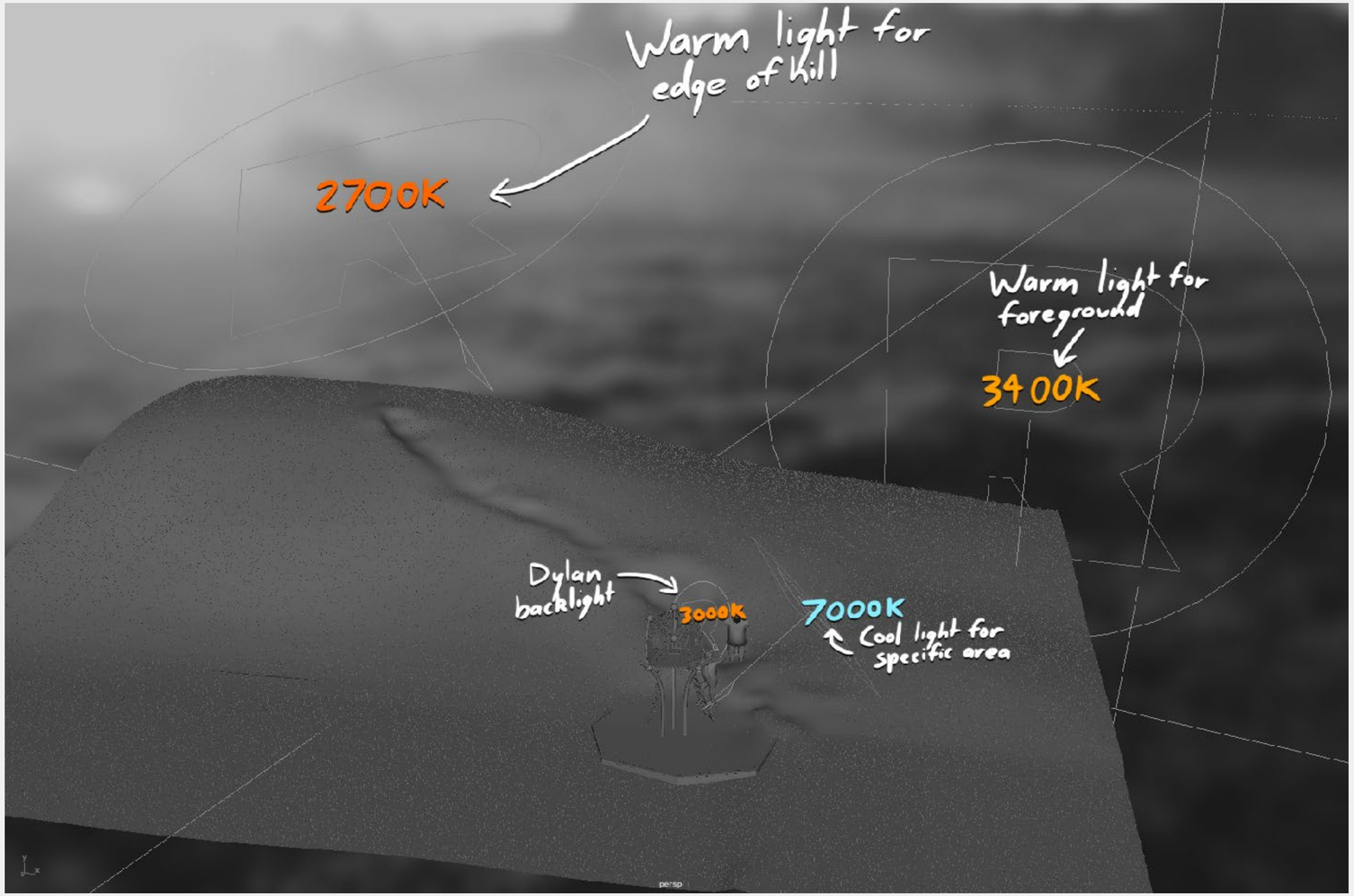
Posing Dylan



I created a simple rig for Dylan, with the extremities being his head, fingertips and ankles. This was all that was needed due to the model's simplicity.

I changed the weight paints on Dylan's legs a bit, so that moving one leg wouldn't affect the other.

Then I set keyframes for all joints at frame 1 forming a T-pose, then again at frame 100 for his climbing pose pictured here. In order for the nCloth to display correctly (which it isn't here), I needed to run a viewport simulation for every frame in-between so Maya could calculate the physics. The final render is from a few dozen frames later, so the cloth had time to settle after Dylan reached his destination.



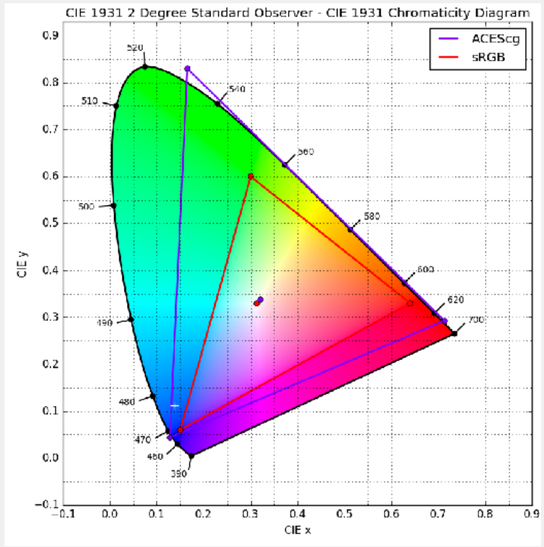
Assignment 2: Mount Victoria Environment

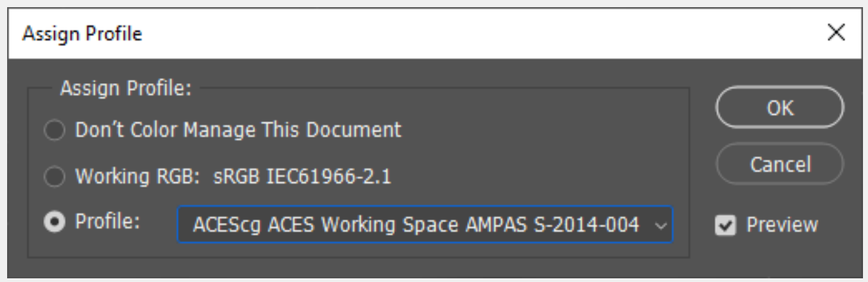
Lighting arrangements

Here you can see the lighting setup for the scene. There's 4 disk/rectangle lights and a dome light with an HDR image applied (pictured at bottom). The dome light provides a background for the scene, similar to a skybox in a video game, with the added benefit of producing different colours to match the image. This results in nice realistic lighting.

I wanted different areas of the scene to look a specific way. For instance the far side of the hill would be lit with a golden glow, amplifying the light from the sun in the image.

A cooler light illuminates the treehouse in the foreground, to avoid going too far with the warmth. A warm backlight is positioned right behind Dylan, helping him feel more seamless with the environment.





Assignment 2: Mount Victoria Environment

Colour management

During this assignment I learnt about the ACEScg colour space. I don't claim to fully understand how it works, but the gist of it is it provides a wider range of colours than sRGB, the most common colour space.

Combining this with the scene being rendered in a 32bit EXR format meant the final exported render would contain vastly more light and colour information than an 8bit sRGB image.

Using this workflow properly meant bringing the rendered EXR into Photoshop, assigning the ACEScg profile from the Edit menu, then changing the image mode to 8bit, compressing everything down to the 8bit sRGB space.

My understanding is that ACEScg is more of a production format, when media is passed between various departments, in order to avoid limitations and compression.

Final render

And finally, here is the finished render.

You can see how the aforementioned light behind Dylan gives him a warm, inviting feel, combined with him waving to someone out of view.

Some textures are merely simple colours, but given enough time they would've looked similar in terms of quality to the ladder. If you look close you can see roughness on the metal beams, and specular areas on the wooden steps that respond to light. The grey balls surrounding the treehouse show the skybox in their reflections.

I never got around to creating trees and bushes, which is apparent as the scene looks rather empty and the background abruptly cuts to the skybox. I tried to mitigate this by introducing a shallow depth of field.