Aber goes to Mars

Rovers Fear Aliens

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1 Introduction

The aim of this assignment was to tell a story in a 3D world created in Blender, with the story centring on the ExoMars Rover Mission, including a video presenting the animation and this written report. The animation should be between 30 seconds – 2 minutes, the video presentation (including the animation) should be between 2 – 4 minutes long and this documentation should be at most 8 pages long.

1.1 Story Plot

My animation begins with a rocket flying in from the left of the screen, rotating so that the user can see the full rocket. Stars (shiny particles) then appear from the right of the screen moving towards the left side to give the effect that the rocket is flying through space. Afterwards flames come out of the rocket's sides to reposition the rocket where it then follows to be pulled down to mars by its gravity.

Next scene starts with the rocket landing directly on the mars surface. Next the door to the rocket opens, revealing a mars rover and a ramp comes out from the rocket. The rover proceeds to come down the ramp and then adjusts itself to mars surface. The camera then changes as to allow the viewer to see the same things as the rover would and the rover proceeds to move around the mars surface slowly as a human would when discovering a new world. Next the rover places an object on the mars surface and moves back a little and the placed object proceeds to grow upwards and a flag comes out its side with the Aberystwyth logo on it. Next, the rover picks up a mars rock as if to investigate it and then rotates to reveal an alien standing next to him who waves at the rover almost immediately as to greet him. The camera waits for the alien to finish waving to give the effect that the rover is still processing that there is an alien in front of it. Suddenly, the camera zooms out really fast to reveal the rover and the alien and once the camera has zoomed out completely, the rock the rover was previously holding falls quickly from the sky behind the rover as to represent the rover being so scared that it defecated itself. After that, the rover drives quickly back to the rocket with

the alien chasing after it but the rover makes it back to the rocket, goes up the ramp and the ramp goes back into the rocket, the rockets door closes and the rocket takes off back into the sky.

2 3D Graphics

Blenders Primitive Meshes

Every mesh originally started as a primitive mesh, some have been altered slightly using editing tools but a few have remained the same. For example, the rover is made up fully of primitive meshes which have not be extruded or intruded although a few faces of specific meshes have been moved in edit mode. Another example is the rocks around the map are based off a two meshes which are simple primitive icospheres meshes that have just been scaled differently from the default.

Mesh Editing Tools and Modifiers

To change the meshes to the desired shape I often had to use different editing tools and modifiers, for example, to create the rocket I had to use 'w' key -> SUBDIVIDE to get the right number of faces on the rocket, then I had to extrude some faces by going into edit mode, selecting the face I wanted to extrude and then pressing the 'e' key and dragging to the size I wanted, afterwards I had to select the front face the piece I just extruded and drag it downwards to create the ends of the rocket. After this was done the rocket still looked too sharp so I added a Smooth modifier to make it look better, I did this by going to the Modifiers tab -> Add Modifier -> Smooth -> Apply.

Creating the alien mesh in particular used some more mesh editing tools and modifiers. For the alien mesh I started off with a cube mesh and by extruding faces I created half the aliens meshes body (excluding the head), then in Edit Mode I adjusted the vertices, edges and faces so that it would look more like an alien body. Once this was done I used a mirroring tool to mirror the half of the lien meshes body that I made along the x-axis by selecting the whole mesh and pressing CTRL + M and dragging appropriately. Once this was done, I put the two meshes close together with tiny gap and combined them into a single object by pressing CTRL + J. Next, I deleted the faces that were facing the opposite mesh part (the faces along the middle of the mesh) and selected each edge with a gap between it and created a face between them by pressing the 'f' key. Lastly, I added the head and the eyes by creating them and fusing them into one mesh just like mentioned previously and gave it a Smooth Modifier just like with the rocket to give the alien a better shape.

Another editing tool I used was the proportional editing tool; I used this tool to make the mars surface look more realistic with hills and valleys and different pathways. I did this by selecting the surface plane -> 'w' key -> Subdivide to give the plane a reasonable number of faces, and then I went into edit mode and selected multiple vertices by using the 'c' key -> Enabled Proportional Editing -> Set Proportional Editing Falloff to Smooth -> Dragged the selected vertices to desired position -> Scrolled in/out with my mouse scroll to create a smoother landscape.

Materials and Textures

I added materials and textures to almost all my meshes, for example, for the rocket I went to the materials tab -> add new material and then adjusted the diffuse colour to pure white. For the solar panels on the mars rover, I repeated the same process except left the diffuse colour as default and

checked the Mirror checkbox and adjusted the reflectivity to an appropriate amount so that it would look like a more realistic solar panel. Just like materials, I have also added multiple textures, for example on top of the material for the solar panels there is also a texture I made by going to the texture tab -> New -> Image -> Finding image file -> UV Editing Layout -> Edit Mode -> Select Image file again -> Select all faces for the texture -> 'u' key -> Unwrap -> Default Layout. This placed the image of solar panels I had on the faces of the mesh that I selected. A few of the texture images were taken from other websites which should be mentioned [4] [5] [6].

Lighting Setup

For the lighting I used a sun lamp to give the effect of the sun shining on everything and gave it a reasonable brightness and placed it away from the surface of the map. I did this for both scenes. For the second scene I used a two spotlight lamps, one pointed directly on the alien mesh from above with a slight angle, I did this to give the alien mesh a more menacing look and the other pointed on the flag to make it stand out and to make it visible as it was facing the opposite way to the sun lamp.

Camera Setup

For the first scene I used only one camera and moved it about with transformations and key frames, but for the second scene I used two cameras. The first camera was like the camera in the first scene but the second camera was attached to the rover as a child by selecting the camera (selected first) and the mesh of the rover that I wanted the camera to be attached to -> CTRL + P -> OBJECT. This allowed the viewer to see what the rover would be seeing when the second camera was active. To switch between cameras during the animation I had to add markers at the desired frames using the 'm' key and then I had to bind the camera that I wanted active to it by using CTRL + B with the camera selected as active camera.

Animation

To create the animation of most of the meshes I mostly just changed the position, rotation and/or scale of the object on the frame I wanted it to be at and turned it into a key frame by pressing the 'I' key and selecting either LocRot or LocRotScale or whatever was most appropriate.

The alien mesh was a little more complicated, for this mesh I had to create an armature inside the mesh and set it as the parent of the alien mesh by selecting the alien mesh (selected first) and the armature -> CTRL + P -> ARMATURE DEFORM WITH AUTOMATIC WEIGHTS. Once this was done, I had to go into Pose Mode to move the bones (parts of the armature) and start making key frames.

Physics and Rigging

In my animation I used a few different physics and rigging techniques, for example, both the first scene and the second scene use emitter particles for the rockets flame because I was unable to make a real flame when following a tutorial, the first scene also uses emitter particles for the stars. To create the emitter particles I selected the object the particles would come out of -> went to the particles tab -> New -> Set Type to Emitter, number of particles, velocity, start and end frames, lifetime and randomness of emission. To get the colour of the particles to become either bright white like the stars in my animation or orange like the rocket flames I changed the material of the mesh that the particles were coming out from (e.g. colour and brightness).

Another technique I used was a Collision; I gave the mars surface Collision physics so that the flames from the rocket would bounce off like sparks would do from a fire to give it a more realistic, flame-like look. To do this I went to the Physics tab -> Collision -> Adjusted variables so particles would bounce off. I set the permeability to around half so that it looks like sparks are bouncing off but not the whole flame.

Lastly, I created a hair particle system on the mars surface as to display rocks all over it. To do this, I went to the Physics tab -> New -> Set Type to Hair -> Set Renderer to Group -> Set Dupli Group to Rocks -> Set Size and Random Size. I set Random Size to what it was so that there was more diversity in the rocks. Furthermore, I created the group Rocks by selecting the two different kinds of rocks I had made -> for each, went to the Object -> In Groups selected Add To Group -> Added the objects the Rocks Group, I did this to further increase the diversity between the rocks. Some of the rocks got in the way of the rovers travel path so to remove them I had to select the mars surface and go into Particle Edit Mode and click all the hairs that I didn't want.

Link to YouTube Video

https://www.youtube.com/watch?v=P33MVzTyf_4

2.1 Permission to share YouTube link

I allow that my animation is shown to other students and be used in university related activities.

3 Video Editing

While creating the full video I used several techniques;

Adding movie and sound strips

First I added in all the movie and sound strips into the video using ADD -> MOVIE and ADD -> SOUND. At first the sound didn't match up with the movie clips so I changed the sync mode to AV-sync. A few of the sound strips were taken from YouTube [1] [2] and converted into wav files via a website [3].

Adding Text

To add text at the end of the full video I used ADD -> EFFECT STRIP -> Text, I then changed the text to display 'This was my animation. Thanks for watching' and adjusted the position of the text and its size in the properties window.

Adding transitions between movie strips

I moved movie strips to different layers and overlaid them then for the first two movie strips I selected them both and added a Gamma Cross transition by using ADD -> EFFECT STRIP -> GAMMA CROSS. Next, I overlaid the second and third movie strips and then I selected both movie strips and added a Wipe transition by using ADD -> EFFECT STRIP -> Wipe and I selected the type of Wipe I wanted which was a Single transition with an Out direction.

Hard and Soft Cutting

For the music of the animation (sound strips) I used hard and soft cuts to get the sound strips to become the right length. I avoided using hard cuts most of the time as it made it harder to fix any changes I made later on to the video strips and I used soft cuts only to make it easier to get the right length of the sound strips but using the length property in the properties window also did the same thing.

Key framing Sound

For the music of the animation, I overlaid the sound strips and adjusted the volume of the strips at specific frames and created a key frame at each changed frame by pressing the 'I' key while hovering over the volume property on each changed frame. I did this to provide smoother transitions between sounds.

Overlaying Images

I put images of meshes over my presentation to make it clear what mesh was what, I did this by adding the images using ADD -> IMAGE, then I dragged the images to the proper place and stretched the image strips to the desired size. Next, I set the Blend to Alpha Over and checked the Image Offset checkbox and all that was left to do was change the x and y positions to the appropriate positions for each image. I chose not to use an Alpha Layer for the image meshes as I believe that it would make the image of the mesh harder to see.

Link to YouTube Video

https://youtu.be/EdP-DQfZFHU

2.1 Permission to share YouTube link

I allow that my "presentation video" is shown to other students and be used in university related activities.

5 Critical evaluation and Conclusion

3D Animation: 60/100

This section was one of the hardest sections but also the most fun, I was most proud of my use of materials and textures as they have really gave my animation a much more lively appeal, especially the solar panels on the rover really stand out in my opinion. One of the few things that went wrong was that in the second scene of the animation there is a white light against some parts of the mars surface and I am unaware of how to get rid of them. As well as this, the alien mesh has an unusual line going down its body; this was most likely caused due to me creating the alien mesh the way I did (joining two meshes together). If I were to redo this animation I would definitely try to make sure I don't have the same problems as previously mentioned by constantly checking the lighting and creating the meshes in a more normal way. Most importantly, if I was to redo the animation I would try to think of a better storyline, as although I believe it to be comical; I also think that it's quite quick and boring.

Video Editing: 80/100

I am fairly confident in this section as I have created a video with a large number of different techniques and amazing transition effects which is what I am most proud of in this section. The hardest part of this section was definitely trying to find music (sound strips) that was the right size and sounded good. If I were to redo the video editing I would try to add a green screen to make my video more appealing, also I would like to have found better music, although I did like the music I chose a little because it was from a game called Pikmin which is about explorers exploring another world and so suited my animation.

Written Report: 90/100

This section was the most comforting to me as it allowed me to explain my thoughts and ideas and display the reason behind them which some viewers may not understand, for example the music of the animation being used from the game Pikmin seemed like a smart idea if you understood the game Pikmin and that the music was from there. If I were to repeat this section I would try to get someone else to proof read and change anything they didn't fully understand and I would record the websites that I took images/sound from immediately after I took them so I don't miss any.

Global Appearance: 95/100

I am most confident in this section as my presentation included full eye contact as I included a script in front of the camera but made sure not to sound to monotonic. Furthermore, the overlaid images in the presentation should provide more engagement for the viewer and I have adjusted the volumes nicely using key frames. If I were to repeat the global appearance I would try to add some illumination effects.

In conclusion, I am most proud of my use of materials and textures and transitions between scenes including transition effects and volume key frames. I would grade myself accordingly; 3D Animation: 60/100; Video Editing: 80/100; Written Report: 90/100 and Global Appearance: 95/100. Overall, I am very happy with the final video.

References

[1] https://www.youtube.com/watch?v=28uI9sGD50M

[2] https://www.youtube.com/watch?v=WLA6sGQuftk

[3] https://www.saveclipbro.com/

[4] https://www.vectorstock.com/royalty-free-vectors/electric-panel-solar-texture-vectors

[5] https://www.solarsystemscope.com/textures/

[6] https://www.freepik.com/premium-photo/red-sand-texture-background_1758150.htm