

Robust Report - Ben Richards

by Ben Richards

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Executive Summary

During this Semester, we threw ourselves into full production for the animation that we had planned before Christmas. We began by splitting environments between each other so that we could all have a go at crafting an environment. The Environments I created were for the opening Hangar sequence and also the 10 second long sunset scene after our hero's lowest point. Through careful shot design and composition these environments were completed in no time, and I was able to cross straight over into animating them.

As time progressed, I was sent the other environments and went through them all, animating the characters and even, in some cases, doing the Visual Effects. The desert wall was a particularly difficult scene to work on due to technical issues and, being the longest scene, it's render times. Towards the end of production, as deadlines loomed, the Beach and Wheatfield scenes were sent to me with the characters' very basic animations to save time. I didn't mind this as it allowed me to focus on rinsing the scenes for all the characters I could, as it gave me more time to work on subtly and detail.

During pre production, I was tasked with creating HUD effects that we would then composite onto the renders. Originally conceived in After Effects, I ended up using Blender to create the HUD as it allowed me to craft a HUD that easily matched the look of the rest of the render. Making different HUD's for different scenes was a quick process so I carried a similar style over to the title sequence and credits, as it would really give our film a cohesive style.

Detailed Production Diary

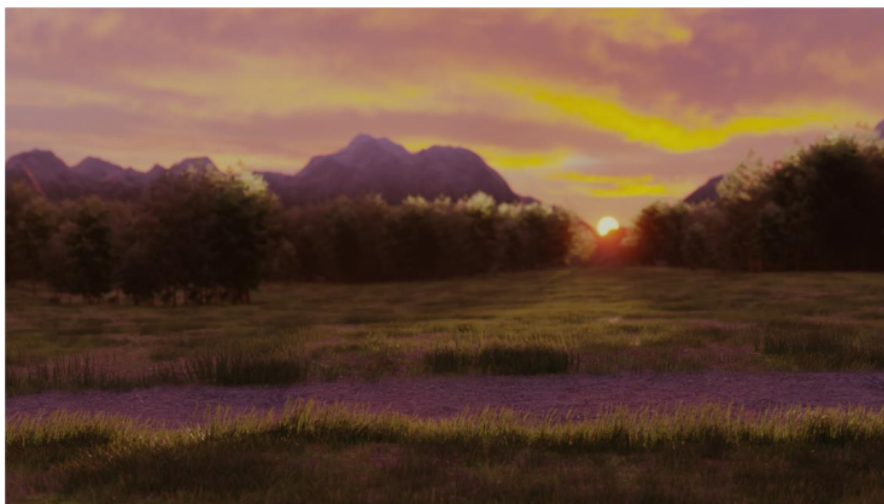
Sunset

Environment

The first thing I did this semester was work on the sunset scene that appears right after our hero's lowest point while I waited for the other environments to be made. I took this shot from our animatic and started to craft an environment around it. Starting with a plane displaced with a modifier as a foundation, I used planes shaped like grass and a hair particle system to cover the ground floor to create a field. Using planes with pictures of trees, and again, a different hair particle system, I lined the horizon where the ground and sky meet with trees. Seeing how well the trees worked, and how harsh the grass looked, I decided to find images of grass to use as textures, as I had done with trees. Being real images, the new grass looked much better for the scene, and so I scattered them around the ground, using vertex groups and weight painting to control where I wanted the grass to be densest and where I wanted none at all. I used a displacement map on a bigger plane set behind the trees to create a mountain range, which would really help give the scene a little bit of depth, a sense of scale, and would really help with the composition I was going for, especially with the little dip where the Sun peaks over.



As the scene started to come together, I went into Blender's built-in compositor to see how the scene could be improved outside of the render. Here I added some glow to the sun and, using a mist pass, I added some depth to the scene, faking some volumetric fog that would have taken a long time to render otherwise. That and adding a little Depth of Field really helps to give the render a sense of space. As I spent more time in the compositor, I came to realise that errors that I had made during development could easily be fixed with some well thought out compositing. One such issue was that I'd created the environment without checking the scale of it with the character model, meaning that the character was basically a giant in this setting. This led to me splitting the scene into 3. The background, the Robot and the foreground. Using cameras with the same keyframes but different scales, I was able to easily composite our character in, without destroying my carefully crafted environment.



Ben Richards - 1702628

After adding a HDRI to give a nicer looking sky and to help light the scene up a little more realistically, the scene was really starting to pull together, but there were still some things missing. So I went back into the compositor and experimented some more. Using the compositor, the sun was now able to give off some lovely light beams that really helped to make the scene more vibrant and real, as well as a small lens flare that made it seem more convincing. This is where the fact that the robot was being composited came in handy, because had the robot been a part of the original render, then glints of light that caught the robot's metallic surface would have also given off sun beams.



From here, it was mostly just small tweaks and changes, mostly to do with the colour grade. However, I started to feel like this scene was a little too claustrophobic for a shot set in a big open space, so I adjusted the focal length of the shot to 30mm, which matched the look of the animatic shot much more. This helped the scene to seem a lot more open and besides some adjustment to make the previously unseen parts of the environment a little more passable, it wasn't that hard of a change to make.



Animation

The environment isn't the only thing in this scene that was important. This was a shot that follows on from a sad scene of one robot falling behind, so the animation for the robot needed to reflect that. The robot stops and looks back towards where he left his fallen friend, and I wanted to try and make it obvious that he was feeling conflicted. This went through several different iterations, one version including his decision to keep going as a "program override" function, showing that he has no control over it, but I felt like that harmed the overall story more than it added to it. Wiping away a character's freedom felt like a lazy way to progress the story, so the robot needed to make the decision to carry on themselves, for both his and his friend's sake.

Title Sequence

Once the sunset shot was in a place where only minor tweaks were needed to correct it, I started working on the opening scene of our story. The hangar where the robot starts his journey. Thinking about how we can open our animation led me to creating an opening title sequence that plays off of the AI theme that we have. Inspired by a few different places but mostly from the Ultron and Jarvis designs from *Avengers: Age of Ultron* (Joss Whedon, 2015). The original concept came from the idea of following the robot from birth (The Hangar) to Death (At the Wall) but as the idea for the end changed to a more happy one, it just became an entertaining and subtly informative way of beginning the animation.

Hangar

Environment

The Hangar was a difficult environment to begin. I attempted many times to create a full hangar environment, complete with cargo boxes, cranes and other models to help build up the world, but as time ticked away, and the render's started to take more and more time, I tried out the complete opposite. Originally, when conceiving this environment, I wanted it to be important that it's all mostly dark, with barely any lights before the hangar doors open, bathing the robot in bright sunlight, which is shown in the top image. Almost feeling like a birthing of sorts, before he sets out on his adventure. This led to me just having the hangar be a box with a small amount of modeled detail but nothing more. This meant smaller render times and worked compositionally for us as it made the shot where the door opens and the robot is flooded with light that is much more impactful and really helps to contrast with the brightness of the outside.

Cinematography

The shot design of the opening sequence is something I enjoyed working on. Having the robot start out in a dark room with limited lighting and then being flooded with sunlight gave me a lot of freedom to get some pretty looking shots, as well as shots that I felt really adds to our story. There are many shots I like in this sequence, but one of my favourites is the shot of the Robot's Eye as he's watching the hangar doors open. We, as the audience, can see the door open in the reflection of his lens, with the distortion of the lens bending the reflection around his 'pupil', stopping the light from touching his soul and keeping him in the darkness. This was not intentional, I originally only tried out the shot because I thought it could make for a beautiful shot, but I'm really happy with where it led.

Originally, at the end of the scene, we had a shot of the robot blasting out of the hangar, over the water. This shot went through several iterations but it just never seemed to work for us, so we ended up replacing it with a shot of the camera flying out of the hangar and having it travel over the ocean, where it eventually transitions into a shot that Dafydd worked on, actually showing the robot travel. This worked much more than the initial shot, as it transitions much better into the rest of the animation, but also sells the journey that this robot has been on and the distance that it has covered in it's quest.

Animation

The Animation for the Hangar Scene was difficult to approach at first. There were a lot of things that we wanted to convey and establish through our character's animation, most of all the personality of our Hero. To try and make the robot a little more relatable in how it acts, I animated it to be a bit groggy when it initially awakens, mimicking how humans are when they have just woken up. This and the frightened jump when the crane carrying the package drops down should help it connect with the audience almost instantly, which will hopefully lead to the audience's heartstrings being tugged at later when the robot displays a desire to hold another's hand. This is an idea pulled straight from *WALL-E* (Andrew Stanton, 2008), and while Pixar certainly earned the pay off to this in their story, I hope that we have done enough to earn it as well, especially as the final shot in our story is the Robot getting it's wish.

The Beach scene, while mostly Dafydd's work, I also helped with. I ironed out some basic Animation that he had keyframed and really tried to rinse it for character and emotions,

especially as this is our hero's test. This was the scene in which he makes his big decision and that wasn't going to be easy. Initially, the robot is sad to find no one to greet him at the beach, and my intent was to show that he was close to abandoning his mission and listening to the messages that appeared on his HUD. I brought back the hand holding theme again here as I saw it as another chance to build towards the final shot. On top of this, the determination of the character was important to show. While before the audience might have just assumed he was a robot carrying out programming, it is now clear in this scene that this robot has his own goals and thoughts and is headstrong enough to want to follow through on those goals.

As well as an emotional performance, I also needed to animate the robot experiencing difficulty in trying to traverse a landscape he is not built for. The effort that he goes through trying to get up one dune was important to set the stakes here. The robot has to fight so hard for a little control, so at any point, his quest could end and he'd be stuck. Conveniently, the slow and sluggish movements really helped the pacing of the scene, with the slow movement of his ski's on the sand really emphasising, not just the power but also the determination that the robot has.

Desert Wall

Animation

The Desert Wall scene proved to be the most stressful and problematic of the scenes I worked on this year. Originally created by Bibin, I had a lot of issues with the linking system in Blender. While I had appended the robot rig into the scenes beforehand, this time I tried linking it in, in an attempt to create a smaller file size for uploading to our server. In a cruel twist of fate, it was this that ended up causing issues, as the links kept breaking in strange ways, with no real ways to fix them outside of unlink and relink, and even that stopped working eventually. In the end, I had to append the rig in any way, but for some unknown reason, I suspect it was something to do with data from the previously linked rigs not being entirely removed, even the appended rigs started to break in ways that severely limited my ability to animate. That on top of this being quite a complicated scene to animate anyway, made this my least favourite scene to work on and the irony of this being the hero's lowest point, as well as my own is not lost on me.

Before I had all the issues with rigs, I did manage to get a decent foundation of keyframes in for the whole scene, so apart from one time towards the beginning of my work on this scene, I didn't actually lose any work or have to redo it all. There were a few emotions that I knew early on that I wanted to come out of this scene. The first, besides the difficulty travelling which was already established before, was joy at seeing another robot. This is a split second emotion, as the robot immediately attempts to locate a safe way down, with it leaning over the edge to see how high he is. The design of the robot made the use of IK handles a little finicky to use, but after refining it, I think the movement of the robot came out pretty well. From there, things don't go too well for our character, as he eventually falls and ends up heavily damaging himself on the big border wall at the bottom of the dune.

The crash itself was a little difficult to animate, if only because of my initial way of keyframing the root to rotate, when I should have only keyframed it to move, saving the rotation for the

body of the bot. That would have solved many issues I had with faulty momentum and janky physics. Despite these issues, I feel like I got the pacing of the crash correct. The robot ramps up over a dune, only to come down hard, spinning hard with each crash. The air that the robot gets lasts a little longer than is realistic, intentionally, to try and give the audience a little bit of anticipation before the crash.

During his interaction with the second robot is when we start to get the pay off to the hand holding idea. Potentially dying, we show the audience that despite this goal of having something other than the package in his hand, the damaged bot pushes the second bot to complete the mission, using his hand to point the robot away instead of holding it out for help. This moment really helps to sell this moment, as this interaction needed to be very one sided, with the broken bot being the driving force and the other bot being submissive despite it's wishes. Handily, the subtle moments of the hand pointing, the weak and shakily way that he's holding his hand up was easily created by using a noise modifier on the hand's IK handle F-Curve in the Graph Editor. Subtle movements that I had to animate by hand though were the movements of the other robot, especially the wheels which required a lot of tweaking to get right.

Effects

As well as the Animation of the robots, I also did the smoke/sand effects of the robot slipping down the hill and crashing into the wall. These effects were relatively easy to create and it was just a case of trial and improvement to perfect it. Constraining a plane to the robot, but only along a certain axis, I created a particle system that, when told, emitted particles that were rendered as image sequences of wispy smoke. In the shader editor, I used a 'Particle Info' node to control transparency, making the smoke fade away instead of blip out instantly. The icing on the cake was then having the particles get larger as they got older, and then randomising the scale, so that the smoke trail looked chaotic as it spread out. While I was happy with how I'd handled these effects, especially as I was rendering separately and then compositing them onto the animation, I never found a way to properly trim down the render times without severely sacrificing visual quality, causing this to be the longest we had to wait for a scene render, some frames taking up to 3 minutes to render at a time (although this was the most extreme case. Mostly, the frames took between 90s to 140s to render). This was especially frustrating, because this was a scene that ended up having to be rendered multiple times due to certain issues.

Wheat Field

Animation

Similarly to the Beach scene, Dafydd sent the wheat field environment file to me with a bare bones foundation animation already done although, unlike the beach scene, my work on this scene was a lot more than just building on what was already there. For some shots, I had to completely redo them, although this did not take that long.

This was another very emotionally charged scene, as this is where our second robot chooses to break through his programming and go save his friend. One of the more important aspects of the robot's performance here was selling the struggle of snatching

control of their body from 'The System'. The Struggle effect was easily achieved by changing the interpolation of the keyframes in the Graph Editor to "Bounce." This gives a very rigid movement but a loose look to the in and out frames. I feel like this struggle really sells where the robot is emotionally at that moment.

A particularly challenging part of this scene was getting the wheel movement correct, as most of the shots show the contact between the robot's wheels and the ground, so I spent a lot of time in the graph editor, going frame by frame to perfect the wheel rotation as much as I could. As well as this, there was also the "money shot" of the scene, which is the robot jumping out of the wheat field at the end. This was a very emotional movement for the robot, so the leap had to have the robot throw his whole body into the action, lifting him up and then when he comes back down and he's out of the field, his limbs and body relaxes, leading to a lot of follow through on his landing.

HUD

On top of the Animation, also designed the robot's HUD to match the style of the title sequence, which was an important job to do outside of environment work and animating as we do have POV shots in the film. Inspired by *Iron Man* (John Faverau, 2008), I wanted to try and find a way to have relevant information displayed without boring or overwhelming the viewer with information. My method of HUD design and implementation was to use the Eevee render engine and to composite the HUD onto the Renders later, as Eevee is a real time renderer that would not take nearly as long as some of our other renders in this project. This meant that we could concern ourselves with the more heavy duty parts of the project first and then revisit the HUD work towards the end of production without stressing about it.



One way of showing the audience information instead of making them read was to have the HUD visualise and highlight certain parts of the environment and to use the context of the situation we've set up to try and get the audience to realise what's happening themselves, without spoon feeding them all the information. An important part of the design that helps this idea is the simplicity of it. The screen isn't filled with junk data, It's quite minimalistic, the

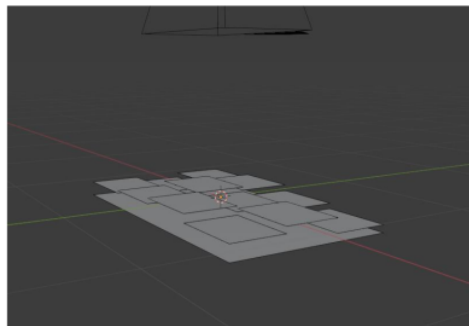
only things appearing other than the 'reticle' is a full body status visual, which is just a wireframes Render of the robot model with an emission shader, and a some information bars that have a scale randomiser modifier on them, implying data changes and an active AI at work.

At certain points of the animation, we couldn't just leave the audience to work things out themselves, as there we hadn't set up the context needed to complete the puzzle. Our solution to this was to create some small motion graphic sequences that would show the process the robots were expected to complete. It sets up where our original robot is in the system and that there are two other robots in the process here. This was also a good way to explain later that one of those robots had failed to show up, and had thus caused problems for the delivery.



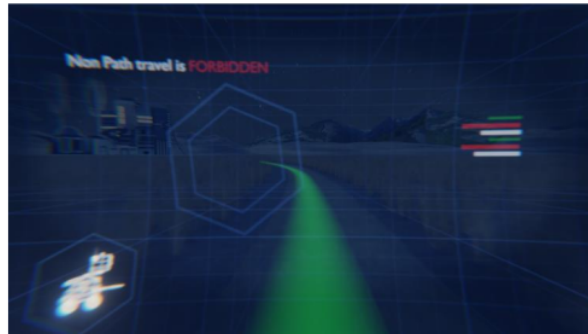
During the crash sequence, the robot becomes nearly fatally damaged, and this was a very important detail that needed to be reflected in the HUD shot. To achieve this look, I recoloured the usual blue hue to a red, as well as the full body status image in the lower left corner, and made the movements of the HUD items very erratic, including their scaling, which really sells the glitching look. I still felt like this effect could be pushed though, and after rendering out all the frames, I put them back into Blender as an image sequence on a plane, cut the plane up into different panels and have the panels move about erratically as well. This was the cherry on top for the damage, as not only did it clearly show that the robot was in danger and alarmed, but it really sold that the robot had been absolutely battered and totalled from his accident.

The final HUD shots I needed to do were for the Wheat Field scene. One was a simple one to say that the mission had been complete and that the robot was about to be shut down but the other was a little more complex. As the robot travels along the path, it looks out towards the building it's headed to and can see a green line along the path. This was to subtly show that the robot's were programmed to follow certain paths, making the scene where he goes through the wheat field that much more impactful. My original intention to get this HUD shot was to create it while I was animating the wheatfield, due to a specific





vision that I'd had of this sequence. However, as I tried to get it to work, what I wanted ended up not looking good, which was a hologram wall blocking the robot from being able to travel anywhere other than on the path ahead. While I would have liked to get that visual working, I think the green line that he follows work just as well even if it ends up being so subtle that it becomes more of a small detail than an actual small plot point.



Review

After all the work that we put into this project, I was a little nervous to see it in its finished state. So many things had been cut from the original animatic, so many things changed, I was starting to get concerned that the film would end up being just a collection of unrelated scenes spliced together. On top of that working during the global Covid-19 pandemic had left me feeling very unmotivated for a lot of the production.

This all being said, I'm quite proud of what we made. I was very relieved to see that the film did have a recognisable plot and that our characters, based on audience reactions, have found their way into the hearts of viewers. I don't think the story we told was a new one, but it's just as relevant today as it was when it's been told before, if not more. Breaking down systems, overcoming structural obstacles (Social or physical) as a true way of reaching each other.

Despite my pride in our work, I can't help but notice the effects of the pandemic depression in my contributions in particular. I can see in the work where I could have done a lot better, where a more thorough production would have really improved the final project. Not all of what I feel like could have been improved is purely due to outside of influence however. There were parts of the animation where I really struggled to work the rigs, not due to the way the rig worked, but due to the robot's design. More scrutiny during pre production could have really helped us out in production, a very important lesson to carry with me as I progress in this industry.

Conclusion

In conclusion, this module cemented as well as built upon everything I've learned, not just in the past 4 years, but practices I learnt in college as well. It was nice to have another go at conceptualising a story, characters and a whole world but most importantly, I've come out of it knowing where my strengths are, where my enjoyment in production lies and what my weaknesses are and how I can overcome them. It has even shown me that, despite my preference for Animating, I wouldn't be against working in different parts of production in my career.

Bibliography

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Iron Man (John Faverau, 2008)

Wall-E (Andrew Stanton, 2008)

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