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DEVELOPMENT ELEMENT 2 ESSAY

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I can't remember a time when I wasn't interested in video games, from spending hours on early *Pokémon* (*Game Freak 1996*) games, to my best friends and I getting *GTA 3* (*Rockstar Games, 2001*) for the first time, the immersive worlds and their music is always something that has captivated me and allowed me to escape to another world when I've needed it. When I was tasked with working on a game and the sound design, I jumped at it even though I knew it would be a challenge as my only experience is that I've played video games. New software and how to code sounds intimidating and would also be a potential hurdle but I wanted to take on the challenge and attempt to at least make a simple functioning game.

Game Engine & Audio Middleware

There's plenty of useable free Game Engines out there on the internet. I Decided to go with Unity (Unity Technologies, 2021) for my project, it was between that and Unreal (Epic Games, 2021) but it was the free asset store and tutorials that swayed my decision. Unity uses C# for coding, which I knew nothing about a few weeks ago, but it's a relatively easy language to pick up the basics in. Unreal would have also been a good choice but it has a smaller asset store, seems slightly more complex and is made for people with more experience.

To make my sound interactive I needed to look at audio middleware. This is software that is designed to integrate with the game engine. It's especially useful to a sound designer as without it you would have to code everything yourself or work with an audio programmer (Robinson, 2019).

I decided to work in FMOD (Firelight Technologies, 1995), this is a side of the industry I've never worked in before and FMOD looked like a DAW with a very simple interface. For me this is great for learning the basics in as it looks familiar to me. It's also a free piece of software which is always a bonus.

There are many other options such as Elias (Eng, Kristofer, 2015) and Wwise (Audiokinetic 2019) but both interfaces looked complicated. As I was doing this for the first time, I didn't want to make the learning curve any steeper.

Concept & Research

The Concept was to create a relaxation music-based game with a simple pick-up system that adds musical layers to the soundtrack as the player scores points. The aim being to relax the player before trying to sleep. Using soft textured instruments, as well as using dark lighting to not strain the eyes. Imagine *Breath of The Wild* meets *Animal Crossing* (Nintendo, 2020) meets *Super Mario* (Nintendo, 1985). Sounds simple right? To an experienced game designer, probably. To me? Not so much.

Breath of The Wild (Nintendo, 2017) was the first thing that came to mind when I started to build the concept for this game as I was playing it at the time. The open world is beautifully designed with sound to match. The colours and textures are incredible. Something that I thought about is how the music changes when Link, the main character, goes into battle and how it goes back to ambient real-world sound when he's exploring. It made me consider how I can make the music in my game more interactive rather than just being triggered by a coin pick up.

On further research I found a game called *REZ Infinite* (Enhance Games 2016). It is visually stunning. The player floats through the level which looks like outer space, shooting colours at enemies which then fizzle into the background with a layer of music that adds to the backing track. The gameplay and the music are sync'd to create a sense of synaesthesia, 'where you can hear the colours and see the sound' (McCarthy, 2016). The big difference to my concept is that the music here is all dance music, hardly relaxing. In terms of how the music and gameplay sync'd, it was very inspiring to see it triggered and layered in that way.

I also looked into *Red Dead Redemption 2* (Rockstar Games, 2018) *Breath of The Wild* & *REZ* are both set in fantasy worlds, so I wanted to play something that felt more human to me. The game map is vast and it showed me how I can apply interactive sounds such as footsteps, jumping and breathing into different terrains like grass, dessert and water. One of the key things I noticed in *Red Dead Redemption 2* is that there's minimal soundtrack music in gameplay, but where there is music, it is diegetic, from a character playing a banjo or a passer-by whistling to themselves. This makes the environment feel more open and at peace because it is just real-world sounds which I would like to apply to my game.

I wanted to relax the player, so I looked into instruments that have a therapeutic effect and induce relaxation, like Rain sticks, Kalimbas and bells (Luna, 2015). I also took into account sounds and music that relaxes me; strings, acoustic guitar and orchestral layers at around 80 – 110bpm. Unlike *REZ*, the idea I had for my music was more minimal using mainly acoustic or at least acoustic sounding elements that would sound natural in the environment I'm going to create.

For the rest of my sound design, I intended to use classic foley techniques to record original sounds that will interact between the player and the environment. Also creating sounds within the game, like natural background noises and obscure textures that I can place around the map.

First draft

The first thing I did was start to build. I thought of each corner of the map as a different type of environment, Beach, Japanese Pond, Forrest and Cave. I came to the final decision on these areas by seeing what I had available for free on the asset store. The reason I split my map into different sections was because I wanted to try and use different sounds to make each area unique, I feel like doing this makes exploring the map more exciting. I also populated the map with trees and other elements that could show off my sound design, as well as making the lighting dark as not to put too much strain on the players eyes (Puckett, 2019).

For the beach area, I painted with a sand texture and made a crater than I could fill with water. The Japanese Pond, I had a slightly different approach as I intended for it to be a waterfall, but my design skills aren't quite that developed. Instead, I made a smaller pool surrounded by blossom trees with a stone floor texture painted onto the terrain. For my Forrest area, I wanted to make it into a maze of trees, but again the idea was asking a little too much of myself because I found it too difficult. I did however build a bending tree pathway into an open grass section surrounded by tall trees. I had a mountain in the corner of my map, I realised this would be perfect to turn into a caved tunnel environment, so I carved away a path and painted it with a rock texture. Next, I placed my Pick Ups, I designed a simple gold coin from a 3D object. With some more experience, I would love to try and make a unique pick up that looks like a black hole, inspired by *REZ*, something that can make the player feel like they're moving into a new part of the environment with the music.

Loosely I came up with the narrative of the island being inhabited by cats that can't fall asleep and are getting bent out of shape about it, quite literally. You'll notice the crates around the beach all have a cat skin. The coins are the "parts" they need to fix the radio so they can sleep peacefully again. Each "part" plays a new layer of the music.

SOUND CREATION & INTERGRATION

I wanted my game to have some realistic human sounds. I broke these down into Footsteps, Jumps, Breathes and Cloth. I wanted these sounds to be as realistic as possible and looked into the best ways to achieve this via Foley. Traditionally it is recorded or performed to picture but with a game it is slightly different as you have complete control over how the player or character moves and interacts with it's environment. As I have multiple terrains, Sand and water for the beach, grass for the forest and stone for the cave, I had to create multiple sounds for footsteps.

For the grass sounds, I found a cardboard box and filled it with dead leaves and grass from the garden (The Film Look ,2019). I then used my hands to crunch them, and it sounded realistic. To record this, I pointed my directional mic about 6 inches above

the box, I also did a take from a greater distance, around 5 ft, as I thought that's what sounded best to my ear (Andersen, 2019).

For the sand steps I used a similar technique, however this time I was recording a bag of cat litter, not used, to make use of what I had at home. A technique I also found was to pour rice into a bowl and take the impact sounds and pitch it up (Macleod, 2011).

For the water steps I was more experimental and filled a bath an inch deep and got my girlfriend to take steps in it. Because of the lack of space and equipment, I did this recording on my iPhone which ended up being a sufficient field recorder. I had to do some EQ in post to remove room noise. I did this in *Logic Pro* pre FMOD because I was comfortable with the software.

Continuing with the iPhone, for my cave, I recorded some steps out in the Garden on the stone path. Again, I tried this at a few distances from the source, the main issue I ran into using this technique is that I was picking up a lot of background noise from neighbours and the road, however I was able to EQ a lot of this out and cut anything unneeded.

To implement these into the game in FMOD and make it sound realistic I needed to create a Multi instrument for each set of footsteps with the playlist set to Randomize. This will play a random selection of footsteps giving you a more realistic sound rather than playing the exact same sample every time. For example, my grass footsteps multi-instrument has 9 samples in it all with an 11% randomization. For the best effect, I found that having around 7 samples for each footstep instrument gave a realistic sound in game. Another technique I used was to change the pitch, this is something I did for my Cave steps, I recorded on stone outside and I felt it could be lower, so I dropped it by 6 semi tones until I thought the sound was more accurate to a cave. I also pitched down my water footsteps by 1.2 semi tones but the reason I did this was to make the high end of the impact sound less harsh.

Something I wanted to do for my cave environment was to add a mix snapshot, to give all of the sound in that area a boomy reverb to emulate a real cave. I had problems getting this to work within Unity and I think it may be due to the walls of my cave being one layer of terrain and the floor being another. To solve this, I added a long reverb to the cave footsteps, the ambient sounds I would add reverb too later. This also saved on processing power which is good for game optimization.

Cloth

I still felt something was missing and that was the sound of "Cloth" i.e., the sound of your clothes moving with the player, this can add to the overall realism. I used a few different types of clothing for this, a thick nylon coat, jeans, t-shirt and a light rain jacket to give me some different textures. I used the same mic set up and scrunched up each item and rustled it around slowly. Most of the sounds I ended up using came from the thick nylon coat, it was padded so had a lot of depth, but the hiss of

the nylon is what made it stand out for me as it gave it clarity.

I set up a Multi Instrument for the cloth with an equal randomize between each sample. After this I opened each footstep instrument and under each one, I added the cloth multi-instrument on a new audio track, I placed the cloth sound a second after the footsteps play to make it sound lifelike.

Now I have randomised footsteps and cloth, this will make navigating my map sound as though are in the world. However, the first major problem I had is that my whole game had been built on one layer of terrain which meant that it can only trigger one of my footstep banks. I had to go back and build new layers of terrain under what I had already built, and make sure they sat just on top and assign them separate tags, for example “Surface A”, “Surface B” and so on. I used a technique called Raycasting, ‘it can be thought of as a virtual line’ (Robinson, 2019) that separates regions of my terrain. In C# I can now tell Unity which sound banks correspond to which tags and have separate footstep sounds for the different environments in my game.

The last human sound I included was a jump noise. I did this with a different mic, because I thought of it as a vocal, I used a condenser mic a couple of inches away from the vocalist so I could pick up a clear and realistic recording. I used the same multi-instrument cloth layering for this.

Atmosphere

When you look at Read Dead Redemption 2 or Breath of The Wild, when the player is left to explore there is no music, just the sound of the world and its atmosphere. Both of these games were exactly the kind of direction I wanted to take to make my map feel open and peaceful. I would have loved to have done this with a stereo pair of condenser mics out in the wilderness (Adorama, 2020) but all I had to use here was my iPhone and with the country still being in lockdown, limited travel. I live in a fairly quiet area and from my garden at the right time of day, I managed to pick up an almost car-less field recording of the birds singing. I still had to EQ out some hum from the city but ultimately managed to create the clean recording I was after by simply standing outside with my iPhone. I went on to use this as my main ambient noise that you’ll throughout the whole map.

I placed this sound in the game using an FMOD emitter and had it triggered by game start. I used a 3D Timeline and set up a loop region, in the deck on the top right of the ‘Sound’ box I clicked the loop button which sets the loop value to infinite. With the Spatializer, I gave the sound a minimum distance of 0 and a max distance of 10k which means I should be able to hear the birds singing at the same level at every point of the map.

For the beach area I wanted to create a sea breeze and the sound of the shore coming in. I recorded the waves earlier when I did the water footsteps in the bath, I filled the bath with another few inches of water and brushed it with my hand, but it was a little harsh, so I tried to brush it with some other objects and settled on using a plate to slowly stroke the water creating small waves. On it’s own it is not very strong, so I had to layer it with something else.

The wind effect is from brushing a tea towel across the carpet (Aturax Audio, 2020) which created an authentic sound. I recorded this with the directional mic about 4” from the source. I took these sounds into FMOD and layered them together with the wind as the main element and bath sound to give it more depth. As I only wanted this sound to be heard when I was near the water, I set the max distance on the Spatializer to 65 so it becomes quieter the further I go from the FMOD Emitter in game.

I used a similar technique for several other atmosphere noises in my game. In the Japanese pond area, I still decided to create a waterfall sound. For this I recorded two tracks of a rain stick which is a therapeutic instrument. Luckily, I had one at home, so I recorded the rain stick being slowly turned from 90 degrees to 180 degrees to create a pouring effect. I layered two takes of this in FMOD and added delay to the top layer to give it some extra ambience and serenity.

In my forest area, you can hear crickets in the background. The original sound is from the end of my rain sticks recording where the last few bits inside the rain stick fall to the end. I used granular synthesis to play around with the sample as I wanted to make something strange for my Cave environment also. I created a back – forward loop in the loop mode, played it on the C2 of the keyboard and it created the chirping you hear from crickets. In FMOD, I had the sound playback on its own with a slow fade in and fade out. When it plays, it’s layered truthfully with the original atmosphere birds recording.

For my cave noise, I took inspiration from *LOST* (2004), the black smoke monster that creates that eerie clicky mechanical noise as its floats through the jungle (McCarthy, 2010). I felt like a minimal version of this would fit with the cave and not distract from the musical score. I used the same recording of the last parts of the rain stick falling down, reversed them and transposed it +12. In FMOD, I added some reverb with a tail, the pitch now almost matches the bird sound and feels like a modulation of that. I layered in FMOD with a recording from my washing machine draining to add some depth. I placed the washing machine sample towards the end of the rain stick sample and purposely extended the loop region. I did this so it felt more eerie and random to the player to get the natural feel of a cave.

Props

I’ve named everything that isn’t a sound from the player in my game a “Prop”, in Foley Props include various items are used in creative ways to make new sounds. For example, using celery breaking to match the sound of bones snapping (Rothstein, 2018). At this point I was having issues coding and getting functionality from my game, therefore I decided to place more props in the map to demonstrate my sound design skills. The following sounds I created by experimenting with different objects around the house.

For my fire I crinkled a packet of crisps slowly to give the impression of a slow burning sound. I layered two samples in FMOD one panned to the left and pitched down just to make the sound more realistic. I added a car and to bring it to life I knew it needed a rumbling engine. I could have gone out and recorded a real engine, but I wanted to try something different. At the time my washing machine was on and I took a few recordings on my phone and found a section of audio that I could loop and manipulate. In FMOD I added fade ins / outs and pitched it down 4.5 semi tones to re-create a car engine. I took the opportunity of having a car to add some diegetic music into the game, as the car was a reference to *Frank Ocean's 'Nike's'* video (Tyrone Lebon, 2017) I took the song and Low passed it, so it was muffled. I put on this on a loop region triggered by an FMOD emitter set to a short distance so that it becomes louder the closer you get to the car.

For my crate impact noises I wanted to try out a different way of randomisation. First of all, the sample is of me hitting myself in the leg, don't worry I'm fine! In the deck there's a pitch control, I right clicked > add modulation and a pitch shift appears, I set that to around 14 semi tones. Now the pitch of that sample will randomise between semi tones every time its triggered, which is usefull for an impact noise as impact won't always be same, therefore sounding truer to life.

I also had a coin pick up noise created using a note repeater, set to an emitter to be triggered on object destroy. However, I couldn't make it work and I believe this was due to a coding issue.

Original Music

The key element of my game is the original music. I wrote the piece taking into account the sperate areas, and instruments affiliated with more relaxing tendencies. The track starts slowly with a simple, pleasant melody played on a Kalimba, with a second kalimba coming in playing down the black keys creating a sense of falling. Following this, a soft string pad droning out in the background joined by a steel drum. This gets its context from the beach area of the map; it also sounds similar to a Hang which I couldn't find a sampler instrument for. After that, a gentle melody plays on a flute building some tension into the final section where string basses and an acoustic guitar comes in to bring to the whole piece to an end. I would have preferred to use real instruments on this track to give it more character, but I had to resort to midi sample instruments, apart from the acoustic guitar which I recorded myself at home.

I broke the song down into 6 loops that I wanted to trigger within the game as the player picks up coins. To a degree I achieved this, but I am still having issues with the looping system within FMOD. Using the parameters 'GameScore' system (Robinson, 2019) I set up each loop with a loop region which is then allocated a 'game score' which is triggered in Unity by number of points scored for example, 1 point plays loop 1, 2 points plays loop 2.

The issue I struggled to solve is that some of my loops did not play back immediately and that there is a gap before the next loop begins, some of my loops also cut the

music completely. One alternative option I tried for the sake of gameplay was to give each coin a FMOD Emitter set to play on object destroy and assigned each instrument layer on an infinite loop. Some of the textures worked together although straight away I ran into timing issues. I later discovered there was a mistake in the trigger behaviour, I had to turn off “Streaming” on the samples which solved the gap problem, as each time the computer had to go and find the sample which created latency.

Reflection & Development

On reflection, I’m not completely happy with how my “Game” turned out, I really struggled with getting to grips with Unity and C#. It was easy enough to build the map but getting any functionality out of it is where the headaches began. That being said I am happy that I did manage to create an environment where I could implement my sound design skills and its integration.

Development wise, there is a lot I would love to do visually with this game. I would like to take the animation in a more *Breath of The Wild* direction, I admire the colours and the animation. In terms of the gameplay, I would love to expand on the soundtrack music and how it reacts with the player. Perhaps more layers of music that can be triggered by different obstacles, for example, destroying a crate could introduce percussive elements whereas destroying a sphere could add delays or reverbs that wash over the whole piece of music to give it a fresh new feel, like a transition. Another idea I would like to expand on is the sound changing to indicate that you’re close to a coin so that the player doesn’t aimlessly explore.

With more time to understand the software I think I could have better integrated some of my sounds as I got held up with issues like my music loops and terrain layer footsteps. Overall, this has been a challenge, but I have learnt a lot about game sound design and gained a good insight into a side of the industry I wouldn’t have previously. As well as creating something I can ultimately be proud of and put towards a sound design portfolio.

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