"Ghost & Ghoul: Animated Short Film by Hayden Michael"

An Honors Thesis

by

Hayden A. Michael

California, Pennsylvania

2020

California University of Pennsylvania

California, Pennsylvania

We hereby approve the Honors Thesis of

Hayden A. Michael

Candidate for the degree of Bachelor of Science

Date	Faculty
4-22-2020	Aleksandra Prokic Aleksandra Prokic, MFA Honors Thesis Advisor
Apr. 22, 2020	Cynthia Persinger, PhD Honors Advisory Board
4/22/2020	Craig Fox, PhD Associate Director, Honors Program
22 April 2020	M. G. Aune M. G. Aune, PhD Second Reader Director, Honors Program

Name: Hayden Michael
Major: Graphics & Multimedia

Advisor: Aleksandra Prokic
First Reader: Dr. Mark Aune
Honors Advisory Board Member: Dr. Cynthia Persinger
Librarian: Dr. Loring Prest

Keywords: Animation, Student Film, Independent Film, Monsters, Cartoons

Please note that this essay is the script for a video series which provides more necessary information in the form of audio and visual aids. I would recommend that you view that version, rather than reading the written form, as it provides a more complete picture of what I am trying to discuss. However, this written essay has been created for the sake of having a physical record of my work.

Ghost and Ghoul – Animated Short Film:
tinyurl.com/GhostGhoulMovie
Alternative link:
youtu.be/VtuJL7xp0e4

Behind the Scenes – Three Part Video Series:
tinyurl.com/GhostGhoulBTS
Alternative link:
www.youtube.com/playlist?list=PL8pQQtOEcSCHmrP8wiwmMIrbRxjQqesjV

If these links are broken, or you are having difficulties accessing the websites, try going to this archive of media related to the film instead:

sites.google.com/site/GhostGhoulFilm/

If none of the hyperlinks work, I am sorry. I may have been able to provide the Honors Program with a hard copy of the film and related material on DVD and Blu-Ray, but due to the events of COVID-19 this is unknown.

`

It's been an exercise in cutting corners, managing expectations, compromise and constant, grueling work. I can't lie, when I first set out to create an animated short film by myself, I quite thoroughly underestimated the amount of work that it would take to see it completed - and there were moments where I thought I would be creating this video essay based on an unfinished project. My initial supposition that it would be possible for one person to create an animated short film in less than a year turned out to be correct, but only barely. I believe the only reason I was able to complete the film was due to focusing on my strengths, and not being too ambitious with the overall scale of the project.

If you're watching this, I would hope that you have already watched my animated short film, Ghost and Ghoul. If not, I would ask that you please do so before continuing to watch this video essay, as I will be discussing the inner workings and details of that entire project in a very matter of fact way which might serve to ruin the magic the piece holds on a first viewing. Please note that the short film is a major piece of this thesis project.

The concept of animation as it refers to pictures that appear to move goes back further than the creation of cinematography, with the phenakistiscope being invented in 1833. In the almost 200 years since that time, there have been many other techniques and methods used to create animation. While these techniques were at first utilized through necessity, many that might be considered obsolete are still being used for the aesthetics and imagery they are associated with to create specific feelings and meanings in the media utilizing them. I originally hoped to explore several kinds of animation through this project, and while I later

`

had to alter my plans, I believe that I still have made a significant contribution to my field with my final piece.

I first began to work on Ghost and Ghoul in the July of 2019, but for now we will skip ahead to November of the same year which is when I first began to write a script for the story. My original script was about six pages long and told a story quite similar to the final project, albeit with two more acts after what ended up being the ending of the story. If you would like to read it, it will be available digitally. While writing, I kept my limitations in mind - as I would be producing this film entirely by myself. I did not include any spoken dialogue, which removed both the need to cast voice actors, and the need to animate characters' mouths moving - something which I knew from experience was a lengthy and arduous process. I also tried to keep my use of complex objects to a minimum. I did not write any scenes with cars, weapons, animals etc. because I knew that the time spent creating and animating these elements would detract from the time I was able to spend working on the rest of the project. However, there was originally a scene where a house burnt to the ground and retrospectively, I am not surprised I ended up cutting that scene entirely.

I wrote a story that I hoped would be heartfelt and easy to understand. I decided to use undead monsters as my protagonists because the idea of taking a creature usually considered to be scary, dangerous, and “other” and bringing them forward into a positive, relatable light was powerful to me. Also, these characters’ inherent association with death drew a connection to a point of inspiration I have carried most of my life from the video game, Majora’s Mask, which dealt with

`

dark themes such as death and loss in a way that captured my attention as a child and has stayed with me since (The Legend of Zelda, 2000). In fact, I can also trace my pursuit of many skills and mediums back to this same game. I recall asking my father how the people who made the game had made the characters move around on the screen, and he gave me a brief, simplified explanation of how 3D animation worked, and at that point I knew I wanted to be an animator. I've worked on quite a lot of animated projects throughout the years, but it was not until the spring of 2019 that I would take my first steps into animating in 3D.

The idea for using a ghost and ghoul specifically came from a few places. Firstly, I love alliteration, so that was helpful, and I am apparently not alone in this specific piece of alliteration as the two creatures are quite frequently linked for this reason. I had seen a comic by an artist on tumblr named Lauren who created a short story of a ghost and a ghoul playing cards with a werewolf in a graveyard, which gave me the idea to have a ghost and a ghoul become friends (Lauren, 2017). Also, there was a wonderful animation I had seen online, created by Louie Zong titled Ghost Choir, which featured simple sheet ghosts harmonizing and dancing together in a most delightfully charming way, and if you haven't seen it, I would highly encourage you to seek it out (Zong, 2018).

Setting the story in and around a graveyard and linking its characters to death in this way also was in part a way of coping with a number of personal losses I have had in recent years, in particular my stepfather, who passed away in the July of 2019.

`

Writing was in the end the easiest and fastest part of the entire process. I had a simple story to tell, and I didn't want to spend very long writing it, because I knew if I held on to that stage too long, I would never get started on the animation, which I anticipated to be the hardest part. I finished my script, and it went through a brief revision process where my professor gave me notes on certain aspects of character development and continuity to ensure the project would make sense when finished.

Animation was indeed the biggest part of this production, but there was another step of pre-production between that and writing which I underestimated to such an extent that it almost prevented the entire film from being finished. There is no good, all-encompassing title for the work that was done in this stage, but it breaks down to modeling, rigging, skinning, texturing, layout, and much more - but to summarize, all of these steps relate to actually creating to objects, characters and environments that make up what you can see in the film and then preparing those objects. I began work on this process in early December of 2019, during my winter break from school, and I did not finish until a week before the Spring semester of 2020 was set to begin - well over a month later. This is the reason why most of the story was cut from the final film - this month was spent building the characters, and environment before I could even begin animation. Any scenes set outside of this same environment would require just as much time to be realized before animation could begin on them as well. At the time this decision was made, however, I had already completed work on several of the

`

characters that would be appearing in a later scene, so these completed characters had no place in the final film.

Creating a unique character from scratch was a lengthy process. I started with my main protagonists - and knowing that my method of animation for Ghost was going to be different than the other characters, I decided Ghoul would be first.

My only modeling tool for this film was blender, which is an open source 3D animation program developed by the blender foundation. I created all the characters for this film using a similar method, which mostly consists of laying out a mesh of vertices, and then tweaking the precise position of these points until I had formed the shape I desired. This is of course an overly simplified description of the process, but it's the most accurate across the board. I tried to make my meshes consist of as low of a number of polygons as possible, as this saves on the number of shapes my computer would need to keep track of while animating, something I knew would become an issue as scenes became more complex. Blender, and other 3D tools, has a function called subdivision surface, which is a non-permanent modifier that can be applied to anything you model and will increase the number of polygons in a model when you are rendering, or exporting your scene. This meant that I could create low-poly models for my characters that I would see during animation, and then they would be increased to higher quality when I was finished with a scene. This is why a model in my animation files will appear jagged and angular, but when you see the same character in the finished film, they appear round and smooth. It is hard to describe

`

the specific techniques I use to model characters and objects for use in animation, as its more of an artistic process - but it's important to keep in mind when viewing this film, that everything which appears on screen is something which I personally created and built from scratch. Everything from the characters' individual fingers, to the blades of grass, to the iron gate surrounding the cemetery, to the moon itself is a 3d model which I created from scratch.

In the end, it takes me about 19 or more hours to go from nothing to ready to animate for a visually distinct character of the quality I was hoping for this film. Except for Ghost, originally, I would have needed to create seven characters, so naturally I sought out a way to shorten the time required to create new characters. I was able to build a frame that represented a basic human, and then modify proportions and facial features to create my three antagonists, and the characters that were cut from the film. This is why all of the human characters have very similar body types made of simple shapes, but it also cut down my creation time from 19 hours per character, to 19 hours once (technically three times, because I had three distinct body types), followed by a further 5 hours for each modified character.

Just modeling the characters isn't enough for them to be used in animation, however. After a character has been created and assigned textures (images or colors which cover the surface of a model), they next need to be rigged for animation. For this project, this involved building an armature - which resembles something you may have seen in behind the scenes featurettes for stop-motion animated films - and then skinning the model to move with the bones of

`

the armature. This process can either be incredibly simple or incredibly complex, depending on the number of fine details in your model and how precise the movements you are trying to achieve are. For my purposes, I only needed to create gross movements of limbs, with only a few specific hand positions being occasionally used throughout the project. However, I still wanted to be able to convey a wide array of emotions through my very simple techniques, and to do this I looked to an old DVD that has been in my family's possession since before I was born. That sounds rather ominous, but it's just an old disc. On the bonus features for *Wallace and Gromit: the First Three Adventures* there were excerpts from a behind the scenes look at *The Wrong Trousers,* where creator Nick Park discussed how the team endeavored to get emotion out of Gromit, a dog who has no mouth and cannot talk ("Inside the Wrong Trousers," 1995). Park says that they realized that Gromit could be incredibly emotive just through his eyes and brow - and it's true, if you've ever seen a Wallace and Gromit feature, you know that Gromit has no trouble conveying his feelings ("Inside the Wrong Trousers," 1995).

Knowing that I would want the eyes of my characters to be the main powerhouse of their emotive ability, I was able to reuse a technique I had developed as an honors addendum in my 3D animation class in the Spring of 2019, where I had eyes that were set to look at a point I could control, and eyelids which were given their own armature and could rotate and blink in a number of positions. It may not be anatomically correct in any sense, but it certainly gave me

`

the results that I was hoping for. Especially as it was helped along by the way that I decided to light the characters

I developed the techniques I used to rig controls and animate expressions for characters in July, when I created a 3D version of my mascot character, the Wry Wizard, for use in various projects. I experimented with ways to show colors and textures, as well as ways to show expressions and create movement. Ultimately, I settled on a technique similar to that used in Majora's Mask to give its characters emotion. This technique involves creating different mouth shapes and facial expressions as two-dimensional images, and then projecting them onto the 3d surface of a character's face. The different expressions can be swapped out to create the impression of more complex facial animation.

Originally, my plan was to have the environments and main cast of characters animated in 3D, with Ghost being drawn over top as a two-dimensional character. To facilitate this, I created a reference version of Ghost based on my original concept art, which I intended to use as a stand-in. This original plan influenced many other parts of this project, some of which I will discuss later. However, with regards to the character designs, I decided to have my characters rendered with a stylized lighting system, which is usually referred to as cell-shading or toon shading, in reference to traditional animation, in which animation was done on a clear sheet called a cell, which is layered above painted backgrounds. The bright colors with a clear, sharp distinction between light and shadow has come to be known as cell-shading. I hoped to emulate the traditional

`

appearance of characters layered above a painting by having my cell-shaded characters layered over a more realistically lit environment.

Blender has built-in functions to allow for cell-shading, but these are not usable within the rendering engine I had elected to use for this project. Typically, Blender uses a system called Cycles to render an image. This process takes small pieces of the image, and systematically calculates the way that light enters the scene and bounces off different surfaces and enters the camera in a reasonable approximation of how a camera works in real life. This technique is known as raytracing, and the results can look incredible, but each image that is rendered in this way can take several minutes to create, with time increasing drastically on a less powerful computer. Blender has an alternative rendering engine called Eevee, however, which utilizes similar technology to that found in video games to create an illusion of lighting and does so almost instantly, with the longest render times never taking more than 20 seconds per frame and the shortest taking less than one. This was important as I knew even before my cuts to the story that I was planning a project of approximately 7 minutes in length. I'll discuss the rendering more later, but for now suffice it to say that Eevee was a better choice for me than Cycles. However, that left me with the problem that my desire to use cell-shading was not accounted for in the rendering engine of my choice. I elected to build my own, rudimentary cell-shading system using the tools provided by blender. I fed the data from the naturally shaded light through several conversions until I was able to force it to have a clear, sharp distinction between light and shadow. A limitation of my system is that it doesn't account for light sources of different

`

colors, so a light with a red hue will affect my characters in the same way that a light with a blue hue does. However, I decided to accept this limitation, as I did not believe that it would detract from the overall film.

That's certainly not all that went into the creation of characters for this film, but it does cover all the major brush strokes. However, with just characters, I still was not ready to start animating my film. I needed a world for my characters to move around within. Even before my cuts to the story, most of the film was set in graveyards, so I knew I would need a lot of tombstones. While I didn't need to use reference to create my characters, I didn't have a good internal concept of what a cemetery should look like. Fortunately, I happened to live within walking distance of one while I was working on modeling the world, so I was able to easily take some photos as reference. I ended up creating 10 different types of grave markers based on my reference photos, with additional variety created by altering colors and slightly modifying the dimensions. I also learned through my slight field research that an old, unkempt cemetery isn't laid out entirely in neat rows, but rather in clusters. Between three and ten graves would be placed in rows near each other, with a lot of open space between clusters. This informed the layout I used to put my gravestones into my scene - though this was also determined by my story.

As for the other structures in my story, I didn't have access to cathedrals or mausoleums in my small town, so I took my inspiration from elsewhere. I used images from the internet as the basis for the overall shape of the two mausoleums within this story and stylized them to make them appear uneven and misshapen.

`

Fans of the Legend of Zelda may also find another nod to this influential series in the design of the cathedral I built - though it is mostly not visible within the film, and I probably could've gotten away with just a big concrete box. Trees and grass are fairly simple shapes, so I won't go into any detail on how they were made. I will say though, that to create the ground which the characters walk on, I placed a very large circle in the world, and divided it into many smaller squares. I then used the points of these squares to manipulate the circle into an irregular surface with hills and valleys.

While I had settled on cell-shading for my characters, the world they would be moving through needed a bit more effort put into the materials that made it up. Within blender, a material is the name given to the part of a model that makes up the colors that appear on its surface, and how that surface reacts with light. In the case of the cell-shading I built, that system is a material. For everything else, it involves a blend of reflectivity, specularity, transparency (or alpha channeling), and texturing. I used different properties for different objects, so it wouldn't be useful to spend my time going through them all. I can talk about a few things with regards to textures, however. I developed most of the textures for my objects to appear like a stylized version of reality. I took photos of objects around my apartment, like concrete sidewalks and grass, then ran them through a filter to create a blotched design that still conveys the colors and textures of the original photo in a vague way. For the wooden textures I used a brown color that I digitally painted, and then drew on sharp black lines to represent grooves in the bark using my drawing tablet. To create the moon, I used an equirectangular,

`

reverse-panorama of the actual moon, which was released by NASA, and then ran it through similar editing filters to match the style of my other photographic materials (NASA, 2019).

Upon the modeling, rigging, and material design of all the elements being completed, I was finally ready to begin animation. I finally had a full set of characters, a full set of props, and a full set. Technically, if I had rigorously storyboarded the entire film in advance, I could've planned my set around this and only modeled the portions of it that would appear on camera. However, I wanted the freedom to be able to make changes during animation, and building a complete world, with no blank spaces left for the camera or specific shots, allowed me that freedom. To liken this to film, I was now playing the role of the director, choosing to shoot on location rather than building a sound stage, so that I could create new shots or alter scenes based on the environment I had to work with. The difference here is that I also had the power to manipulate the ground, trees, and buildings to suit my purposes as well.

To create animation in blender, you must create keyframes - specific points in time, where you want an object to have a specific position, shape, color, rotation, etc. Frames are still images which, when viewed in rapid succession, create the illusion of movement. This concept is fairly universal at this point, with frames making up the images in cartoons, movies, videos on social media, video games, and pretty much every form of digital media with a video aspect. Keyframes are specific frames along the timeline, which serve the purpose I described previously. As for the frames in between keyframes, it is a luxury of

`

computer animation that they are calculated automatically based on the keyframes you manually place. If you set a keyframe for an object on the ground at one second, and then keyframe the object in the air a few seconds later, the frames in between will automatically show the object rising. Naturally as a result, animation which hopes to show more fine details, with smaller, more specific movements need more keyframes than animation which only needs to show gross movements. I don't have a way to count the total number of keyframes I ended up creating for this film, but I know that in the over 4,000 frames I created, there must be more than a thousand keyframes. In fact, because many keyframes must be placed to manipulate all the objects which move through a scene, I wouldn't be surprised if I had as many keyframes as I had frames.

Animation is typically played at around 24 frames per second, but because I was originally planning to animate Ghost by hand, I reduced my frames to 12 frames per second. This is why the film appears to have a choppy, stuttering look during some scenes. The goal was to emulate the appearance of stop motion animation, though if I could go back and redo things, I probably would have raised the frames per second back to 24.

I started animating in the December of 2019 and made decent progress until I had to return to school at the end of January. My progress slowed to a near halt with classes and work taking up most of my time. I had two computers with the necessary software installed for animation, but unfortunately my laptop was not powerful enough to run my files in preview mode while all the models were loaded in. This further refined my time to animate to only when I was in my room

`

and had access to my more powerful computer. I found time to animate during free time in the evenings and weekends once I had finished the assignments for my other classes. I steadily worked on animation through March, when I was finally able to complete the process during Spring break.

At some point between January and March, I realized I would not have time to animate the Ghost character by hand as I had originally planned, so I created a more advanced model for her, which gave me control over the expressions her eyes could make and what direction they faced independently of her body. Both Ghost and Ghoul have cloth simulations which allow for secondary movement in their body and hair respectively. These simulations needed to be finetuned and refined to match the speed and weight I needed, and while I had originally planned to use soft body physics, this ended up being a process rife with glitches, so I replaced it with the slower, and safer cloth simulation. For a cloth simulation to work, you must specify a group of vertices which will be affected by the simulation, and then determine how much weight this group places on each vertex within it, which is illustrated by a gradient resembling a thermal image. The group is referred to as “pinning” and in the context of the cloth simulation, refers to the portions of the mesh you wish to remain still, while the vertices with a weight of less than 100% will move through the simulation.

I used the same technique to create a brief sequence where a leaf flies past Ghost in Limbo. By assigning proper weights to a leaf I modeled and running it through a cloth simulation, I was able to create a leaf that flew through the air - a

`

sequence which I personally consider to be my favorite piece of animation within the film.

I also incorporated several particle systems into my animation. A particle system is a tool within blender which can be used to render a large number of objects in seemingly random locations and can be altered to allow these particles to move in ways that you can specify during creation. The most obvious use of a particle system surrounds the portal through which Ghost travels to reach the graveyard. Every little speck of light moving around the portal is an instance of a glowing model that I created for this purpose. I used particles in many other ways as well, however. All of the limbo sequence is illustrated with a particle system very similar to the portal to provide a sense of scale for Ghost's movements throughout it. The grass that can be seen throughout the graveyard is also a big particle system tied to the ground, as are the trees that can be seen outside of the graveyard on the surrounding hills. The sparks that float away from the torch held by one of the monster hunters is also a particle system. I considered using particles to place the tombstones, but decided I needed more control over their placement. Together, these particle systems work to enhance the visual quality of my animation while reducing some of the work I would otherwise need to do.

After I had finished all animation, it was time to begin my next large task, rendering. I had to save all the frames of my project so that they could be placed together into a final film. Normally, this would be a very straightforward process, like saving a document only slower. However, I had introduced several complications which required me to forge my own path through the rendering

`

process. Firstly, I still wanted to have Ghost appear visually distinct from the rest of the characters, even though I had to animate her in 3D with the rest of them. To do this, I separated Ghost from the rest of the scene and used a material called a "holdout texture" to cover everything besides her. When rendering scenes with Ghost now, I would have a frame that was entirely transparent except for where she was. I also further separated Ghost's eyes from her body. For each frame of animation for Ghost, I would then have two layers, one of her body and one of her eyes. I was able to use a photo editing program to then procedurally apply proper, bright colors and outlines to each of these layers, and then combine them together into a final image with just ghost, now visually distinct.

To tie Ghost into the world though, rather than have it appear as though she was pasted on top, I had a light that matched her location within the scene while she was gone, and lit up the portions of the world she was near. This created a problem with the fog I had been using to add depth to the scene however, as a very clear dot was visible in the fog wherever this light was - and placing ghost overtop of this dot would solve the problem if I didn't intend for her to be slightly transparent. My solution then was to separate the fog away from the scene in the same way as I had done for Ghost's body and eyes. As a result, for every frame of animation within the film, I now needed to render four separate images.

The complications did not stop there, however. For any item that incorporated cloth simulation, there would be a lot of wild stretching resulting from rapid movements in the animation. I used these movements to line up a scene for a character who needed to be framed a specific way in one shot and

`

needed to be framed a completely different way in the next shot. Most of the time this was used to pull characters in and out of the scene during a camera cut and isn't noticeable unless the character has a cloth simulation, like Ghost or Ghoul. I didn't have the option of altering these movements that far in production, so my solution instead was to now chop each of my four rendering layers into separate pieces for each of these necessary camera cuts. This had the added benefit of allowing me to speed up render times within certain segments because I could remove elements that wouldn't appear on screen from the file and allow the computer to use its processing power solely on the elements which appeared within the scene. After separating all the sequences, I now had 47 separate files of animation I had to render, which resulted in over 16,000 separate images. I used video editing software to layer each of the images on top of each other, but used temporary frames for Ghost so that I could see everything altogether as I cut down shots that lingered for too long, or reordered shots to tell the story better, before I finished the final effects for Ghost.

There were other small issues I had encountered during editing. I did not use separate cameras for cuts within scenes during animation, so I had excessive motion blur whenever a camera would jump into a new position. I rendered all of Ghost's frames without motion blur, so to solve this problem I went back and manually rendered every frame that followed a cut in both the base scene and fog layers. Occasionally there would be glaring problems that I would discover through the post processing of the film that I would go back and reanimate if necessary, which then necessitated renders to be redone as well. One prominent

`

example of this is in the scene when Ghoul takes a selfie with the discarded smartphone. In my initial animation, Ghoul's shoes disappeared noticeably into the floor, though I had not picked up on it until very far into post processing. I reanimated this scene to fix her feet, and in the final film it appears as it should.

After rendering and editing was completely finished, I still needed to apply visual effects to the film. Though this was not chronologically the next thing that I did, it makes sense to discuss it next. This process was relatively simple, if time consuming. I took all the frames of ghost and applied a glowing effect to them in Adobe After Effects, then brought these new glowing frames into my main video. From there I applied a color correcting filter to the whole project, which intensified my colors and increased the visibility of some of my scenes which were previously too dark. I also decided to play back Ghost's frames at half speed compared to everything else, which further separates her from the world the corporeal characters inhabit.

That was everything it took to complete the visual aspects of my animation. With all that done, I had a complete film, all the way through, visually appearing the way I wanted it to. The only problem that was left was the film was completely silent. While what I had written was technically a silent film as it had no dialogue, it was not my intention for the film to contain no audio. That left me with the task of now producing sound effects and music for my film, and I fortunately had a great deal of experience and high-quality tools available to do it.

Before he passed away, my stepfather had given me a very good microphone to use in my music projects, of which he was very supportive. I was

`

able to use this microphone in a process known as Foley. Foley takes its name from sound designer Jack Foley, who used instruments and various objects to create the sound effects heard in radio plays (“Film 101”, 2019). I couldn’t get access to a recording studio environment like one might find in Hollywood productions, but I was able to follow the basic concepts of Foley. I queued up a preview of my footage and watched my characters moving through the world. As I did so, I stomped around in old shoes, rustled jackets, crinkled papers and threw rocks into piles in front of my microphone in time with the movements on the screen. I took these recordings and manipulated them into the sounds that you can hear my characters and the objects they interact with making throughout the film.

In a similar fashion, I also provided voice acting for my antagonists. They didn’t need to speak, but in order to make things seem more natural, I recorded various grunts, snickers, laughs, and shouts doing different voices for each of the monster hunters. This served to help further bring them to life. Ghost and Ghoul themselves also needed voices, but I didn’t want them to just sound like people.

For Ghoul, I had a concept outlined in the script where she would speak using a voice like a distorted banjo. My goal was for her to sound disturbing and monstrous, while avoiding typical snarling and growling sounds associated with undead monsters. I didn’t end up using a banjo sound, but I simulated my original concept using a synthesized instrument with grating, low-end tones. In a fashion similar to Foley, I played keys on my keyboard in time with the moments I believed Ghoul should be vocalizing, attempting to imitate the emotions she should be expressing with the notes I played. This alone did not capture the sound

`

I was hoping for in Ghoul, so I also recorded myself vocalizing in short grunts in time with the notes I had played, and then used autotune to tie the pitch of my voice to the pitch of the recorded notes. This distorted, abstractly musical sound is what created Ghoul's final voice.

Ghost's voice required an entirely separate process. I took my inspiration from Louie Zong's Ghost Choir, where he chose to have his ghosts sing using harmonized sine waves (Zong, 2018). I created two sound effects for Ghost, using notes that harmonized in a minor key to create a haunting tone. The first sound effect was simply a rising arpeggio of notes, while the second began with a similar arpeggio, then held for a few measures and fell again. I brought these two sounds into a composition with my reference footage, then began to manipulate the sounds by stretching them out, speeding them up, cutting them short, and altering the pitch over the whole film to create all the various sounds and emotional noises that Ghost needed to make. I then took this new audio track and brought it back into my composition software. To make the sound of Ghost's voice more ethereal, I played it backwards and applied a long, echoing reverb effect to it. I then reversed the sound again, so it was now playing forwards and added the same reverb effect again. As a result, I now had a complex ghostly sound for Ghost which was built from only two original sound effects.

With all my sound effects and animation finalized, I also need to add music to the film. I wrote all the music for the film in an attempt to capture the emotions I wanted the audience to feel during the various scenes. Normally, I animate to music that I have already written, so writing music to match with

`

existing video was a reversal of my usual process. Fortunately, I was able to find tempos and rhythms which matched appropriately with the scenes I had crafted. I chose to use synthetic orchestral instruments to emulate the soundtracks of the old Legend of Zelda games which inspired me. I avoided using overtly electronic instruments except for emphasis, as I wanted the unnatural electronic sounds to be associated with Ghost and Ghoul. This is accentuated in the final piece of the soundtrack, titled “Ghost and Ghoul” which features a smooth sine tone being paired with a harsh, grating synthetic instrument and mirrors the harmony between Ghost and Ghoul featured in the animation.

With music, sound, animation, post processing, modeling, rigging, and everything else complete, I had a short film. It took almost a year in total, with more than six months of almost non-stop work, and I am very proud of what I was able to accomplish. I believe I have made my voice clearly heard within the conversation of animated film production, and all fields related to it.

Included in the following pages before the works cited is the final draft of the script for Ghost and Ghoul that was written before the film entered production. The final film still deviates from this script in a number of key ways, but no other script was written after this one.

`

Ghost & Ghoul

written by

Hayden Michael

`

The film opens with silence and a blank screen. Quiet shuffling noises, as though a person is walking into a room and setting something down are heard.

Suddenly an abrupt noise like a large switch being thrown is heard, and the screen lights up, showing the text "It was a dark and stormy night". Dark, stormy, and night appear to be set into the background, on a layer below the rest of the text.

After a brief moment, the three separated words begin the spin like a slot machine, and one by one settle on new words to form the sentence "It was a dim and uninteresting day."

CUT TO:

INT./EXT. VAGUELY VICTORIAN FUNERAL PARLOR - DAY

IN TIME WITH STACCATO, PERCUSSIVE MUSIC, CAMERA ZOOMS IN FROM AERIAL VIEW OF STREETS INTO PARLOR THEN DIRECTLY ABOVE COFFIN. WORLD IS RENDERED IN 2D.

Footsteps are heard getting closer, then the coffin is opened. Inside there is the body of a woman. There are coins on her eyes.

A hand reaches from out of frame and removes the coins from her eyes, then the coffin is closed and footsteps are heard walking away.

CUT TO:

INT. COFFIN/LIMBO

EXTREME CLOSEUP OF WOMAN'S FACE.

Camera very slowly zooms forward, then cut to equally close shot of GHOST. Background has disappeared. All that is left is black.

`

GHOST's eyes suddenly open wide, blank and staring. Camera backs out to medium shot and GHOST is seen floating in the middle of a vast expanse of nothingness. Swirling patterns fly through the air, like wind.

TEXT APPEARS ABOVE GHOST THAT READS "GHOST"

GHOST looks around, quickly becoming nervous. She sees no one around her. She tries to drift around, but her surroundings do not change.

A leaf blows past GHOST, startling her. She turns around. There is a portal filled with stars and tree branches seen from underneath.

GHOST examines the portal curiously, drifting all around it. After glancing around the nothingness of limbo once more, GHOST becomes determined and flies through it.

SEAMLESS CUT TO:

EXT. CEMETERY - NIGHT
GHOST rises from the ground with camera oriented to match her. Portal closes, then the camera turns to be aligned with the ground. GHOST is rendered in 2D but world is rendered in 3D.

The slot machine text reappears and spins to say "It was a dark and cold night."

GHOST looks around, nervously taking in the sight of the cemetery around her. Suddenly her eyes go wide and she turns around and looks at the gravestone behind her. We do not see the name or dates listed on it, the camera snaps to the words BORN then DIED. We see GHOST's face, her eyes flit from side to side, then become sad. She rises up and nervously examines the cemetery once again.

`

Suddenly, a rustling noise is heard and GHOST hides behind her gravestone.

A small group of people are walking through the cemetery holding torches. They are dressed in modern clothing and one of them is holding a smart phone with a picture of a gangling creature on it. They look around, one of them gestures to the phone, then points in a direction. They walk past GHOST's gravestone, one of them kicks it and laughs. The gravestone falls face down through GHOST as the group walks away. Ghost seems at first scared, then angry. She begins to follow the group.
GHOST tries to scare the humans, but none of her attempts work.

The group rounds the corner of a crypt and a smile appears on their faces, GHOST is startled to see a creature kneeling behind the crypt. Creature slowly looks around and we see GHOUL's eyes reflecting the light of the torches. GHOULS goes from neutral emotions to scared.

GHOUL makes noises, attempting to get the people to go away, but they reach their torches forward. GHOUL does not want to be near the fire, and backs away, clearly terrified. The group presses forward, sneering at GHOUL's fear.

GHOST seems shocked at the treatment of this new creature and tries to put herself between the group and GHOUL, but they just walk through her. She seems surprised and floats in front of them again, with the same results.

GHOUL is now desperately looking for a place to run, but is cornered. GHOST looks at her and then floats up next to the torches and blows them out. We hear her "speak" as she blows them out, emitting a smooth, sine wave tone.

`

After the fire goes out GHOUL's emotions quickly shift from scared to a sinister grin. She takes a few steps forward, reaching her arms out to her sides with hands in a clawed position. She takes a deep breath and roars at the group of people, who are now quite scared. They drop their extinguished torches and run away, leaving GHOUL behind, who does not chase them.

After the group has left, GHOST drifts curiously towards GHOUL. GHOUL seems to be able to see GHOST and grins at her. She gives GHOST a thumbs-up and turns to grab something from where she was kneeling earlier. She offers what we now see is a partially chewed human arm to GHOST. The arm is not gory, and no excessive blood is visible.
TEXT APPEARS ABOVE GHOUL THAT READS "GHOUL".
GHOST seems disgusted and OOO's softly, shaking her head. GHOUL shrugs and quickly finishes the arm. GHOUL gets up and starts to walk away, throwing a bindle over her shoulder. GHOST drifts towards GHOUL, but she "grunts" making a sound like a distorted banjo and puts out her hand signaling that she does not want GHOST to follow her. GHOST seems taken aback. GHOUL resolutely turns back around and starts to leave the cemetery before being stopped by a chained-shut gate.

GHOUL drops the bindle and tries to pull on the gate, rattling the chains and making more distorted banjo noises, apparently frustrated. Meanwhile GHOST is delicately drifting towards GHOUL, trying not to be noticed. GHOST flits through the gate to the other side, now directly in front of GHOUL, who does not seem amused. GHOST ooo's and looks at the lock on the chains. After a moment she flies into the lock. The lock begins to glow white and shuffle around, before clicking open and falling to the ground as GHOST flies back out of it, looking happy.

GHOUL is obviously impressed by this trick, but quickly tries to hide this. She picks her bindle back up and walks through the gate, not looking at GHOST.

`

She gets a few yards away, then GHOST ooo's softly. GHOUL stops, and makes a big show of exasperatedly slumping her shoulders, before turning to look at GHOST and motioning for her to follow.

GHOST's eyes brighten and she ooo's excitedly, drifting up to float next to GHOUL.

As they move away from the camera, text that shows the title "GHOST & GHOUL" appears above them.

THE END

`

Works Cited

"Film 101: Understanding Foley Sound and Why Foley Sound Is Important - 2020." *MasterClass*, MasterClass, 22 Oct. 2019, www.masterclass.com/articles/film-101-understanding-foley-sound-and-why-foley-sound-is-important#the-3-types-of-foley-sound.

"Inside the Wrong Trousers." *Bonus Features. Wallace and Gromit - The First Three Adventures.* Aardman. BBC Video, 1995

Lauren, Iguanamouth. 3 April, 2017, 2:00PM, iguanamouth.tumblr.com/post/159163660067

The Legend of Zelda: Majora's Mask. Nintendo 64, Nintendo, 2000

NASA's Scientific Visualization Studio. 6 Sept. 2019. https://svs.gsfc.nasa.gov/4720

Zong, Louie. "Ghost Choir." *YouTube*, uploaded by Louie Zong, 23 Oct. 2018, www.youtube.com/watch?v=kXF3VYYa5TI

`