Magmachete and the Manifestation

Abigail Anne Howland

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Magmachete and the Manifestation

by

Abigail Anne Howland

An Honors Capstone
submitted in partial fulfillment of the requirements
for the Honors Diploma
to

The Honors College

of

The University of Alabama in Huntsville

April 24, 2019

Honors Capstone Director: Dr. Vinny Argentina
Assistant Professor of Art, Animation and Game Design
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Date
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# Table of Contents

Abstract 2

Visual Development 3

3D Modeling & Rigging 7

In-Game Results 22
Abstract

This paper documents a part of my journey as a contracted artist for the local indie game company, Little Wizard Games, LLC. Taking on the roles of a concept artist, 3D modeler, and artistic lead, I participated in the visual development of the team's first video game title, arbitrarily nicknamed “Mango Fortress” and scheduled to release in 2020. Using my favorite arts program, Clip Studio Paint, I have created a number of character designs and environment concepts for the company since mid 2017. I also began teaching myself how to use Blender, a 3D program which has great modeling, animating, and rendering capabilities. As my 2D designs were coming to life as 3D assets, I took my first steps into exploring Unity, an open-source game engine. This document will focus on my design and production work in the creation of three characters for the company's first game in progress.

“You are fire. Everything else is tinder. Burn the world.”

This was the working vision for our first title.
Visual Development

Our visual goal for the game was to create a 2D side-scrolling action game in a pixelated art style that would be rendered in real-time using 3D assets.

The Player: Magmachete

My goal was to design an embodiment of our working vision as the playable character for the game. Later to be nicknamed “Magmachete,” I designed this character composed of volcanic rock and magma, with flames as ethereal limb joints (figure 1).

Figure 1. Howland, Abigail. “Fire Player Concept.” Little Wizard Games, LLC, 2018.
The sword, while left untouched in the initial image, became a massive machete riveted with magma in my following concept iterations (figure 2). I translated the design into a pixelated style to better represent what Magmachtete may look like in-game, and placed the character onto both green and black backgrounds to see how the colors would contrast against those shades. Green was especially chosen to represent the extensive foliage that would most likely be present in the game’s environment.

Figure 2. Howland, Abigail. “Fire Player Pixel Art.” Little Wizard Games, LLC, 2018.
The Manifestation: Bat and Bonzai

Following the player’s character design, I drafted concepts for potential enemies in the video game. Our working vision was narrowed down to entail the “tinder” as “parasitic plants” and “mutated mammals”, so I created a piece of concept art for each of those ideas. At this point, I also created a general color scheme to restrict myself to (figure 3).

Figure 3. Howland, Abigail. “Mango Fortress Palette.” *Little Wizard Games, LLC*, 2018.

The first design spawned from an idea of a potted bonzai tree growing large enough to lift itself from the ground and allow its pot to be its “head” (figure 4).

The second enemy design was inspired by the hammer-headed fruitbat of equatorial Africa. This fruitbat’s large, almost wolf-like face seemed fitting for a ferocious mutated version of the animal, so I practiced sketching its facial features a couple times before drawing out an entire design (figure 5). Adhering to my color palette, I used oranges to play on the “rotten fruit” pun.

Figure 5. Howland, Abigail. “Rotten Fruitbat Concept.” Little Wizard Games, LLC, 2018.
3D Modeling & Rigging

With three character concepts approved by the team, I started 3D modeling. I aimed to stay low in triangle count with the meshes, since any highly detailed parts would likely be lost in the small number of pixels output by the shader. Assuming that each character would fill a square space of about 32 to 64 pixels, I wanted to make sure that I was creating strong shapes in my low-poly models that would appear clearly when rendered through the pixel shader in Unity.

Modelsheets

When 3D modeling, I almost always create modelsheets for myself. Usually, a front view (Z axis) and side view (X axis) will suffice. For Magmachete and the Manifestation, I saved time by re-using my concepts’ linework for most of the references (figures 6, 7). I did, however, create a new drawing for the player’s frontal view (figure 8). I used Clip Studio Paint for these images.

I used Blender 2.79 to create the mesh for Magmachete.

I begin every 3D model I make by defining its dimensions with basic cubes and rectangular shapes (figure 9, left). I call this “blocking out” the shapes, much like how a painter would “block out” their fields of colors or values in a painting before getting into the details. This creates a three-dimensional foundation on which to model or sculpt.

When modeling from a blocky foundation, it is easy to create edge loops wherever I need to expand or contract the shape, which is how I match the contours of my model to
the contours of my reference. For the player model, I did these steps almost exclusively in orthographic viewports. As I built up more geometry, I eventually started dollying around in 3D space to “round off” any hard corners, removing any rectangular appearance (figure 9, right).

I completed the model using as little geometry as I could manage, and took careful time to create the major shapes and details I wanted to show through. The following set of images show my progress in that pipeline.

Figure 11. Howland, Abigail. "Player Process 2: Back End" *Little Wizard Games, LLC*, 2018.
Rigging the Player

I used Blender’s Riggify add-on to rig the player character, painted weights, and made test poses (figure 13). This was the first model I had created that physically lacked connected limbs. The goal, with the help of Unity, was to create Magmachete’s fiery joints in-game using real-time particle systems. As such, I did not connect the geometry of the forearms to the upper arms, or the knees to the thighs. My hope was that the flame particles could easily conceal the disconnected parts I had modeled, resulting in full-fledged arms and legs. When the time came to rig the model, I was still able to use the elbow and knee joints of Blender’s Riggify human meta-rig and allow the character to move in a believable way (figure 14). The player was able to wield the currently unfinished sword model as well.

Figure 14. Howland, Abigail. “Final Player Rig.” Little Wizard Games, LLC, 2018.
Material Iterations

One challenge I encountered with Magmachete’s model was in the creation of important details such as magma-filled cracks and the color separation between those and the character’s base material. I was not doing UVs or making textures for any of these characters, so I had to use the mesh geometry to create colored details. My first complete pass on the character materials did not capture this detail well, particularly in the chest area (figure 15).

Fortunately, even after I had rigged the character, Blender allowed me to go back and change the model’s geometry - even add new edge loops for more detail - and so I was able to achieve the appearance that I wanted after some experimenting. It was at this point that I also decided to tweak the player model’s shape to make it appear less bulky in some areas and more sleek in general, which would match closer to my original concept (figure 16). This is when I came up with the name “Magmachete,” and after one of my teammates heard that name, they started calling the player “Maggie” - so, at that point, this androgynous male character became an androgynous female character. Why not?
Modeling the Bat

The rotten fruitbat was modeled similarly to the player, beginning with blocked out shapes to refine contours and add details. I modeled the bat’s mouth to be open so that it would be easier to rig closed if needed. The wings were modeled as separate objects for ease of connection to the body, especially since much of the neck and shoulders were covered with leaves anyway.

To create a leafy appearance, I made a simple leaf-shaped plane to duplicate all over its neck. I failed to get this to work programmatically, but manually placing clumps of leaves was easy enough and definitely gave me the result I was looking for. However, I did...
not learn until later - when the fruitbat was finally rendered in Unity - that the backsides of all the leaves would not show their color in-engine, because our game would use backface culling. Knowing this, I would make sure that any other card-like modeling I did would have volume, and that it would appear as I desired by turning on backface culling within Blender.

The tail was completed last because of its complexity. I managed to create the coiled vine look more easily than I anticipated by using add-ons that come with Blender, allowing me to create spirals to model from.

Since I wanted to add lots of orange detail to the chest without adding lots of unnecessary geometry, I made a few simply strips of color that clip into the body, automatically creating random scraggly shapes. I figured this would become an easier method of adding color detail than trying to make interesting shapes directly onto the surfaces of character meshes.

Most of these steps are pictured in Figure 13 on the following page.
Figure 18. Howland, Abigail. “Final Bat Model.” Little Wizard Games, LLC, 2019.
Modeling & Sculpting the Bonzai

For the bonzai, I took a very different approach to modeling: after blocking out basic shapes and contours, I started sculpting the mesh into the shapes I wanted. This allowed me to get a more knobbly look on the character, not to mention it took way less time than my typical modeling methods that required more precision. I still had to go back in afterward to edit certain forms and make some parts appear sharper. Overall, the initial free-form technique was a great time-saver and produced a very good result to work from.

Once the body mesh was finished, I added individual twigs protruding from the bonzai’s branches in various places. I let these objects clip into the body mesh since that would also save lots of time from having to connect all the mesh parts. These twigs were placed more or less in accordance with my original reference.

For leaves, I created one leaf shape, making sure to give it volume so that Unity’s backface culling would not remove too much detail. The added volume worked well and in favor of my visual goals as well. There was enough geometry to create a few different bent and curved versions of the leaf, all of which I used to dress the bonzai model in foliage.

The pot started as a simple cube and was modeled out to its round shape before I cut cracks into it. Blender’s knife tool and extrude tool made it easy to create crevices with depth, which I then colored black to deepen the effect.

The bonzai felt like a breeze to work on after the previous models, the player and the hat, both of which I decided to model first due to their complexity.

Steps for the bonzai modeling are visualized in Figure 19 on the following page.
Figure 20. Howland, Abigail. “Bonzai Final Model, 1 of 2.” Little Wizard Games, LLC, 2019.

Figure 22. Howland, Abigail. “Final Models Comparison.” Little Wizard Games, LLC, 2019.

(Note that a slightly older version of the player model was used in Figures 22 and 23 for ease of importing.)
In-Game Results

While I completed the first three character models to go into “Mango Fortress,” the lead programmer of Little Wizard Games created a custom pixelation shader within Unity to achieve the 2D style that we were aiming for. He also began animating Magmachete to function as a playable character. The following links and images show the three characters’ final translation from 3D to 2D.

Figure 23. Howland, Abigail. "Final Models in 3D." Little Wizard Games, LLC, 2019.


At this state, Magmachete was nearly perfect to my vision of the character. The added particle effects for bright flames pulled the model together and made Magmachete stand out against the other enemy characters, which is just as I had hoped for.
**Major Takeaways**

I learned a lot about low-poly modeling while working on this project, and will be taking the new techniques I learned into future modeling projects - especially for modeling the remaining characters of "Mango Fortress." I also discovered that a lot of the smaller details I had spent time on really did get lost in the final product; this was fine for learning purposes, but would be critical moving forward in the video game’s development. Any game developer or game artist would want to utilize the fastest methods of asset creation and implement stable innovations that made visuals easier to produce in their game.

3D modeling is a great passion of mine, and I am grateful to have been able to give tangible insight into my workflow and the hurdles that come with it. The trials and processes I have documented in this paper will push me to improve even more as a character artist and an asset artist for not only the Little Wizard Games company, but for my personal growth and enjoyment.