

Unfinished Business

A Major Qualifying Project Report
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And for the Degree of Bachelor of Science in
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Abstract

Unfinished Business is a 2D platformer where you play as Sadie Welile, a 13-year-old girl on a journey to save her town from the necromancer and find her missing father. Along the way players talk to Ghost NPCs and gain abilities that help them progress in their journey. The goal of this MQP was to create a solid, polished game that could be a published portfolio piece. The final version was published to itch.io on April 21st.

This paper will discuss the conception and production of *Unfinished Business*. We will talk about our inspiration and design goals, our Art, Writing, and Audio process, Technical landmarks and the rationale behind them, and the results of our playtesting sessions. We will also reflect on our process and discuss what was successful, what could be improved, and our plans for the future.

Acknowledgements

We would like to thank our advisors Dean O'Donnell, Walt Yarbrough, and Gillian Smith for supporting and guiding us through the development process. We would also like to thank Janelle Knight and Hailey Fink, who both assisted us at various points in completing Concept and UI artwork. We would also like to thank all of our friends and fellow IMGD majors who playtested and supported us throughout the process.

We would like to draw special attention to Professor Dean O'Donnell, who unfortunately passed away on March 7th, 2022. Although he did not get to see our final product, he was immensely important in the conception and production of this project. His contribution to this project was massive, and his influence, feedback, and guidance were instrumental throughout our development cycle. This project was published in dedication to him and his memory, and he will be greatly missed by each of us and the IMGD department as a whole.

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Table of Software and Versions

Software	Version
Clip Studio Paint EX	1.11.8 2021
Adobe Photoshop	2022
Adobe After Effects	2022
Sprite Illuminator	1.6.0
Texture Packer	6.0.1
Visual Studio	16.7.6 2019
Plastic SCM	10.0.16.6060
Unity	2020.3.29 f1
FL Studio Producer	20.9 [Build 2748]
Audacity	2.4.2
Arrow	1.4.0

1 Introduction

Unfinished Business is a 2d platformer developed as a Major Qualifying Project (MQP) during the 2021-2022 school year by five students for the IMGD and CS programs at Worcester Polytechnic Institute. In this game, players play as Sadie Welile, a 13-year-old on a journey to find her missing father and defeat the necromancer who attacked Willow Town. They can gain abilities and make friends with ghosts along the way, while combatting the necromancer's minions and traversing platforms through several levels.

This paper will first review the main inspirations we drew from when developing. We will then discuss our process for Art, Design, Technical Implementation, Writing, and Audio development. We will discuss our three major playtesting sessions and their outcomes. Finally, we will discuss what each person contributed to the project, what went right, what went wrong, and what we learned moving forward.

This project took place across four 7-week terms, with the goal of publishing a polished portfolio piece.

On March 7th, 2022, Professor Dean O'Donnell passed away. This had a significant impact on the final term of the project, as he had a massive impact on the development and was present from the very first conception of the idea. We were able to publish the game to itch.io, but his loss shook every member of our team and affected the final term of development greatly. We have published this game in his memory and want to emphasize how greatly he impacted each of our careers at WPI and how he guided us through this project.

2 Background

When planning Gameplay, Narrative, and Setting for *Unfinished Business*, we had many other pieces of media we looked to for inspiration. We wanted to create a game aimed towards a younger audience, around ages 12-15. It would tackle heavy narrative themes in a lighthearted way. Additionally, it would need to have supernatural elements worked into the story. The game would be a 2D platformer that was fairly light on mechanics- the narrative would be the centerpiece of the player experience.

One of the main pieces of Media we looked at for our narrative design was *Gravity Falls*. This show, made for Disney Channel, had supernatural narrative influences with silly, lighthearted plots. It captured the narrative vibe we were aiming for perfectly. Another inspiration we referenced is *Undertale*. This 2D RPG has a simple gameplay loop but gained extreme popularity due to its fun NPCs and fascinating environments.



Figure 1: Screenshot from *Gravity Falls*



Figure 2: A screenshot from Undertale

Some inspirations we had for gameplay were Night in the Woods, Hollow Knight, and Ori and the Blind Forest. Each of these 2D platformers have simple UI, interesting platforming mechanics, and are narrative driven. Ori and Hollow Knight have very tight platforming controls and are satisfying to play, which were huge priorities for us as well. Night in the Woods also has a limited color palette, interesting lighting, and an emotional, narrative driven gameplay loop. We referenced all of the games and shows listed here, as well as reference imagery and past development experiences when working in the pre-production and production phase.

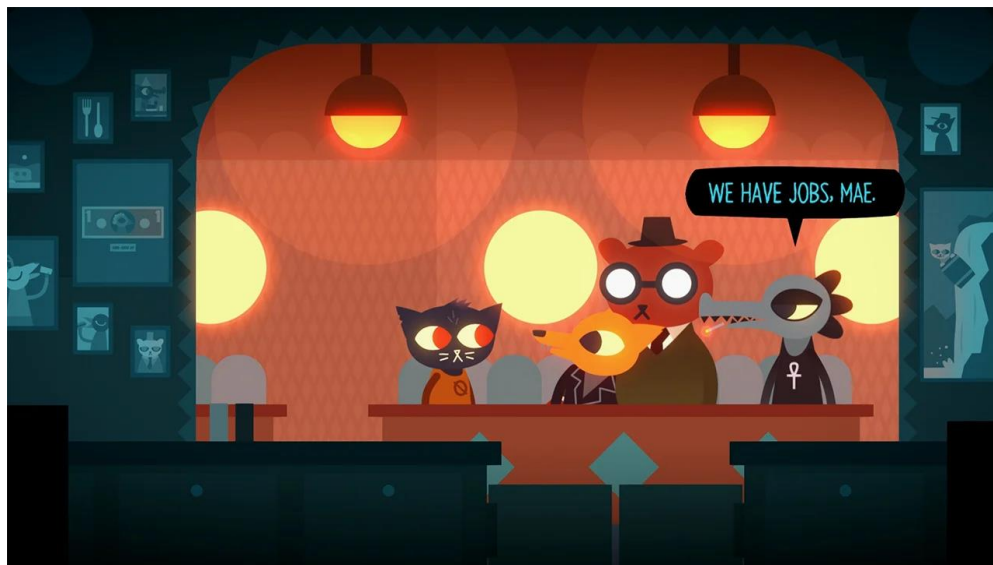


Figure 3: A screenshot from Night in the Woods

3 Art

3.1 Art Direction

The main priority for our visuals was creating a style that was cohesive, readable to the player, and matched the vibe reflected in our inspiration and our narrative. To do this, we referenced many other titles (both games and other media, laid out in Chapter 2), as well as other reference imagery. Each person on the team, in the first stage of production, created moodboards reflecting how they were envisioning the final product.

From these moodboards, we found that everyone on the team gravitated towards cooler color palettes, a modern-fantasy setting, and a combination of painted and loose, sketchy assets. Additionally, the target audience is 12-15, so we wanted to make settings and characters that would appeal to this audience. Characters are silly, and locations are whimsical, so the art needed to reflect this. Hannah, with the assistance of Janelle Knight, worked together to create a cohesive set of concept art and mockups to reference when creating assets that reflected these choices. The next section will go over the concept art process we followed.

3.2 Concepting Process

Concepting took place during pre-production primarily, but more pieces were created throughout development as the narrative evolved. While concepting, we wanted environments to reflect the moodboards assembled by the team. We focused on several main areas for concept art including environments, NPCs, and characters. Concept art was created in both Adobe Photoshop and Clip Studio Paint.

Because we had one artist on our team, concept art was created with the intention of team approval and communication rather than as reference for asset creation. It was an iterative process, with some of the concept art being unused or revisited as development progressed. This is typical in concept art development, as team goals, scope, and the narrative evolve through development. A great example of this is the concept art for the enemies in the game, shown in Figure 5.



Figure 4: The first iteration of Concept Art for Enemies

One trend we noticed in the Concept Art development was dynamic lighting, which influenced our asset creation pipeline. Each of the pieces we created for the environment had their own interesting lighting shapes and styles, and it is something we really enjoyed about the concept art. We decided to implement lighting as a key part of our art style because of this. An example of this can be seen in Figure 6.

This is also typical in a Concept Art phase- because of its exploratory and iterative nature, we found new elements we hadn't thought of during brainstorming that impacted the final visual appearance of the game. Because the game is set during the evening, we had more freedom with interesting lighting techniques- this is not something we would have necessarily considered if we had not taken the time to iterate and develop our concept art. This is why, although we had only one artist on the team, we felt it was a crucial step in our development to create said concept art.



Figure 5: Concept Art for The Mines

The full set of concept art created through development can be found in Appendix A.

3.3 Color Design

Color was a key part of our visual design. We had a very cool color palette through each level. It reflected that the game takes place across a single night, with the palette getting cooler and dimmer as the levels and the night progresses. This limited palette helped the levels feel like they took place in the same world and helped us cement a feeling of sadness and mystery throughout the game.

Aqua blue was an indicator of good- all of the NPCs that help the player are in this color palette. Conversely, Purple represents evil- enemies and the environment becomes more purple as the levels progress, indicating how the player is approaching the necromancer. In the final level, the crystals glow blue and the lanterns glow purple- this dichotomy of color created a sense of conflict that Sadie faces in her final choice at the end of the game.

We had a color reference sheet, shown below in Figure 7, laying out our color palettes for each level and key character so that we could make sure any new assets would match as development progressed.

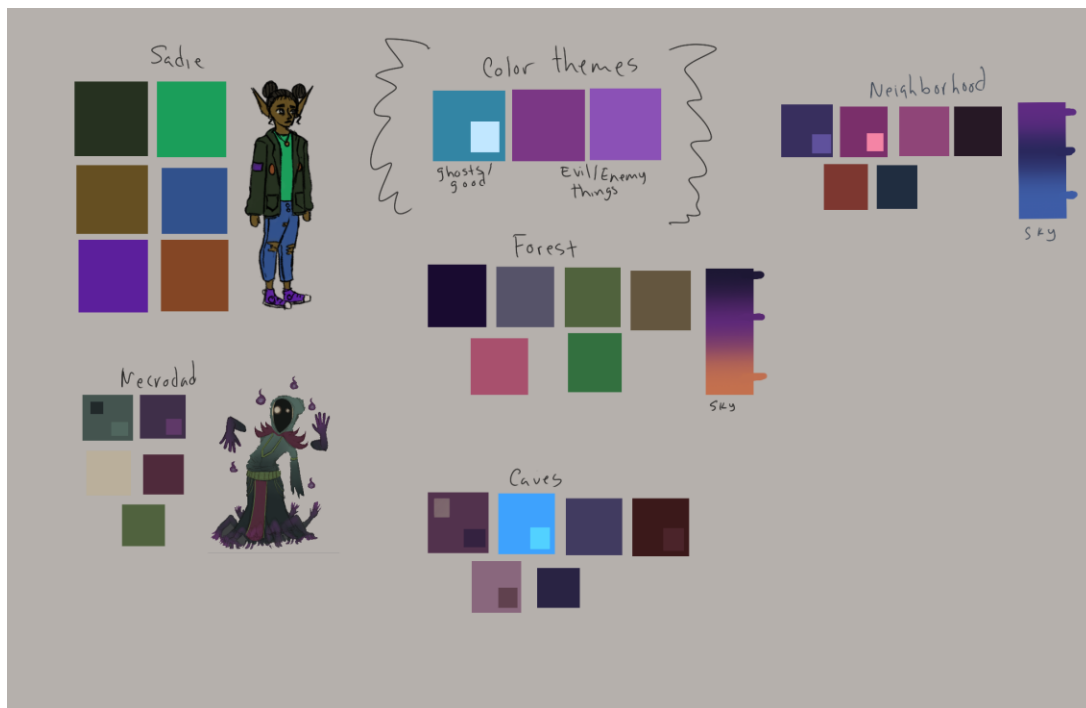


Figure 6: Color Reference Guide

3.4 Asset Development

Our assets were created using Clip Studio Paint, and tile maps as well as sprite sheets were taken through Sprite Illuminator and Texture packer before being brought into unity. This allowed us to create custom normal maps so that our sprites would reflect the dynamic lighting throughout the levels.

The art style was a contrast of both painted assets and sketchy, loose animations, again reflecting the sense of conflict faced in the narrative. Because of our

limited color palette, we needed to make sure players could discern themselves and other characters from the backgrounds- this contrasting of art styles allowed us to visually separate the characters from the environment, making the screen more readable for players.



Figure 7: Screenshot from Level 2, showcasing the contrasting styles

For our animations, we opted for hand-drawn keyframe animations. This allowed the animations to feel more organic and to line up with the loose, sketchy style we were aiming for the enemies, NPCs, and main character. Animations were first blue lined in Clip Studio to block out the general motion of an action, then lineart and color were added.

From there, Animations were exported into Sprite Illuminator, a program by CodeAndWeb, allowing us to paint normal maps for each frame of the animations. They were then brought into Texture Packer, another program from the same CodeAndWeb suite, packaging and slicing the frames and normal maps for use as sprite sheets in Unity. Figure 9 shows off one of these sprite sheets, generated for the Skeleton Enemy's death animation.



Figure 8: Animation Sprite Sheet and Normal Map Example

Unfinished Business has two pre-rendered cutscenes at the beginning and end of the game. These exist to tell the story leading up to the game's events, and what happens when you reach the end of the game. These were pre-rendered videos created in Adobe After Effects by Janelle Knight. They are in a hand painted style and use some of the concept art created during pre-production as backgrounds. This method was chosen for speed and allowing creative liberty we couldn't have taken if it were rendered in-engine.



Figure 9: A screenshot from Cutscene One (Janelle Knight)

4 Tech and Design Implementation

4.1 Software and source control and rationale

We had several key decisions to make during pre-production regarding development software, including which game engine we wanted to use, as well as the version control system we wanted to use alongside it. We decided to develop in Unity as most of us already had some degree of experience with the engine, and it features a greater degree of support for 2D game development than the Unreal Engine, the other main candidate. This also made the version control decision extremely easy, as Unity had an integrated functionality at the time called Unity Collaborate which allowed us check assets in and out with the push of a button.

4.2 Render pipeline

Unity has a few render pipelines to choose from. We chose the Experimental 2D Universal Render Pipeline. The rationale behind that decision was, although the 2D URP pipeline is experimental, it's quite stable and supports some features that made the game look more visually pleasing, such as 2D lights and an array of post-processing effects. 2D lights were used frequently in every level, and the use of post-processing allowed us to enhance the visual fidelity of the game by adding bloom and increasing contrast.

4.3 Design pillars

During pre-production we laid out three main pillars for development- platforming, combat, and conversations. These three pillars represented the three main gameplay loops players could engage in.

During the early stages of development, our main game play loop was platforming until you found either enemies or an NPC. The enemies would have to be defeated using combat mechanics. As we implemented these mechanics, NPCs were gradually added to the world.

The NPCs were under two categories: Quest and Flavor text. The flavor text NPCs existed to give the world a feeling of being lived in, while the Quest NPCs were

how players get new abilities and expand on the story. As you make your way through the game there are ghosts that need your help. The main example of this is the blacksmith ghost, who lost his hammer and needs you to retrieve the parts. Once you get the parts he gives you a ground pound ability. This new ability now affects how you move through the world and combat enemies.

We decided to separate the game into peaceful zones and combat zones. In peaceful zones you talk to NPCs and take a break from combat; In combat zones you fight enemies and have a Quest NPC. These are longer zones with a focus on combat and platforming. Figure 10 shows the layout for the levels in the game.

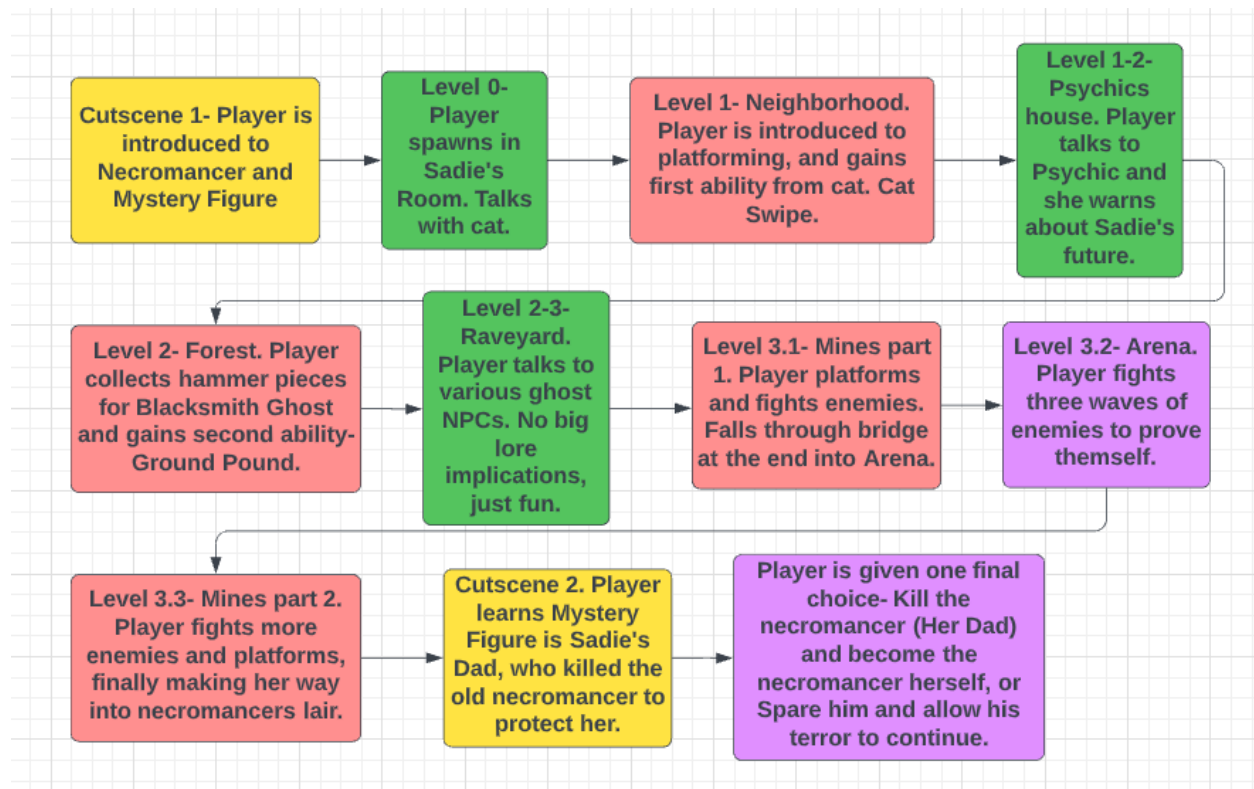


Figure 10: Flow of Levels

4.4 Movement

Since the game is a 2D platformer, we began development on movement immediately. It started with white boxes for the ground and wall and colored circles for the player and enemies. At first we only had moving back and forth and jumping.

One of our earlier challenges was getting the perfect balance between “floaty” and “realistic” movement, so that it felt natural while still affording the player the degree of mobility that is expected in a 2D platformer. The way we were able to do this was by

increasing the gravity scaling values at the apex of the player's jump, resulting in a very "floaty" ascent, followed by a quick drop.

For enemy movement we had them only move back and forth initially. At first they would go in one direction forever. We fixed this by having them check for the ground and walls to alter their direction.

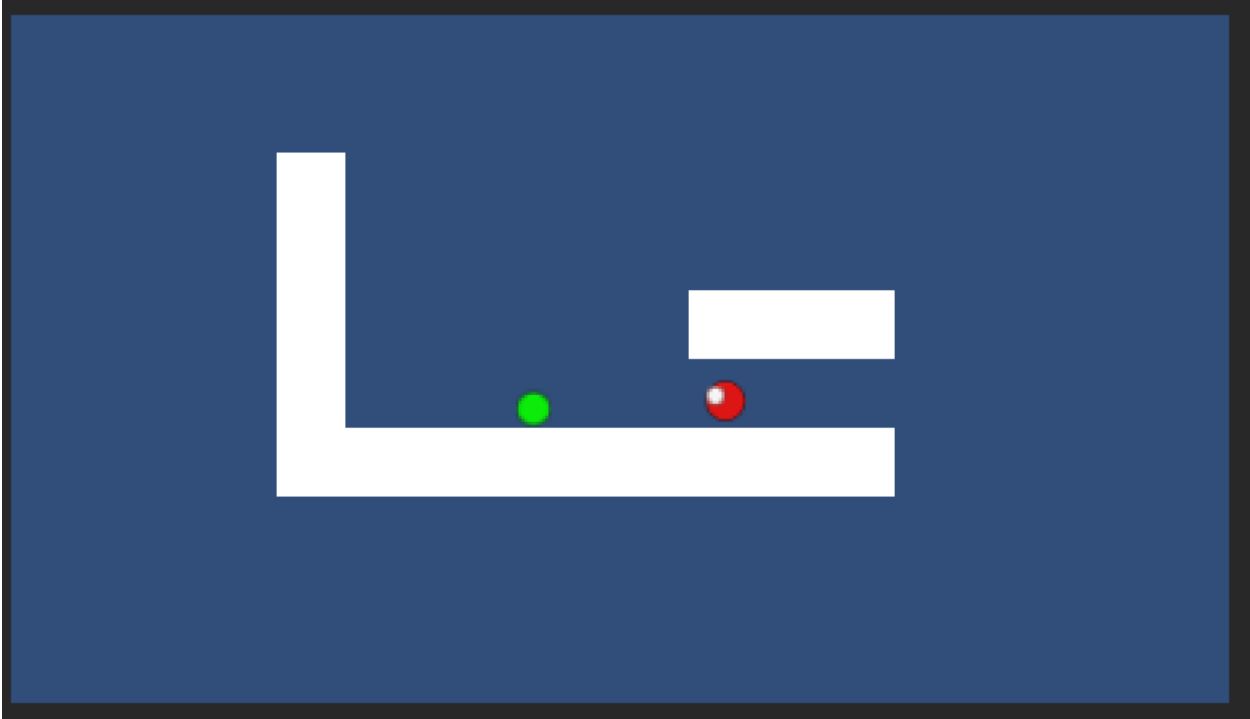


Figure 11: Greybox screencap #1, the green circle is the player, and the red circle is an enemy. Note that the white circle indicates that the enemy is facing to the left.

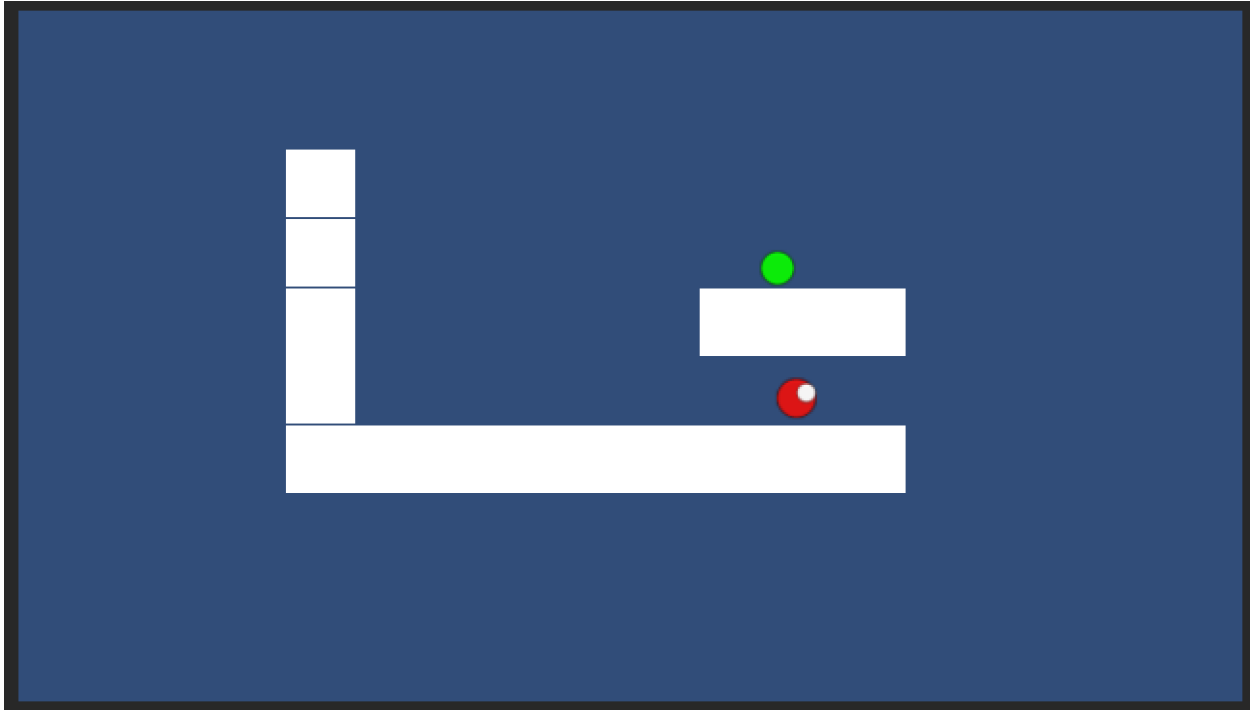


Figure 12: Greybox screencap #2, note that the player has jumped up to the elevated platform, and the enemy, having already reached the wall on the left side, has turned to face to the right.

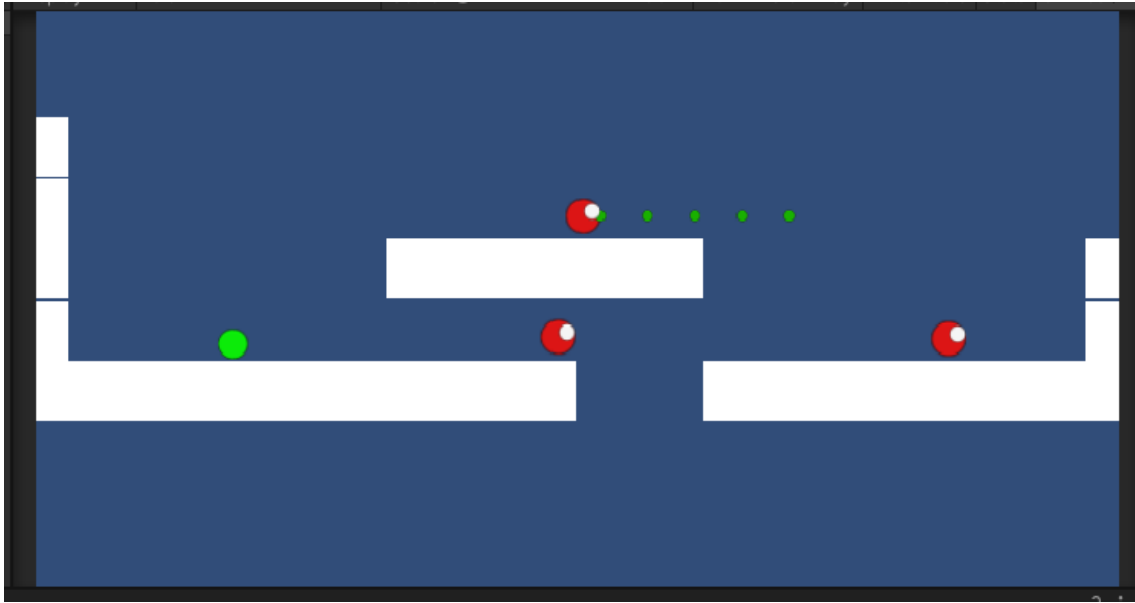
4.5 Combat

One of the main problems that we had in approaching combat was that we needed direct control over the position that the player's attacks were coming from. This was solved through the usage of a separate "fist" child object to generate projectiles and toggle its punch collider, which was responsible for dealing damage to enemies. This

allowed us to keep our code clean, as well as allowing us to more directly control the positioning of the attacks.

Figure 13: Greybox Screenshot 3, showing off different enemy types

The three Enemy types are shooter, puncher, and normal. The shooter and puncher derive from the normal enemy, with a “fist” object that manages the different



attacks, similar to how the player’s fist object functions.

4.6 Abilities

The ground slam ability was relatively easy to program, requiring little more than some quick physics and collision tweaking. The ground slam can only be activated after the player has been jumping for several frames, a balancing decision made to prevent players from spamming it. When it is activated, the player’s gravity scaling is multiplied, causing them to fall faster. When the player makes contact with the ground while in this state, two projectile instances are spawned, which travel in opposite directions.

When implementing the cat swipe ability, we wanted to give the player a tool that would allow for swift lateral mobility. This, however, meant that we needed a way to negate gravity temporarily. To solve this issue, we ended up setting the rigid body component as kinematic, meaning that it could move without being affected by most physics effects, namely gravity. This created another problem: the player could now pass-through walls and get stuck inside. We fixed this by using raycasts to check for walls in front of the player before trying to move.

4.7 The Arena Level

The goal for the arena level was to have the next wave of enemies spawn if and only if the previous wave was completely defeated. This was more difficult than it had first appeared to us because we needed a way to both spawn in enemies during runtime and track whether a wave of enemies was completely defeated or not. We solved these issues by first creating spawner objects that created enemy instances when triggered, then adding all the enemies into an array as they spawned, then constantly checking for non-null entries in the array (indicating enemies that were still in the scene), which would show that at least one enemy in the current wave is still alive.

5 Writing

5.1 Narrative flow

The narrative of the game is told linearly primarily through dialogue. Exposition is given gradually as the player talks to the friendly non-player characters that they encounter. The reason why we took this approach is because it's engaging enough to keep the player interested by feeding them little bits of lore and other relevant information rather than dumping all exposition on them all at once. Although the problem that we ran into is, for many players, the story ended up being unclear. To remedy this, in v1.1, we clarified and shortened some of the dialogue, and added a few more conversations to expand on what was happening.

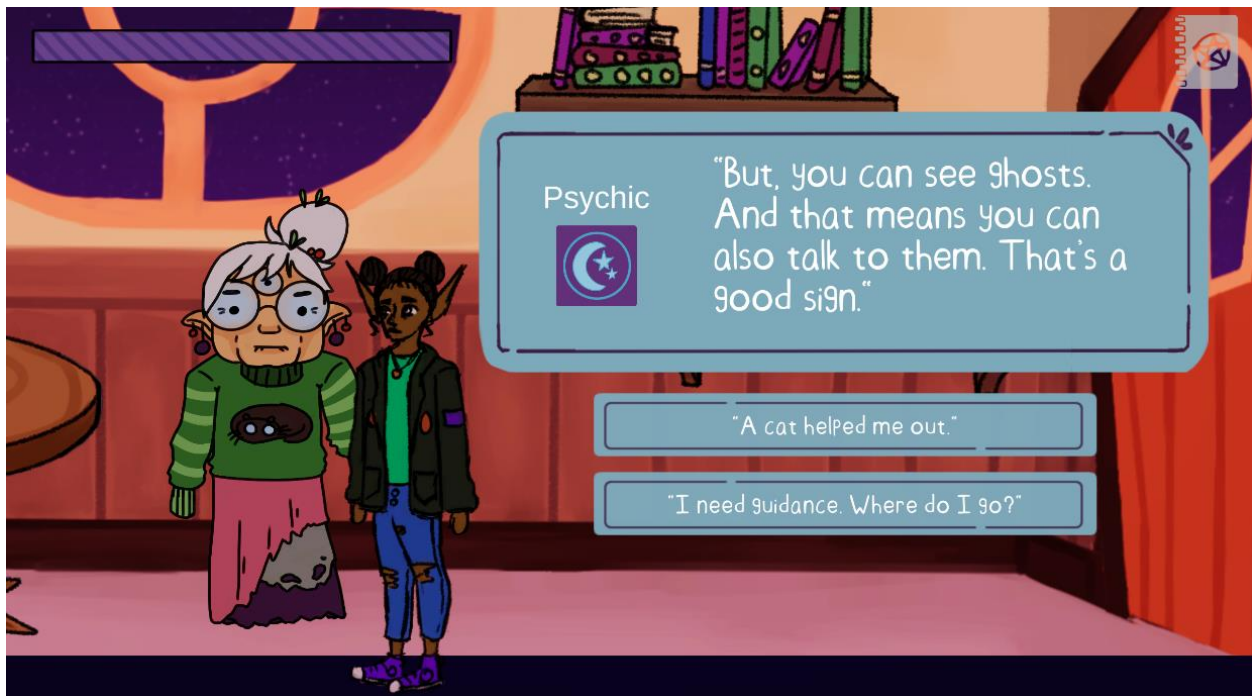


Figure 14: Psychic Dialogue Example

5.2 Script

To plan out the dialogue before implementing it, we used Google Docs to write a rough draft to give a general idea of conversations and their structure. Very little of that rough draft ended up being in the final version of the game, but it served as a guideline while it was being implemented inside of Unity.

This document is for all of the dialogue that you'll experience in the game

All of Sadie's dialogue is placeholder text because you'll be able to pick from different dialogue options. But the flow of the conversation will overall stay the same.

Main NPCs

Level 0:

Cat

"Well, well, well... would you look at what the cat dragged in."

Sadie

"But I was already here..."

Cat

"Who said I was talking about you?"

Mrrrow! Kids these days. Always think the world revolves around them."

Sadie

"My foot is gonna revolve on your butt if you don't shut up."

or

"What do you want?"

Cat

"Such hostility! I was just going to tell you where your dad went. But, since you're so inhospitable..."

or

"I was just going to tell you where your dad went."

Sadie

"WAIT! Where did he go?"

Cat

Cat: "Hm... why don't you follow me outside?"

Level 1:

Cat

"Find me at the end of the forest. I have something I'd like to show you."

The cat runs off screen.

At the halfway point of the level, you encounter the Cat again.

"You made it! Great."

"Do you see this pit? It's rather wide, isn't it?"

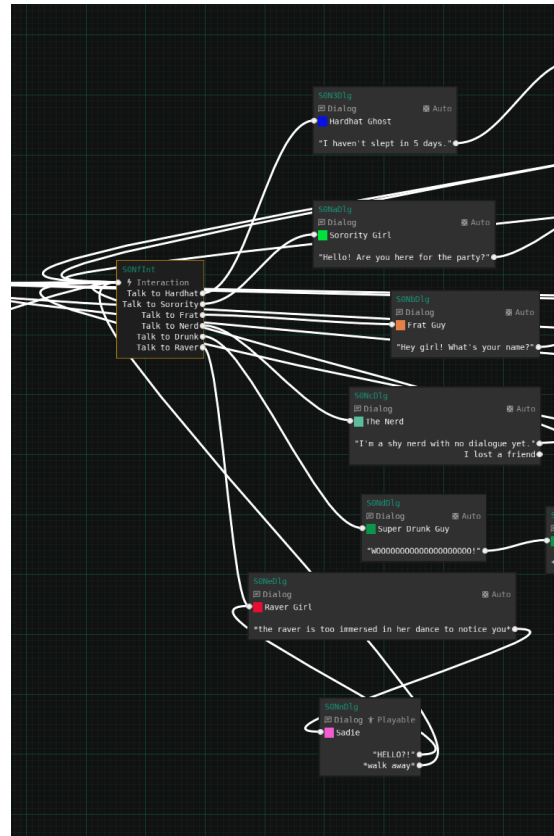


Figure 15: Google Docs and Arrow Examples

Another tool that came in handy was Arrow. For one of the levels, the Raveyard, we were planning to have 6 characters that you could talk to. We realized that Google Docs was not going to work as well for the other levels where the storytelling was more linear, so we opted to use Arrow. Arrow is node based, so it allows you to create branching dialogue much easier than in Google Docs. We used that feature to design the different NPCs and give them dialogue which changes based on which option the player picks.

5.3 Implementation

To implement the dialogue inside of Unity, we used a couple of free addons which made that process a lot easier. The first one is Dialogue Editor. It comes with a built-in dialogue tree editor with two options for nodes: a speech node, and an option node. Speech nodes are usually what the NPCs are saying, and the option nodes are what the player has the choice to pick between. It also has a built-in dialogue box sprite (which we edited), and some other neat features like the ability to execute events and play sound effects when a piece of dialogue is spoken.

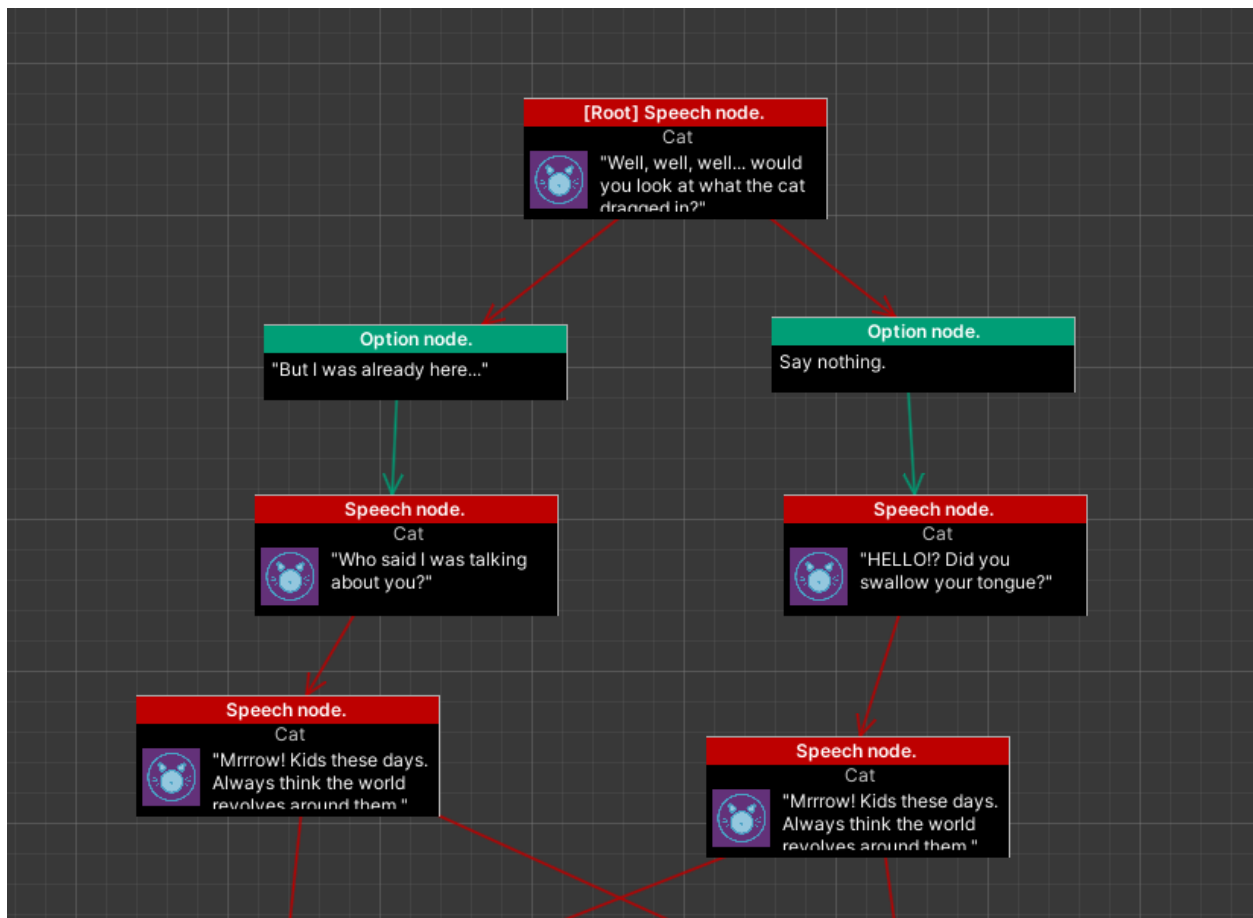


Figure 16: Dialogue Editor Window in Unity

Another add-on which helped with juicing up dialogue is Cinemachine. Cinemachine provides more functionality to cameras. It allowed us to create seamless transitions at the start of dialogue, as well as camera transitions in the middle of some conversations where it was needed (such as in the 2nd encounter with the cat NPC, and the first encounter with the necromancer).



Figure 17: The camera shifts here to show the player the wide gap ahead of them

6 Audio

6.1 Chosen Programs

The primary tools used for the creation and modification of the sound effects and music used in *Unfinished Business* were *FL Studio 20* and *Audacity*. *FL Studio* was chosen over other Digital Audio Workstations such as *Logic Pro*, *Pro Tools*, and *Ableton Live* after weighing the strengths and weaknesses of each. Compared to the other highly popular DAWs, *FL Studio 20* has the most versatility regarding the creation and editing of music and sounds, accounting for both synthesized audio and sampled audio. Additionally, *FL Studio 20* can be argued to be more user-friendly than many of its competitors and is very compatible with a 'rapid-fire' style of audio development, which was the style used for this project.

Audacity was used to prepare the majority of the sound effects which were created via Foley techniques. *Audacity* was chosen for two primary reasons: firstly, the program itself is very easy to use - and secondarily, the program is free. Competing programs focused on the recording and editing of audio, such as *Reaper*, can cost upwards of \$60 USD - compared to that, *Audacity* had all the capabilities necessary for this project, at a price point of zero. While it would have also been possible to record and edit audio entirely within *FL Studio*, *Audacity* is superior at quickly isolating specific parts of recordings - as such, the decision to use both programs in tandem sped up the development process compared to what if only one program was used.

6.2 Sound Design Goals

The goal for the audio for this project was to evoke feelings of mysticism and wonder. As such, it was decided that it would be the most fitting to use sound effects which err on the side of creativity over realism. The thought process behind this decision was that even if a sound effect matches perfectly with how its corresponding action would sound in a real-life scenario, if the sound effect does not evoke any strong feelings in the player, that level of accuracy and realism would be effectively meaningless. By using sound effects that do not necessarily adhere to realism, the player's imagination will be stimulated more so than it would otherwise.

The music for this project was designed with its corresponding section and/or level as the primary inspiration. Each composition was created such that it achieves a balance between what is and is not included - if the music were to be too complex, it would distract the player from the game itself, but if the music were too simple, it would not make any meaningful difference within the game. Additionally, each composition

was made to be easily loopable, such that players could spend as long as necessary within each level without noticing any major breaks of continuity within the music.

6.3 Sound Effect Development Process

The sound effects created for this project fall broadly into two categories: those created using primarily synthesis techniques, and those created using primarily foley techniques. As an example, for the foley-based audio, the sound that plays when a zombie enemy is defeated is a good point of reference. An initial voice recording is taken and isolated, after which point various effects are applied to it to eliminate unwanted frequencies and boost desired frequencies, while making sure that the resulting sound effect ends up neither too loud nor too quiet.



Figure 18: The chain of effects used for the zombie death sound effect.

After getting the sound effect to a usable state, a final set of tweaks and adjustments are applied to it. In this example, the pitch of the sound is lowered over time along a logarithmic trendline, and the volume of the sound is quickly - but not abruptly - lowered at the end, to allow for a smooth cutoff. Sound effects created using this method often required less impactful edits to create a finished product, as the primary advantage to this approach is that the initial sound to be edited will already have some - if not most - of the sonic qualities desired for the final sound.

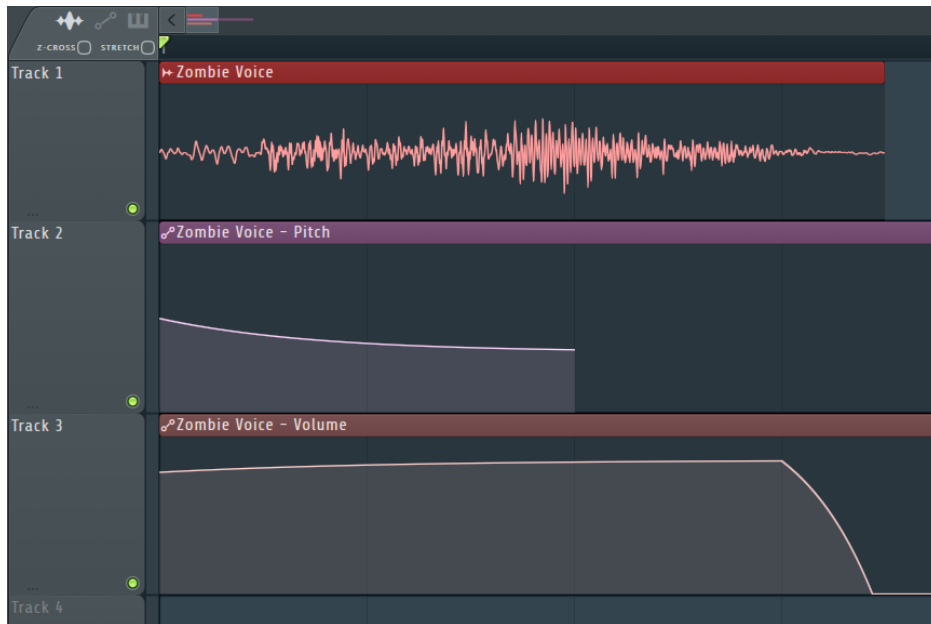


Figure 19: The changes to pitch and volume applied to the zombie death sound effect.

In regard to the second type of sound effect for this project, the process is largely similar to that which was discussed previously, for the Foley-based sounds, but with two key differences. The primary difference between the two is that the synthesized sounds were not created using audio recordings as a basis, but instead were created entirely from scratch, using oscillators and other tools to create generated sounds. The sound that plays when an enemy is successfully hit is a good point of reference for this.



Figure 20: The oscillator used to create the enemy hit sound, as well as the effects applied to it.

First, a suitable sound is chosen - in this example, an oscillator is used to generate noise as the basis for the sound. The primary effect used on this sound is a 'bitcrusher,' which changes the bandwidth of the sound to create a distorted, compressed sound. The values for the bitcrushing effect start relatively low and are automated to increase quickly in the span of under a second, creating a sound that evokes a feeling of an impact which then dissipates. A reverb effect is then applied on top of the sound to add a feeling of 'fullness,' after which point the sound effect is complete, save for minor adjustments to volume.

6.4 Music Development Process

The compositions created for this project were rooted in the same inspirations used for the visual assets, although more loosely. The primary aim of each piece of music was to match the intended feeling of the area(s) in which it was used, and the secondary aim was to keep the compositions and their instrumentations as stylistically consistent with each other as reasonably possible.

Regarding inter-compositional consistency, the usage of leitmotifs was extremely helpful. A main leitmotif was created in the first composition made for the project (the composition used for the title screen and Raveyard level), which was then used in

various ways in every other composition. The leitmotif itself uses upwards and downwards motion while making use of chromaticism to add tension to the music - it is structured in such a way that the end of the leitmotif can be immediately resolved at the start of the next measure, as the note which would logically follow the end would be the same note as the first.

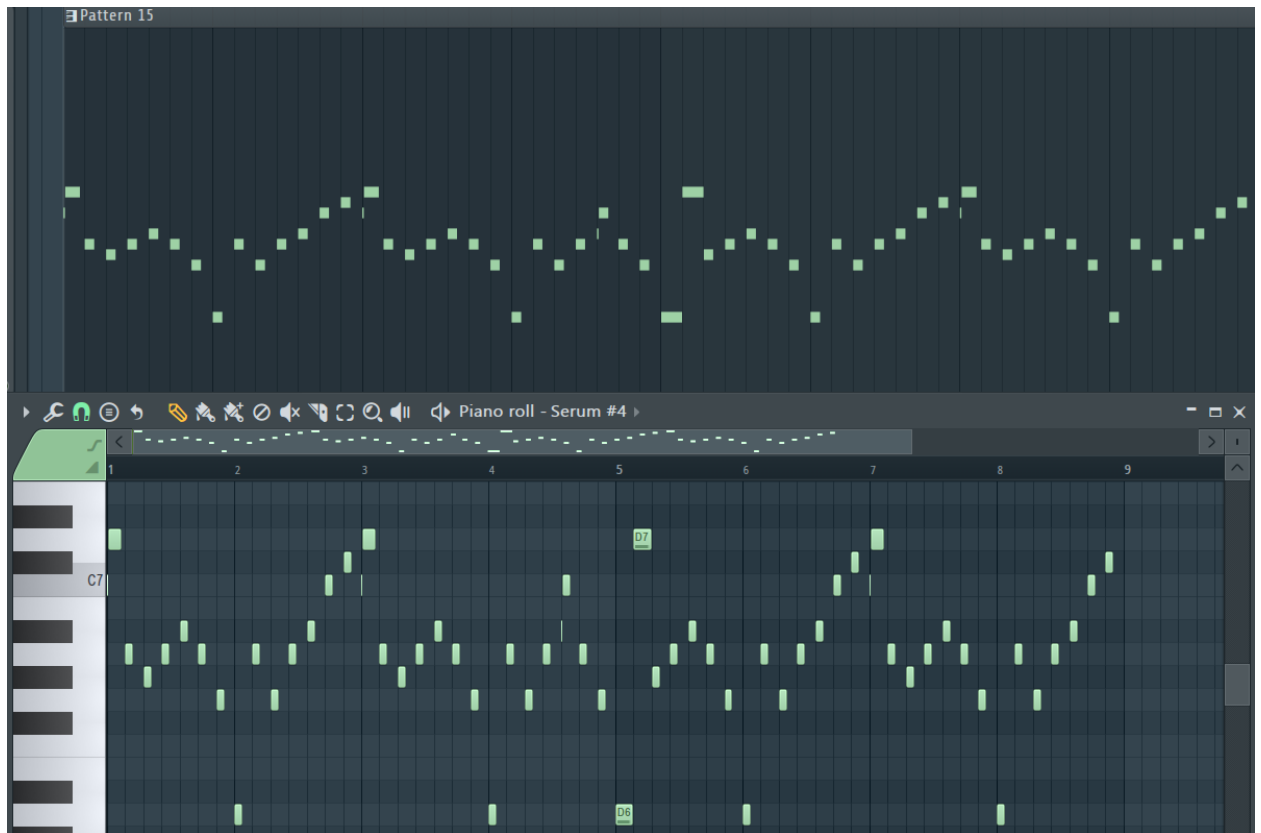


Figure 21: The leitmotif used, in its original form.

As an example, the music created for level three, the underground mines, features good usage of this leitmotif. In the second section of the composition, there is a sine wave used for the lead section. The first half of this section uses the sine wave for a melody unique to the composition, whereas in the second half, the melody uses the leitmotif as a base, while managing to keep the transition between the two halves smooth. This allows for the song used for the mines to be tethered to all the other songs, creating a sense of cohesion within the game's soundtrack.

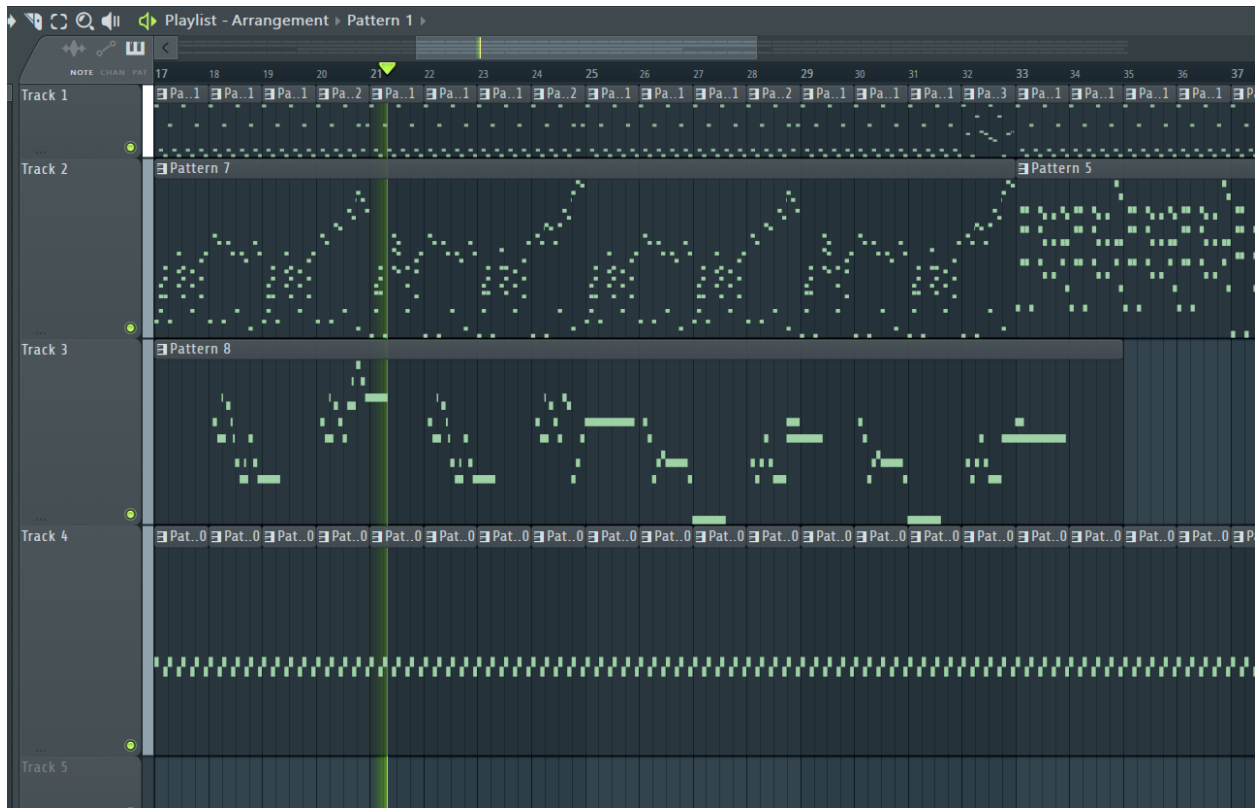


Figure 22: The second section in the underground mine's soundtrack. The referenced sine wave is played on track 3.

6.5 Audio Implementation Within Unity

Unity has a built-in audio handler. Just add the component onto the object you want then in code you can trigger when you want it to play. For music this is just an easy play on start then loop. Sound effects are a little trickier as they need to be incorporated into the action. Unity does have a function called `PlayonShot` that will just play the audio clip once. This is very useful for sound effects.

7 Playtest Data & Player Feedback

7.1 Alphafest

Our first major build was completed for Alphafest in B term. This build contained one level of the final game and was created as a vertical slice. The playtesting at this stage existed to tell us about any major bugs, whether our sound and visuals aligned with our vision, and whether the gameplay we had created so far achieved our goals. This level contained the basic mechanics that would be present in each level in our later builds, as well as the ground pound ability, so we were able to test the basic platforming mechanics such as jumping and how it interacted with this ability.

Overall, this build was received okay by our testers. We found a few game-breaking bugs, such as our pause menu breaking the build and forcing a restart, and the parallax backgrounds not functioning correctly. Players really disliked the control scheme, so this was something we changed in future builds. Additionally, while our visual style was really enjoyed, it needed a lot of polishing and only a small amount of our total assets were implemented. All the data gathered, as well as the survey given to playtesters, can be found in Appendix B.

7.2 v0.9

The next major build was at the beginning of D term. We spent C term expanding the Alphafest build to our full game, implementing the cat swipe ability and the rest of our playable levels. We changed the control scheme from the previous build, and fixed major bugs found during our first playtest. This build contained all of the main levels and the two abilities but did not contain the transition levels between the main levels.

This build had a smaller number of playtesters but was received well. There was a huge improvement in the visuals, control scheme, and audio. Players liked our new control scheme better, and the cat swipe was fun to use. However, players were able to abuse the lack of cooldown on the cat swipe, skipping through the game incredibly quickly. We fixed this in the next build, adding a cooldown. There were a few new major bugs found, such as infinitely falling, getting stuck in floors, and being able to dash off map edges. All the data gathered, as well as the survey given to playtesters, can be found in Appendix C.

7.3 v1.0

The next build, and final playtest session was several weeks after v0.9. In this build, we included all of the transition levels, finished assets, cutscenes, and sound. We also tweaked the combat system, adding knockback to enemies, so punching felt just as powerful as shooting. It was essentially the final project, with the final build only being minor bug fixes and polish changes made after this.

Players generally liked this build as well. There were some balancing issues, such as jump being too floaty and respawn points needing to be moved, but overall players enjoyed the experience. A lot of players really enjoyed the art style and the sound but wished there was more audio feedback and variation. Some players were also confused by the story- In the final build, we clarified and added a few extra dialogues to fix these issues. All the data gathered, as well as the survey given to playtesters, can be found in Appendix D.

7.4 Analysis

The final build was published to itch.io on April 21. This build incorporated all of the feedback we received during previous playtests. This included art adjustments, sound mixing adjustments, extra and clarified dialogue, and bug fixing. As of writing this, the final build on itch has almost 300 impressions and 30 downloads.

Our playtesting was fairly successful- it allowed us to find bugs and gauge how players were receiving our design. However, we should have gotten more playtesters to get more effective data. We sent out our itch page and playtesting forms in every form we had available- we tablesat on campus, raffled gift cards off to playtesters, sent out the form on social media and discord servers as well as to friends directly, but we just didn't get a lot of engagement.

This could have been attributed to the fact that we had our final two playtesting sessions too close to each other, or that they took place earlier in the term. IMGD students at WPI need playtesting credit for each of their IMGD classes- they have to playtest one game per class per term. We had hoped we could utilize this pool of students as playtesters, but because it was early in the term students felt less pressure to complete these assignments yet.

8 Conclusion

8.1 Scope

Scope was the biggest lesson we learned throughout this project. We frequently revisited our goals and plans, continually reducing and redefining our scope as the project developed. Our initial pitch was extremely over scoped, stating our goal as 5 to 10 hours of gameplay. The pitch was developed for another class as a theoretical project, so when we entered pre-production we quickly cut this down to a goal of about 15 minutes of gameplay. Our final build of the game was about 10 minutes of gameplay in a normal playthrough, with twitch speedrunner JimmyJam100 optimizing and completing the game in just under 4 minutes.

We employed several methods for cutting down our scope, including creating a MOSCOW chart and revisiting elements such as abilities once we had developed the first. The MOSCOW chart allowed us to lay out which elements and mechanics we believed we Must have for release, Should have, Could have, and Wish we could have. This helped us prioritize and polish the most important elements first, ensuring we would have a total, finished product at the end of development that contained the most important elements.

This was a living document- after completing the ground pound ability, the first ability we developed, we were then able to make a more informed decision about how much we would be able to complete within our time frame. This method was applied to our Art, Audio, and Technical pipelines frequently- twice per term, we would revisit our goals in each area and discuss what would be possible for our next major landmark.

8.2 What Went Right

As a team we worked really well together. Every week we each had a personal task and completed it. We had weekly meetings as check-ins to address any issues. We mainly communicated over our Discord server and kept everyone up to date on how the project was going. We were able to meet our main goal of making and publishing a full game.

8.3 What Went Wrong

8.3.1 Issues during pre-production

During the early phase of our game's development, there were several things that we were missing. The first and foremost of these was a lack of clear comprehension of the team's capabilities over the given timeframe as well as what the finished game was going to look like. Originally, our plan was to have a small-scale RPG with 10+ hours of unique gameplay. It took us way too long to chart our final course, with the scoped-down version of our goals being finalized close to halfway through the year. Another problem that hindered our early progress was a lack of communication from someone who signed up to be on our project team, but never showed up (with time, we learned they had signed on with another team).

8.3.2 Version Control Issues

Sometime during early January, Unity Technologies decided to transition their official version control system from their internal Collaborate feature to an external service called Plastic SCM. While this had no long-term effect on our project's development, it did create a momentary hurdle. We were alerted by Unity Technologies sometime in mid-January that our project had been archived (effectively preventing us from making any changes) and would be deleted if it remained archived for the two subsequent weeks. The only way to save our project from being wiped from the Unity cloud was to migrate our project data to a Plastic repository. This process took an entire weekend to figure out, but in the end, we were able to migrate our project. This set us back a small amount with respect to our approaching internal deadlines. Through this ordeal, we learned that during the development process, we must be able to address external factors that may take urgent priority and be able to recover in terms of working towards future deadlines.

8.3.3 Professor Dean O'Donnell

As stated previously, Professor Dean O'Donnell Passed away before the final term of development. This impacted each of our team members greatly, and made finishing the project, both logistically and emotionally, very difficult. Although we published and were able to work with what we had, it had an impact on our final product and our work ethic in the final stretch of development.

8.4 Where to go from here

Because of scope we had to cut a boss fight from the game. This could be added after the completion. We also could add more levels and abilities. We had a life steal ability that had to be scrapped that could also be added.

One thing that's positive about how we structured the project is, more levels could easily be inserted into the game. Because the framework is already there, adding more content like levels, abilities, and enemies into the game would be much faster than the time that was required to create everything from scratch.

9 References

Life, Nintendo. "Night In The Woods (Switch EShop) Screenshots." *Nintendo Life*, 2 Oct. 2019, https://www.nintendolife.com/games/switch-eshop/night_in_the_woods/screenshots.

Night In The Woods Screenshot

"Undertale Screenshots for Windows - MobyGames." *MobyGames*, <https://www.mobygames.com/game/windows/undertale/screenshots/gameShotId,874028/>. Accessed 14 Apr. 2022.

Undertale Screenshot

"Why Gravity Falls Is the Smartest Cartoon on Television | WIRED." *Wired*, WIRED, 28 Sept. 2012, <https://www.wired.com/2012/09/5-reasons-gravity-falls/>.

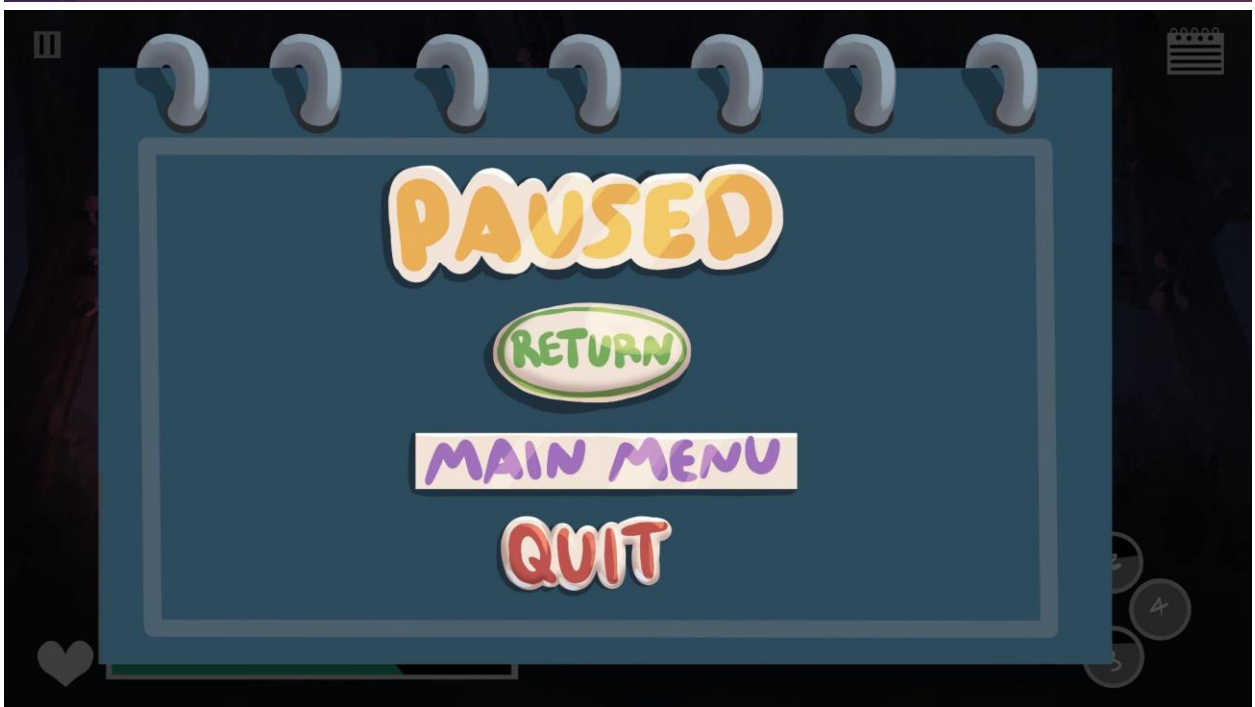
Gravity Falls Image

10 Appendices

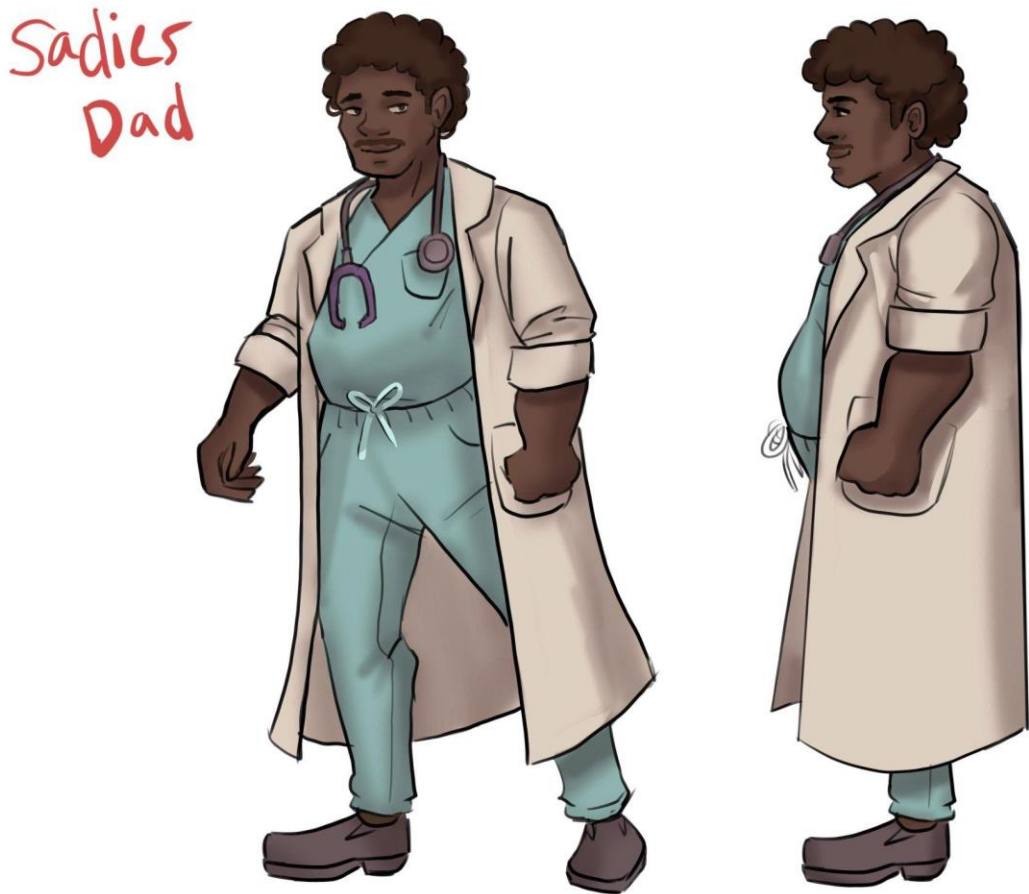
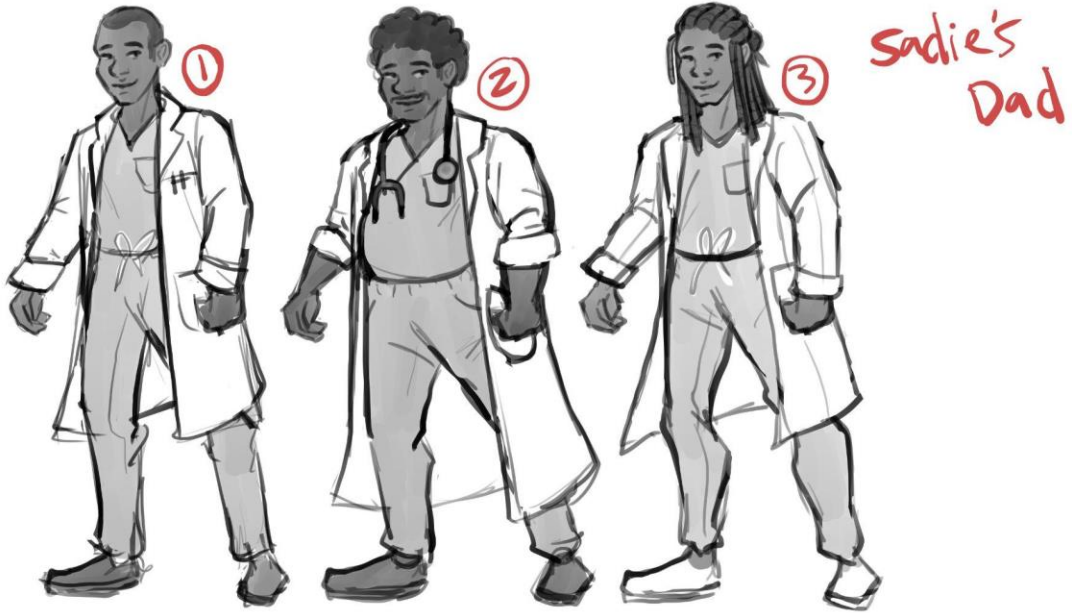
Appendix A: Concept Art

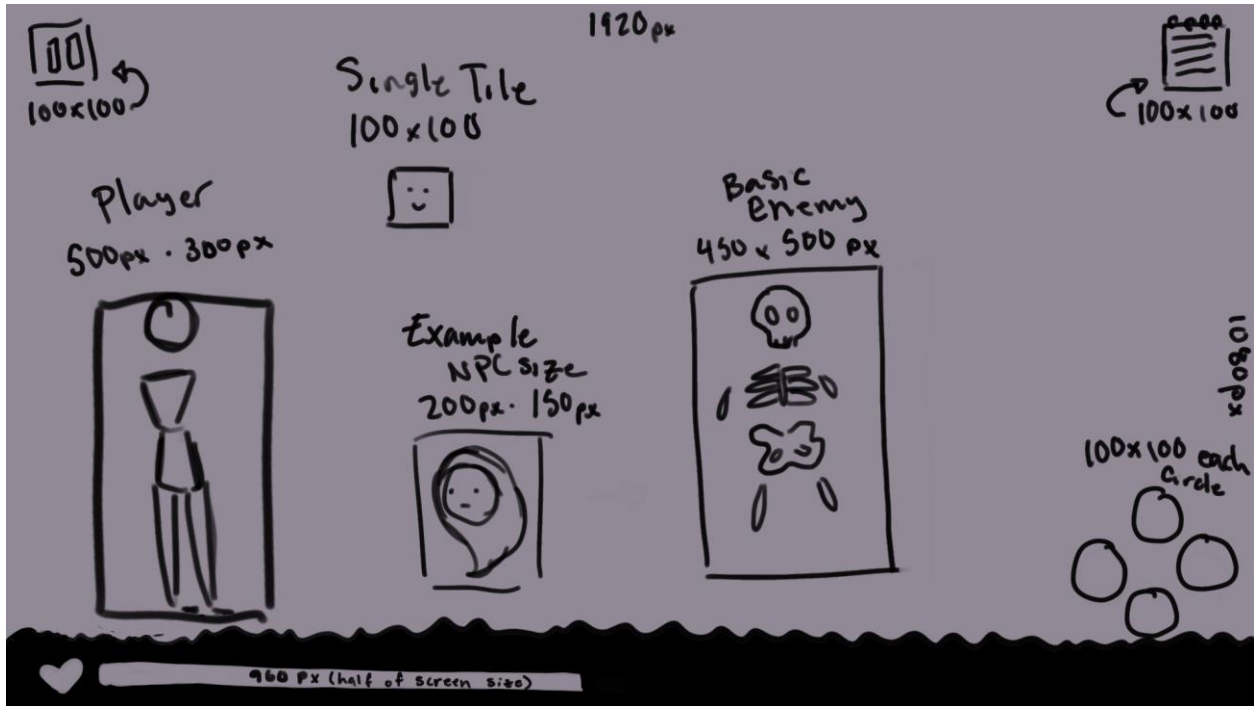














Hands pull him along
Floppy upper body









Mad scientist



Mad scientist's
Mech





Appendix B: Alphafest Data & Questionnaire



Unfinished Business Alphafest Build - Player Response Form

Please fill out the given questions to the best of your ability.

Did you complete the demo? *

- Yes
- No

On a scale of one to five, how would you rate the controls and handling of the game? *

Awful 1 2 3 4 5 Wonderful

If you would like to elaborate on your previous answer, please do so here.

Long answer text

On a scale of one to five, how would you rate the visuals/art of the game? *

	1	2	3	4	5	
Awful	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Wonderful

If you would like to elaborate on your previous answer, please do so here.

Long answer text
.....

On a scale of one to five, how would you rate the audio/sound effects of the game? *

	1	2	3	4	5	
Awful	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Wonderful

If you would like to elaborate on your previous answer, please do so here.

Long answer text
.....

Please check off any emotions listed that our game made you feel. *

Happiness

Sadness

Confusion

Hope

Excitement

Anticipation

Wonder

Nothing

Other...

If you would like to elaborate on your answer(s) to the previous question, please do so here.

Long answer text
.....

Did you encounter any bugs? If so, please describe any that you did encounter.

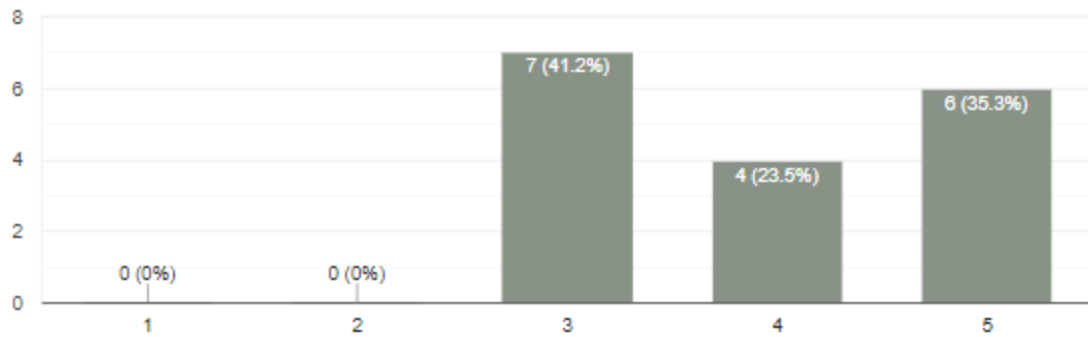
Long answer text
.....

Please leave any other comments, concerns, and feedback here.

Long answer text
.....

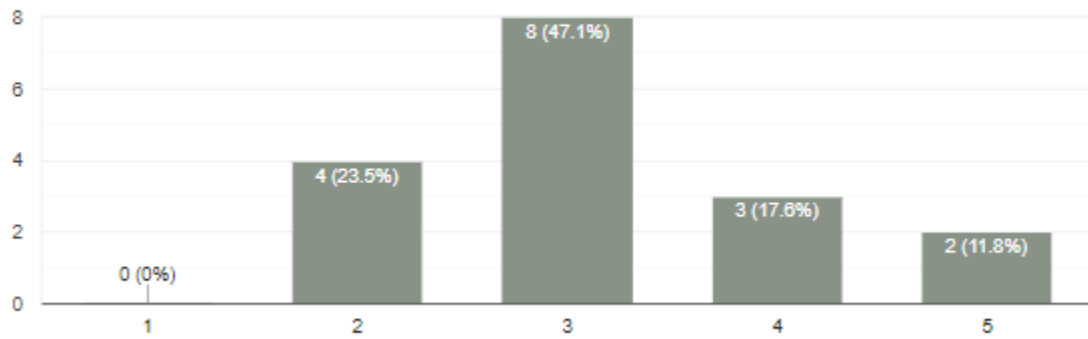
On a scale of one to five, how would you rate the audio/sound effects of the game?

17 responses



On a scale of one to five, how would you rate the controls and handling of the game?

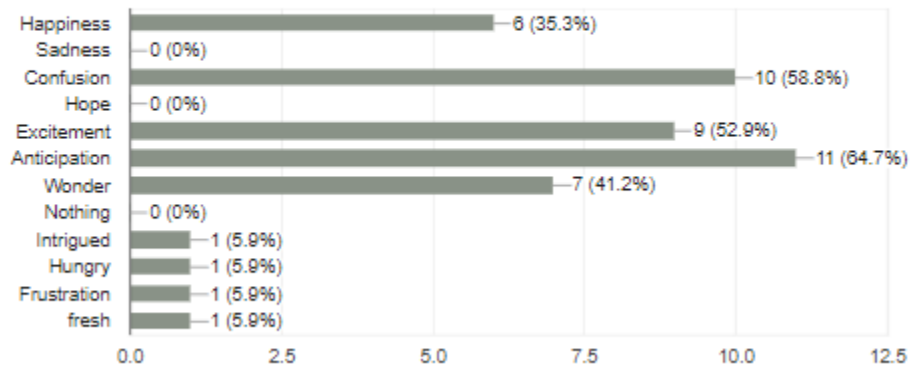
17 responses



Please check off any emotions listed that our game made you feel.

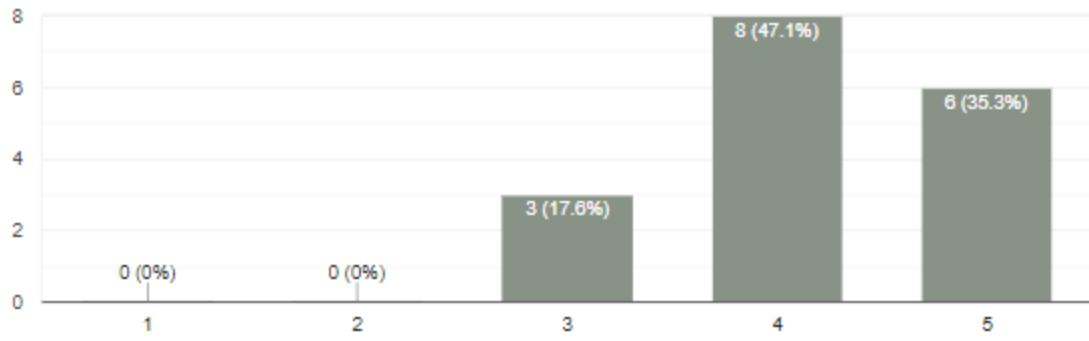


17 responses




On a scale of one to five, how would you rate the visuals/art of the game?

17 responses



Appendix C: Version 0.9 Data & Questionnaire



Section 1 of 2

Unfinished Business v0.9 - Playtesting

Please fill out the given questions to the best of your ability. This is a private build- another will be published to itch.io April 7th with a public playtesting option.

The game can be found at
<https://unfinishedbusiness.itch.io/unfinished-business>
Password:12345

Did you complete the game? *

Yes

No

On a scale of 1 to 5, how would you rate the controls and handling of the game? *

Frustrating 1 2 3 4 5 Satisfying

If you would like to elaborate, please add comments here:

Long answer text



On a scale of one to five, how would you rate the visuals of the game? *

	1	2	3	4	5	
Unappealing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Amazing

If you would like to elaborate, please add comments here:

Long answer text

On a scale of one to five, how would you rate the audio/sound effects of the game? *

	1	2	3	4	5	
Unappealing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Amazing

If you would like to elaborate, please add comments here:

Long answer text

Please check off any emotions the game made you feel

*

Happiness

Sadness

Confusion

Hope

Excitement

Anticipation

Wonder

Frustration

Other...

If you would like to elaborate, please add comments here:

Long answer text
.....

Did you encounter any bugs? Elaborate here if you did (what happened, if you could replicate it, any other details you can provide)

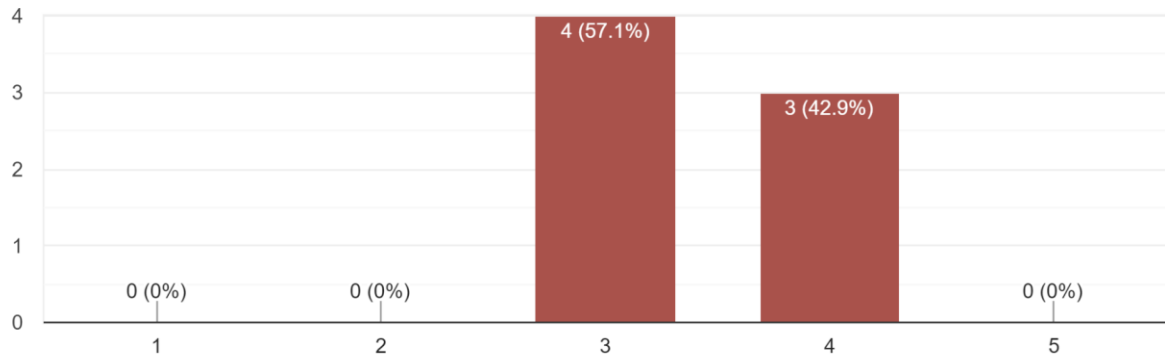
Long answer text
.....

If you played our game at Alpha fest, how did your feelings/experience change with this new build?

Long answer text
.....

On a scale of 1 to 5, how would you rate the controls and handling of the game?

7 responses



Pretty good, might want to add a delay on dash, the first area didn't have a kill floor, I managed to get over the invisible wall in the second area and fell forever. it never tells you how to dash. Punch is totally useless because the range is so low that you have to stand in an enemy hitbox, which does damage every tick killing you almost instantly. There were a bunch of one block tall invisible wall is the final area that I could stand/walk around a little bit on.

1 response

The jump feels a little floaty; I think adding the ability to make a shorter jump with a shorter press and a longer jump with a longer press would be a really good idea. I had no idea what button to press to use the cat ability. I think mapping shoot to left click or a key would probably be better if they are available.

1 response

The jump mechanic is really good but there are no instructions as to what to do to activate the first powerup. I pressed every button I could but none of them would let me cross the gap

1 response

The jump is a bit floaty, but I got more used to it as the game progressed. The F dash thing is extremely powerful and I could just fly across levels with it.

1 response

If you tap f at perfect timing you go flying forever. besides that everything was good

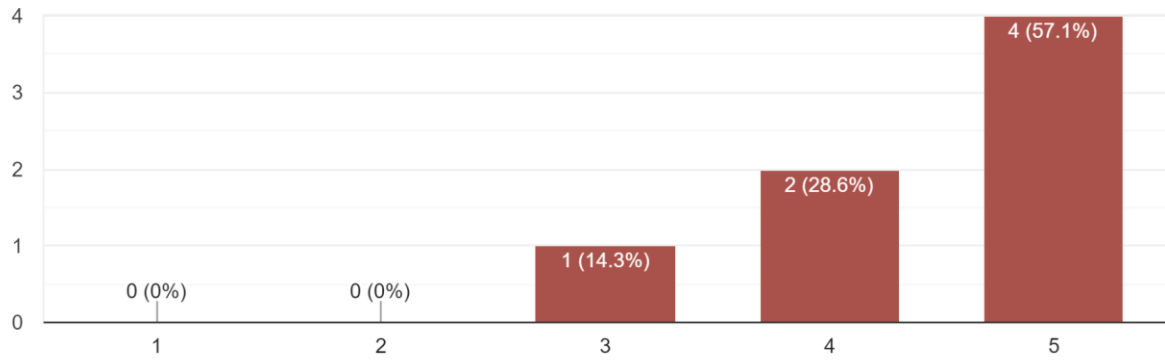
1 response

Change dash from F to V or something closer to the spacebar

1 response

On a scale of one to five, how would you rate the visuals of the game?

7 responses



I think it'd held a lot if the house looked less like it was placed on top of the grass by adding some sort blades around the base. Not sure how slopes could work, but as is, the breaks in the road feel a bit awkward? I think the game actually might look better slightly more zoomed in to decrease the empty space on screen. Some visual feedback for clicks would make the menu feel nicer. I love the ghost.

1 response

some many messed up or missing animations. Punch has the frames in the wrong order, for some reason the NPCs had their models all switched, dash has no animation, missing hammer assets, zombies walk backwards, and were sometimes in the ground, missing projectile assets, main character walks like a pimp, which is neat. Punch animation and shoot animation lift model up off ground.

1 response

I think the art style is really appealing and I love the detail of the sprite changing when the character goes under the street lamps

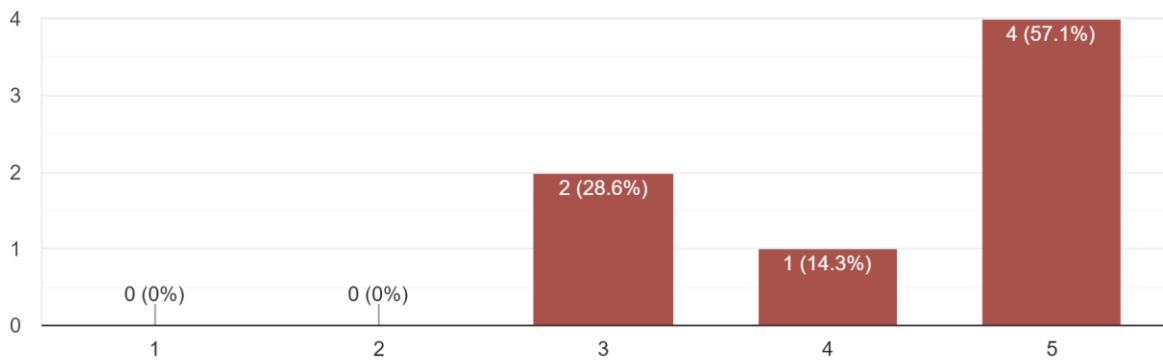
1 response

really liked the visuals

1 response

On a scale of one to five, how would you rate the audio/sound effects of the game?

7 responses



The background music is really good- I think it added a really good sense of awe to the game. However, I did think the jump sound effect was a lot louder than the background music and the sound of the cat was very harsh. I think if the volume was turned down a little bit for those that would fix it though.

1 response

Solid. I think the main track is kinda repetitive. I quite like the pause music. Projectile doesn't feel punchy enough. No sound for menus..?

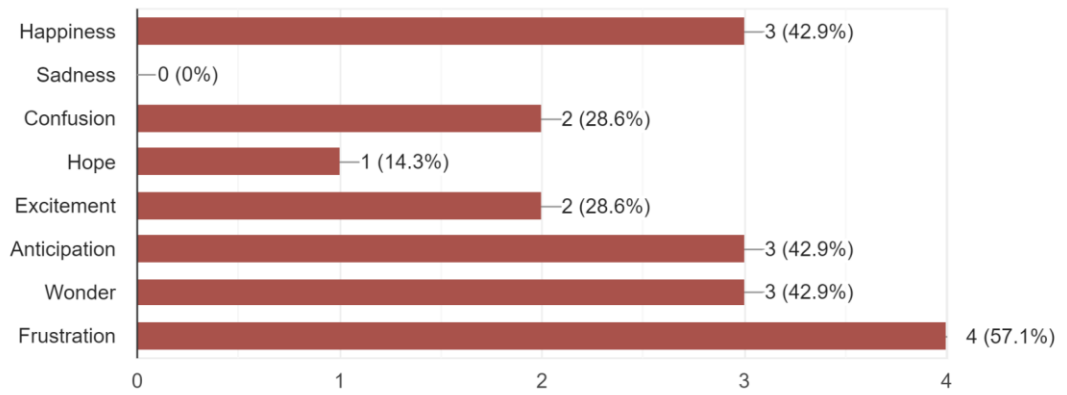
1 response

Quite good, not sure why all NPCs scream at me. Would be nice to have sounds when you/enemies get hit, you punch/shoot etc.

1 response

Please check off any emotions the game made you feel

7 responses



The premise, the art, and the music all convey super positive emotions but I was frustrated and a bit sad when I couldn't cross that big gap.

1 response

Text scroll speed is a little slow, and clicking does not fast-forward but instead take you out of the dialogue

1 response

one level the collision did not work and it made me frustrated. Also I had to alt-f4 a couple of times

1 response

Trying to jump was difficult at fist

1 response

Did you encounter any bugs? Elaborate here if you did (what happened, if you could replicate it, any other details you can provide)

The first level doesn't kill you if you fall in a pit. In the second level (tree area), if you dash at the left wall in the first pit you encounter (just before the blacksmith) a bunch, you can get lodged in it and the menu buttons stop working. Spamming space might help to replicate this, but I can get it after a few tries. You can get stuck in between the platforms just to the lower right of the blacksmith easily. Just face them and dash at them. This can be escaped with button mashing, but does disable the menu buttons. The textures for the pink balls you can shoot and the line that shows up when you dash are behind the houses and grass in the first level. The L button shakes the screen violently, but stops doing it after entering the graveyard. The ; button (I think) sometimes plays an animation and shoots two balls out in either direction, but is super inconsistent about it. It's possible to dash above the end of the level (starting from a higher platform earlier in the level) in the forest and just fall infinitely off the right edge of the level.

1 response

falling into the infinite void (went way too far left on 2nd screen), got stuck in platform (fell off one of the first platforms on the 2nd screen), some weird collision in first mine level (did not do anything just got stuck on the first platform)

1 response

-Falling into the first pit did not result in a death or restart, just falling in to an endless void. -The cat says they will meet you ahead, but the sprite when you get there is a ghost -The "cat ability get sequence" does not appear to be present

1 response

When I fell through the pit there was no kill floor so my character kept falling forever until I restarted the game. Also when talking to characters, if I click to try to speed up text or answer a question my character plays an animation.

1 response

Appendix D: Version 1.0 Data & Questionnaire

Section 1 of 2

Unfinished Business v1.0 Feedback Form

Play as Sadie Welile, a 13 year old on a journey to find her missing father and defeat the necromancer who attacked Willow Town. Gain abilities and make friends with ghosts along the way, and don't let the necromancer's minions defeat you! (v.1.0)

[Version 1.1 with updates and polish planned for April 21, 2022]

The game can be found at
<https://unfinishedbusiness.itch.io/unfinished-business>

Did you complete the game? *

Yes

No

On a scale of 1 to 5, how would you rate the controls and handling of the game? *

Frustrating 1 2 3 4 5 Satisfying

If you would like to elaborate, please add comments here:

Long answer text



On a scale of one to five, how would you rate the visuals of the game? *

	1	2	3	4	5	
Unappealing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Amazing

If you would like to elaborate, please add comments here:

Long answer text
.....

On a scale of one to five, how would you rate the audio/sound effects of the game? *

	1	2	3	4	5	
Unappealing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Amazing

If you would like to elaborate, please add comments here:

Long answer text
.....

Please check off any emotions the game made you feel

*

Happiness

Sadness

Confusion

Hope

Excitement

Anticipation

Wonder

Frustration

Other...

If you would like to elaborate, please add comments here:

Long answer text

Did you encounter any bugs? Elaborate here if you did (what happened, if you could replicate it, any other details you can provide)

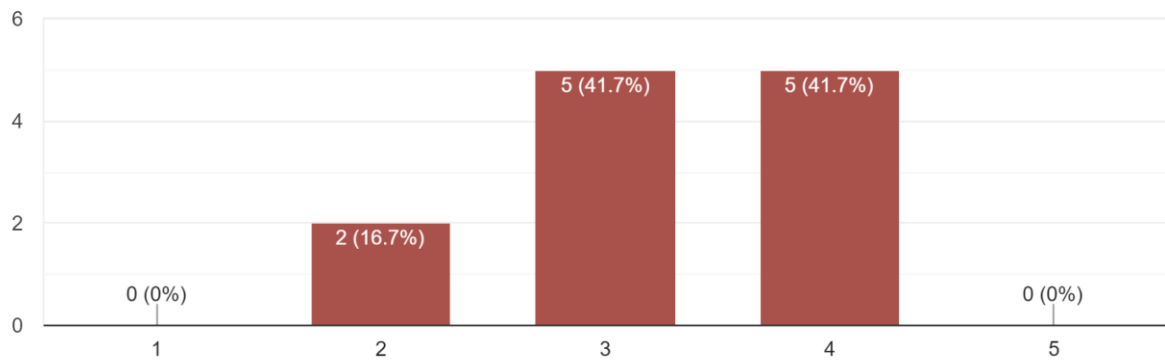
Long answer text

If you played our game at Alpha fest, how did your feelings/experience change with this new build?

Long answer text

On a scale of 1 to 5, how would you rate the controls and handling of the game?

12 responses



The controls are pretty hard, f to dash makes it hard to dash right because you have to take your finger off of the movement key to use it, and the hammer is also a bit hard to hit for me. Platforming felt a touch floaty and sometimes I would have to take a jump up a ledge a few times because it felt like it just barely went high enough, even when I held down the space bar the entire time.

1 response

the jump felt too floaty, the f button is in an awkward place for a movement ability, your hit-box when jumping felt weird, you can move while talking to someone, text speed too slow/no way to speed it up

1 response

Bindings could be a bit better, I'd prefer if the dash could be mapped to shift so that you wouldn't have to shift fingers. Controls are pretty fun though, particularly like the dash.

1 response

The jumps felt too floaty for my comfort. The cat power being on the "F" key felt unintuitive when I'm moving with WASD and jumping with Space. Maybe L-Shift would be better?

1 response

Something I noticed is if you're walking one direction, then turn around, it doesn't register until you let go of the first direction key. Other than that pretty smooth.

1 response

Oh fall really slowly and there is no way to control jump height, also when dashing you sometimes bounce off the ground if you do so while falling

1 response

it was mostly fine, but it felt a little floaty for me, and in Sadie's house I couldn't click on a dialogue option with the ghost cat

1 response

momentum should be cancelled on death/respawn, died multiple times immediately after respawning on small platform

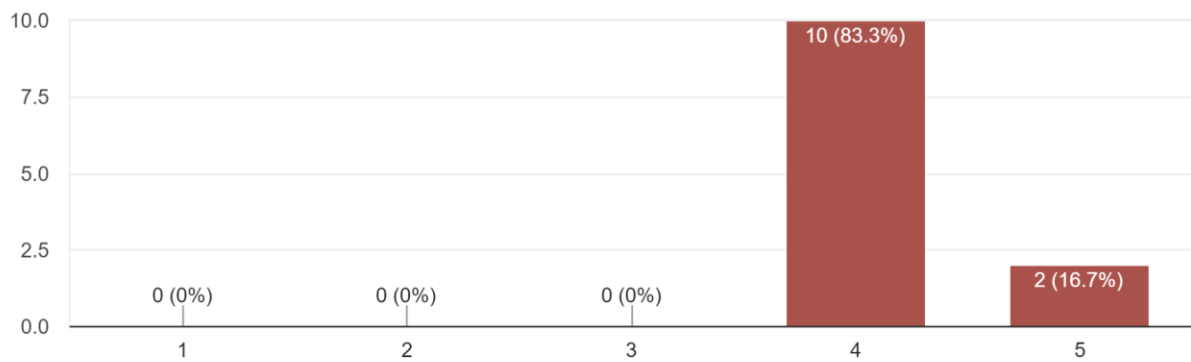
1 response

The hammer feels weird to use. key placement was very awkward.

1 response

On a scale of one to five, how would you rate the visuals of the game?

12 responses



fair enough art style, most animations were fine (laser in starting cutscene too fast, slapping animation too small/insignificant and the hitbox was also too small. it was hard to use without getting hit myself so i just spammed M2 and F)

1 response

The art was vibrant without being bright, which fit the tone of the game. I thought the dynamic changes in lighting on my character depending on the lighting of the game environment was done excellently

1 response

The backgrounds are nice, but the character and level seems to clash art wise.

1 response

Who turns their head 90 degrees when walking, the lumpiest of pimp walks

1 response

Style is great! Looks very pleasant

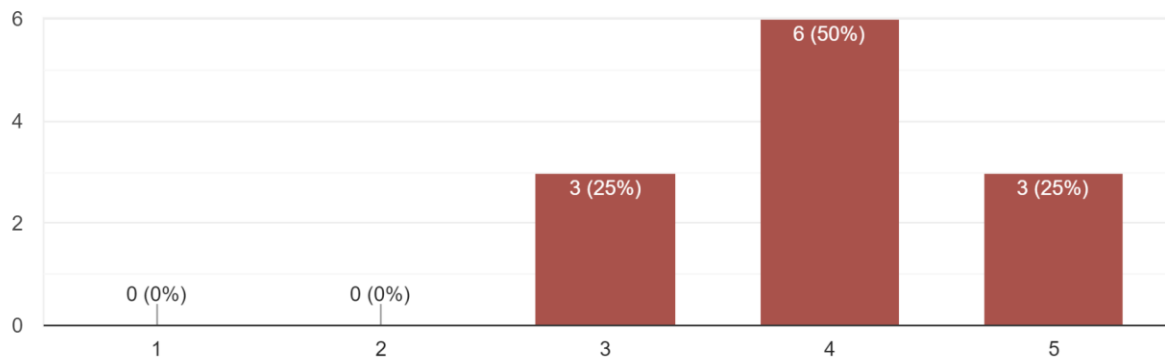
1 response

font is inconsistent in some areas

1 response

On a scale of one to five, how would you rate the audio/sound effects of the game?

12 responses



I think audio feedback for when I get hit/lose health would mean a lot. There is not a lot of feedback to know when I get hit. Audio feedback for when I acquire the blacksmith parts would also add immersion. However, the death sounds for the enemies were great and the music was bopping.

1 response

atmospheric menu + bg music, shooting fx was a little basic + slap was a little loud

1 response

audio was good, though sometimes it got a bit repetitive when attacking

1 response

Will's doin good work, the skeleton do the crackly

1 response

music is great, the dash sound gets old fast

1 response

Some more ambient noise would go along way

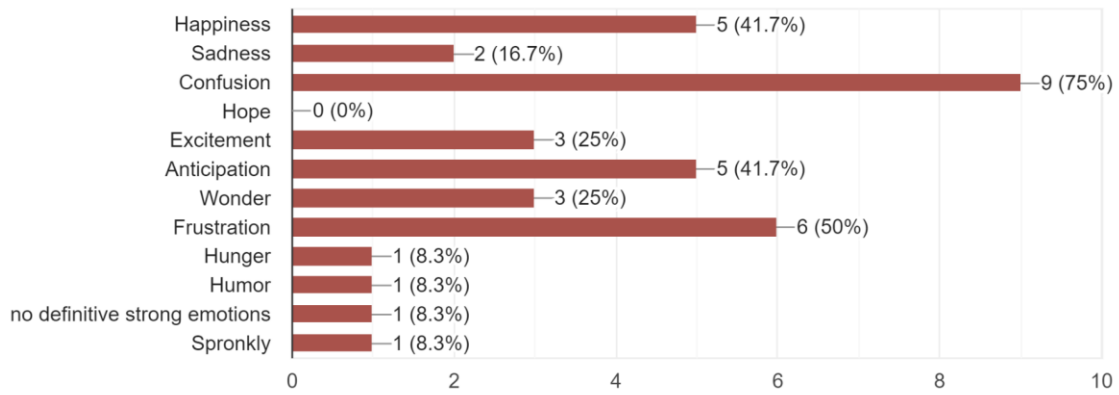
1 response

Serviceable

1 response

Please check off any emotions the game made you feel

12 responses



Just the lack of saving my progress while testing frustrated me. I was trying to replicate glitches and kept running into new ones that softlocked me, so I had to restart from the beginning over and over.

1 response

I didn't really understand what was happening. why was there a blacksmith in a modern town. the loading zones felt awkward (maybe use an interaction to load)

1 response

The ending/story was good, but the game was too short to have the punch I was looking for. I left it more thinking "That's it?" than anything else

1 response

I really liked the ghosts at the party level!

1 response

the raveyard

1 response

Appendix E: Itch.io Page

The current build of Unfinished Business can be found on itch.io here:
<https://unfinishedbusiness.itch.io/unfinished-business>