

Group 1: Technical Document

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Introduction

This document is intended to describe the technical aspects of “Playing Game” such as the tech, methods, and detailed descriptions of the various features and mechanics of the game.

1. Overview

For more information on our game's design aspects and artistic intent, please refer to the Game Design Document [1].

2. Prototype Objectives and Requirements

- Create a 2D farm simulator within a 3D “walk-about” game.
 - 3D game to facilitate environmental storytelling and spoken dialogue
 - 2D game to facilitate more interesting and engaging (more desirable or *addictive*) gameplay
- Create all 3D assets in-house
- Theme of Obsession and Addiction - “Why play this game, when you can live your real life?”

3. Technologies and Methodologies Used

3.1. Hardware Used

Dell G15 5511 Laptops with an Intel® Core™ i7-11800H (11th Gen) processor and 16GB RAM

3.2. Software Frameworks Used

- Game Development: Unity - Editor Version: 2020.3.30f1
- 2D Asset Creation: Krita
- 3D Asset Creation: Blender
- Source Control and Backups: Github
- Communication: Discord, Whatsapp
- Documentation: Google Docs, Overleaf (LaTeX)

3.3. Additional Templates and Resources Used

- Unity First Person Template (to provide the basic First Person Character controller, compatible with slopes and stairs)
- 3D Visual Assets used:
 - All in-house
- 2D Visual Assets and UI elements used:
 - Some in-house
 - Others sourced from Unity Asset Store [2]
 - 2D Pixel Item Asset Pack
 - Free Pixel Font - Theleah (Font)
 - Basic Pixel Farm Asset Pack
 - 2D Simple UI Pack (**UI elements** and Background UI)
 - Tutorial Characters sourced from
 - Stardew Valley Character Creator [3]
- Sound Assets used:
 - Music, in-house, by Dylan Cairns
 - Voice Cast: Dylan Cairns, Micayla Cairns, Malakai Braam

4. Feature Documentation

4.1. Farm Simulation

4.1.1. Mechanical Aspects

The basic loop of the game follows growing produce to fulfil requests to earn coins and XP that can be used to make the process of growing produce more effective and efficient.

4.1.1.1 Requests

Members of the town will put requests forward each day that the player needs to fulfil to earn coins and XP.

4.1.1.2 Levels, XP and Coins

Completing requests, buying buildings and producing crops will earn XP. Once the XP cap is reached, the player's level will increase, rewarding them with a gem. Coins must be used to produce crops and purchase buildings and upgrades.

4.1.1.3 Crop Plots

On each crop plot, the player can grow either wheat, corn or rice for a certain price that will take a certain time to grow. Once it is grown, it will be available to harvest and add to the player's produce pool.

4.1.1.4 Chicken Coops

The chicken coop manages two resources: chickens and eggs.

Players can upgrade the coops by accessing the upgrade menu by interacting with the red arrow button to the left of the coop. This will allow for a series of upgrades like buying more chickens, increasing the number of eggs laid, the rate the eggs are laid and the maximum number of chickens the player can keep in their farm.

Lastly, an incubator can be unlocked which will allow the player to place an egg in and allow it to hatch to become a chicken after some time.

When there are two or more chickens, they will begin the production of the eggs that the player can collect.

4.1.1.5 Cow Barns

The cow barn manages two resources: cows and milk bottles.

Players can upgrade the barns by accessing the upgrade menu by interacting with the red arrow button to the left of the barn. This will allow for a series of upgrades like buying more cows, increasing the number of milk bottles produced, the rate the

milk bottles are produced and the maximum number of cows the player can keep in their farm.

When there are two or more cows, they will begin the production of the milk bottles that the player can collect.

4.1.1.6 Upgrades

There are several buildings the player can unlock through the game. Each of these buildings will provide some sort of upgrade.

Silo - Increase the maximum number of the crops the player can hold.

Transport - Delivers the produce for requests to customers faster. Thus, increasing how much the requesters pay.

Composter - Decreases the time it takes to grow crops for a certain period of time but requires a certain number of each crop to make compost.

Greenhouse - Increases the amount of yield from the production of each crop.

Shop - The player can place produce into the shop that will sell randomly and earn money in the background.

Each building can be upgraded to make its effect more powerful.

4.1.1.7 Microtransaction Shop

Here the player can exchange gems earned from levelling up for coins.

4.1.2. Thematic Aspects

The story of the game follows Farmsbury Jnr. who is the newly appointed owner of the farm by Mr. Farmsbury, her father. Sadly, a tornado hits the farm and nearby town leaving it to be rebuilt.

The player will need to fulfil requests for produce by the town's people to help the town and the town's people will pay Farmsbury Jnr. providing her the funds to rebuild the farm.

Each day, new buildings and upgrades will be available to bring the farm to where it was before.

4.1.2.1 Daily Rewards and Pop-up Ads

Each day when the player enters, there will be a new daily reward for them to accept. This will grant them some sort of resource.

Every so often, pop-up ads will appear.

Both these aspects are to emphasise addictive gameplay that will require the player to return and be attentive.

4.1.2.2 Blurring of the 2D and 3D worlds

In the latter half of the game, elements from the 2D world will bleed into the 3D world and vice versa. This was to further emphasise how the character cannot manage the two worlds and that they begin to have an effect on each other.

4.2. UI

4.2.1. Main Menu

Inspired by Windows XP, the main menu allows you to start up the game from a “Playing Game” app (or the start menu) on a desktop.

4.2.2. 2D Game UI

The entirety of the 2D Farm part of this game is built through the UI elements. All interaction within the Farm is done through the right mouse click.

4.2.3. 3D Game UI

Only “E to interact messages” in the final game. In prototype versions, there was text dialogue bubbles since audio wasn’t implemented yet. Once the voice lines were added, the text fields were removed.

4.3. Sound Design

Creating the sounds

Ableton Live 11 Suite was used to process the dialogue audio, which was recorded on an SE X1S microphone. Ableton Live 11 Suite was also used to produce each soundtrack using midi. No instruments were recorded.

Dialogue audio for the neighbours needed to sound believable. Unprocessed, they sounded as if they were right in front of the player. This is not believable or diegetic at all. However, using a slight lowpass filter mimics the way people sound when they are far away from the listener, especially in another room. Coupling this with a touch of reverb (Ableton’s stock Reverb), we achieve the effect of proximity and depth. Now the player can believe that there is actually someone behind the door when they knock and respond back.

Player dialogue was less complicated. Instead of making the player feel as if they were hearing the player character’s thoughts, I wanted it to sound as if the player character was talking to themselves, and the player was eavesdropping on them. It adds a sense of unease. So to do this, I just applied a slight reverb to the player character’s dialogue to make it sound as if they were in a room (there would be no reverb if it were thoughts, haha).

All audio was compressed and EQ'd accordingly for maximum versatility inside of Unity. Having some recordings being louder than others before implementation is not conducive to anybody.

Voice cast:

Playable Character - Dylan Cairns

Neighbour 1 - Dylan Cairns

Neighbour 2 - Micayla Cairns

Neighbour 3 - Malakai Braam

Implementing in unity

The music for both the 2D and 3D sections of the games loop constantly from awake, however one track is just muted when the other one plays. This allows for constant music.

For trigger events, like interacting with items or neighbours in the 3D game, audio clips simply play after the player presses "E" to interact. The triggers get disabled after one use, thus preventing the repeat play of an audio clip.

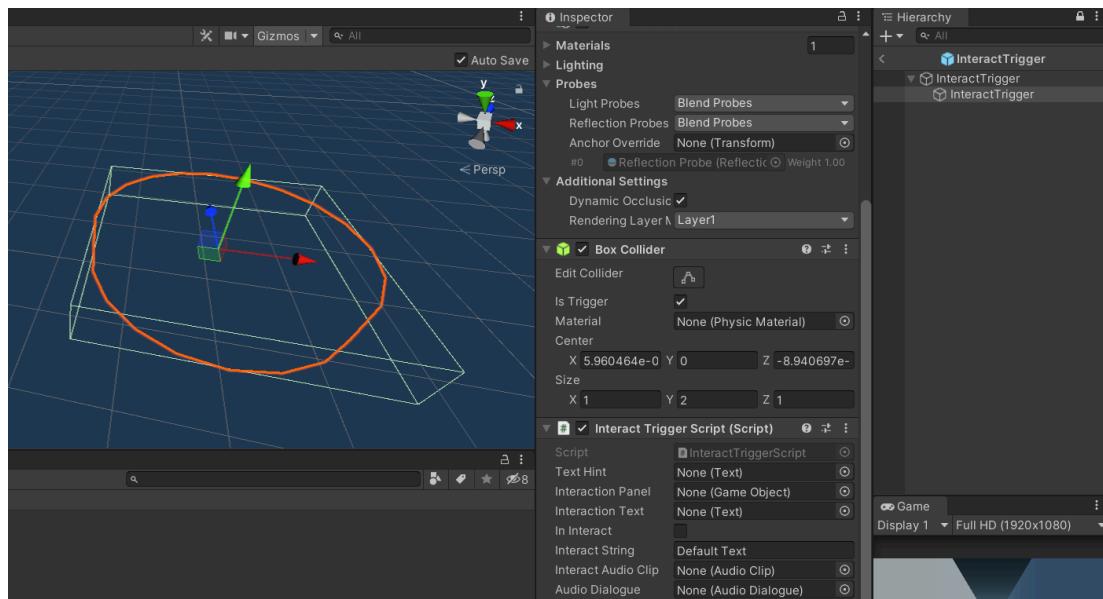


Figure 1: Screenshot of InteractTrigger prefab

4.4. Visual Design

2D Game

Most 2D assets were created by team members, Dylan Cairns and Malakai Braam. Though, there are some free use assets that were found online. Both the 3D and 2D halves of this game have a retro aesthetic. In the 2D game, our team took inspiration from older pixelated video games and Windows XP (especially for window pop-ups and icons).

3D Game

Every 3D asset in the game was created by team members, Dylan Cairns and Malakai Braam. As stated in the game design document [1], The Stanley Parable was an inspiration for the visual style of the game.

The relatively simple assets are a clear result of that inspiration.



Figure 2: WIP assets



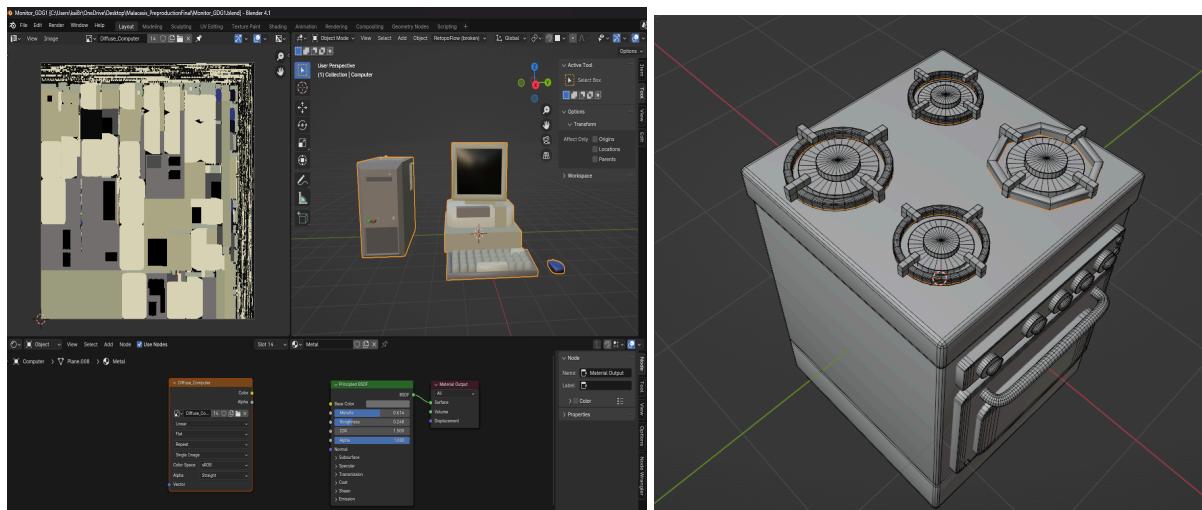
Figure 3: Final assets in game scene

Using Blender

One of the extra design goals, for team members Dylan Cairns and Malakai Braam, was to create all detailed 3D assets in-house. No outsourced 3D assets are in the game - only unity primitives and assets created in Blender.

Initially, the Asset Team had very little experience in terms of asset creation in Blender. However, through this process the team's production time became faster and faster - to the point where the last three assets were made in under an hour.

The team ran into initial issues with exporting textures into Unity and missing geometry when importing assets. Through troubleshooting, the team was able to understand how to successfully import assets by checking normals, applying the transforms and modifiers as well as the textures.



Figures 4 and 5: Screenshots of Blender

4.5. Level Design

4.5.1. Level Metrics

2D Game

As the days progress, more crop plots, animal habitats and buildings will be unlocked and available for the player to utilise. This falls in line with the narrative of the game as the inheritor of the farm trying to rebuild it after the tornado. Along with this, the requests are asking for more resources, relating to how effectively the player can churn them out and along with the farm game character being a pillar of support for the people that were also struck by the tornado.

Lastly, objects from the 3D space will bleed into the 2D space and vice versa to show the blurred lines between the worlds that the character in the game is experiencing.

3D Game

Day to day, the assets within the playable character's apartment shifts around - to convey that the 2D game is taking up all their attention and they are allowing their

apartment to become more messy and fall into disarray. As the 2D game progresses, the 3D game regresses - all to convey the themes of OBSESSION and ADDICTION.

As the days go on, the line between the 3D ‘reality’ and the 3D virtual game becomes blurred, so 3D assets become more glitched out (missing/broken textures, incorrect scales, etc.).

4.5.2. Level Topology

2D Game

For the player, controlling the playable character, they would need to traverse the 3D world and enter the 2D game through the laptop within the character’s bedroom.

Within the 2D game, the space the player makes actions is constant but through the different days, new buildings and farming infrastructure will appear for the player to unlock and utilise. These new unlockables will assist the player in producing more resources to fulfil requests.

3D Game

Early on, it was conceptualised to have each day in the 3D world start in the corridor of an apartment complex, where the player walks down, knocks on neighbours’ doors and goes into their apartment and then goes to their computer and enters the 2D game.

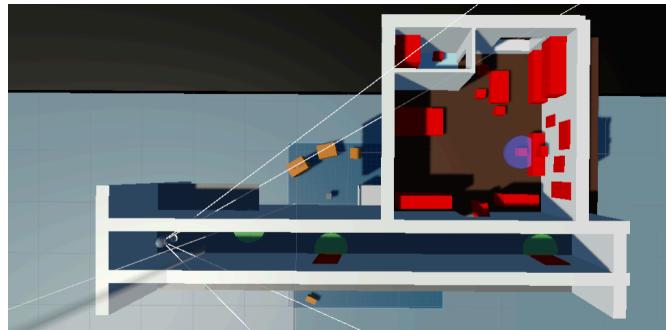


Figure 6: Early Prototype of 3D environment

The basic design of the 3D world remained unchanged during development, just the assets were slotted into the red spaces.



Figure 7: Top Down view of final 3D environment

4.6. Facilitating Narrative

2D Game

The tutorial and progression systems, as well as the change in environmental details are what facilitate the narrative aspects of the game while in the 2D farm sections.

3D Game

Mechanically, the 3D sections of the game is just a ‘walking simulator’ that allows the player to “press E to interact.” The only purpose of these sections are to drive the narrative forward with environmental storytelling (shifting and changing environment) and spoken dialogue that hints at the consumptive and addictive nature of the 2D farm game.

5. Bug Log

- The mouse cursor locks at incorrect times. (**Fixed**)
- Build issues due to script extensions (**Fixed**)
- Mouse camera drag not working (Removed feature)
- 3D textures overlaid incorrectly (**Fixed**)
- UI laying issues (**Fixed**)
- Bed and Shower textures imported incorrectly (**Fixed** and broken texture for bed reused for Day 5 - on purpose for “glitched” look)
- Sound and trigger issues (**Fixed**)
- Incubator not activating on right day (**Fixed**)
- Sound too soft in credits (**Fixed**)
- Milk Bottle production is too slow (**Fixed**)
- Not all Main Menu elements implemented yet. (**Fixed**)
- Requests’ “unable” variable not assigned (**Fixed**)
- Cow barn text error (**Fixed**)
- 3D Day 3, Door 2 - no sound (**Fixed**)
- 3D Day 4, Door 3 - no sound (creepy, when left in - the world is deteriorating)
- More 2D game Layering issues (some **Fixed**)
- Tooltips, if hovered over by the mouse, and the scene switches to 3D, the tooltip still stays on the screen
- In the early days, it is easy to run out of coins completely and not be able to do anything else (**Fixed**)
 - Log-in rewards for daily play (give coins or gems at the start of each day)

- Collecting Eggs allows you to click collect multiple times (**Fixed**)
- Instructions say the right-hand side of the screen when resource statistics are left side (**Fixed**)
- Silo Limits may reset on a new day

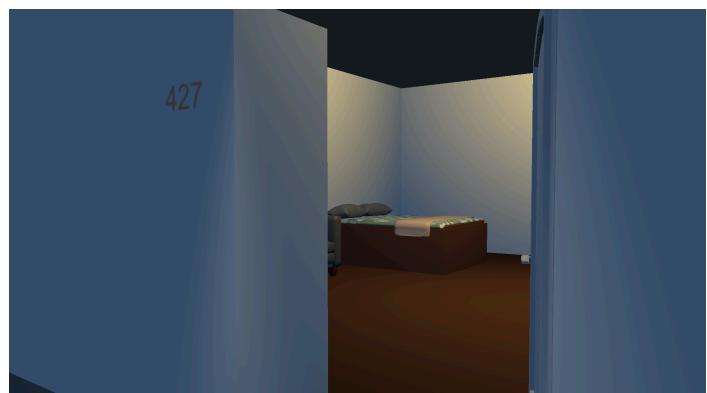
6. User Guide

After booting up PlayingGame.exe either click on the “Playing Game” icon on the in-game desktop or click on the “start” button on the in-game task bar to progress to the 3D scene.



3D scene

Once in the 3D scene, the player can move around, knock on neighbours’ doors, interact with items in the apartment and use the computer.



WASD - Walk
Left shift - Sprint
E - interact

Once the player has interacted with the computer, they are inside the 2D-farming-simulator game.



2D scene

Inside the 2D game, the player

has a set time to play with the farm mechanics, before they are thrown back into the 3D game.

Follow along with the in-game tutorial on the first day.

Red “Up-Arrow” buttons:

- Upgrade Menu for whatever is next to the button

Red “List” button:

- Lists current inventory

Farm Land:

- Plant wheat, rice or corn

REQ button:

- List of requests

Gold-roof Hut:

- Fake Microtransaction store

- Convert Gems into Coins

Chicken Coop:

- Get chickens and eggs

Cow barn:

- Get cows and milk bottles

Greenhouse:

- Increases yield from crops

Composter:

- Temporarily decrease grow time for crops

Transport:

- Increases payment

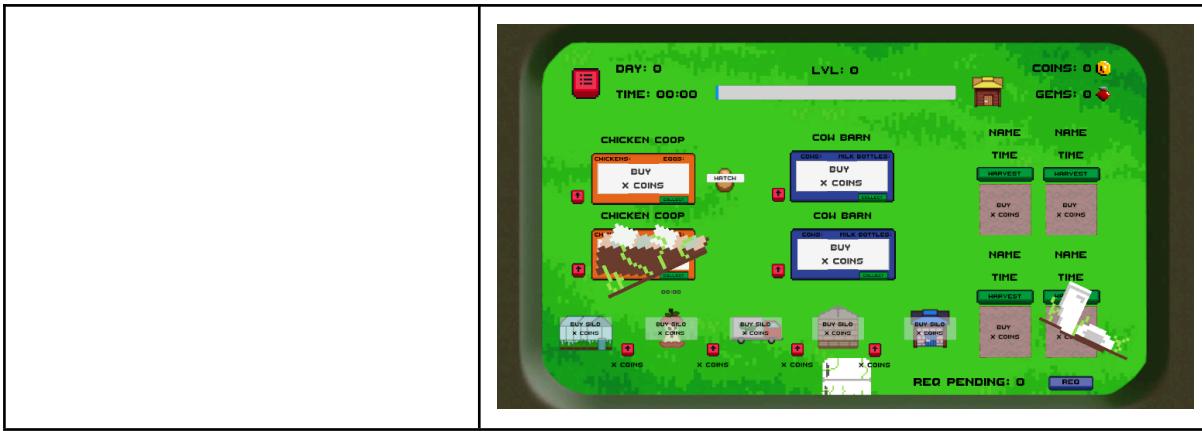
Silo:

- Increases max storage for crops

Farm Shop:

- Random Passive Income if filled with items from inventory





References

- [1] M. Govind, J-F. Retief, M. Braam, D. Cairns, E. Harper, 17/06/2024, "Group 1 Game Design Document", Unpublished Internal Development Document
- [2] Unity, "Unity Asset Store", URL: <https://assetstore.unity.com/>
- [3] Poltergeister & Jaz, (2023), "Stardew Valley Character Portrait Creator", URL: <https://jazzybee.itch.io/sdvcharactercreator>