“An ecosystem is a geographic area where plants, animals, and other organisms, as well as weather and landscapes, work together to form a bubble of life.” National Geographic

Josh Antolovic (B.S. Architecture 2017, unfinished MFA in Art 2021-2023)

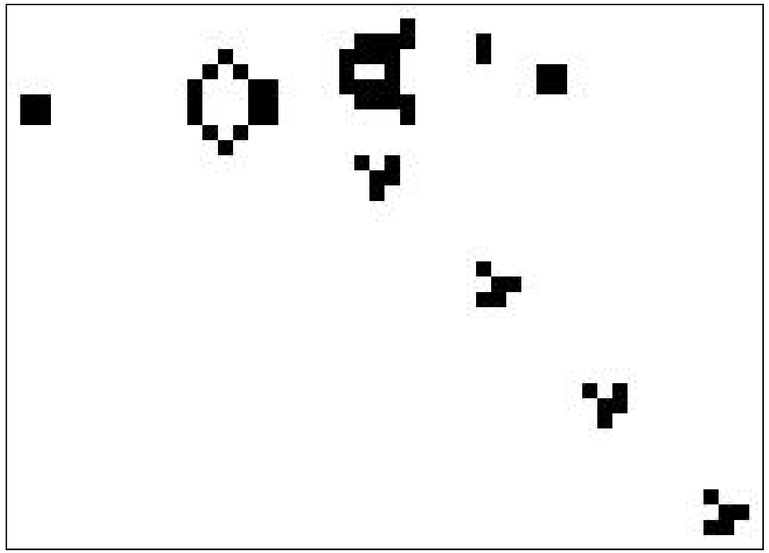
Traditional game environments are static

- The ground and natural elements are typically static tiles, created by artists as PNG or JPEG files.
- Tiles are often repeated for efficient computer memory.
- Large game studios have emphasized realism in environments while paying less attention to ecosystem relationships.

Pokémon Legends: Arceus, Washington Post

Studying player experience based on cause-and-effect in digital ecosystems.

- To simulate a dynamic environment that has memory and behaviors.
- To give digital ecosystems an active role in interactive media.
- To explore technical implementation that can process all the information of an evolving ecosystem.



Conway's Game of Life, Wikipedia

Perception driven by media

- Interactive media may be an influential means to transfer an ecocritical mindset outside of academia.
- Player’s perception and understanding of real world environments might be influenced by digital environments.

Child using digital media in bed, www.sciencealert.com

Guiding thoughts

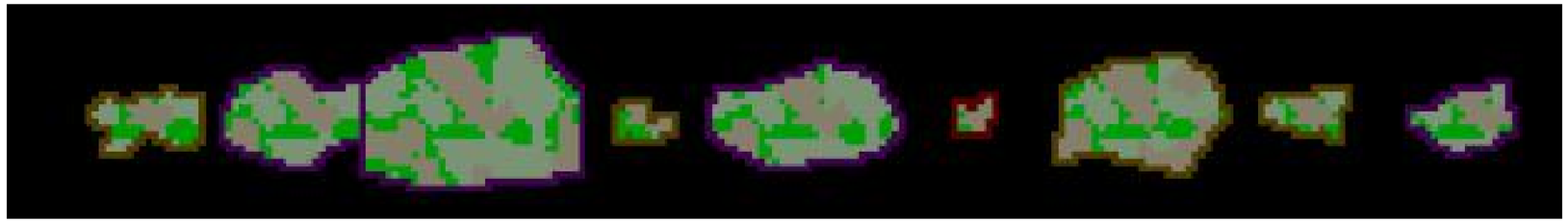
- Typically left out of digital environments: #time #state change #consequence #relationships

- To use a simplified visual language that aids in studying these concepts clearly while conveying them to others.

- A *poetic* mindset: ‘think like an ecosystem, design like an ecosystem’.

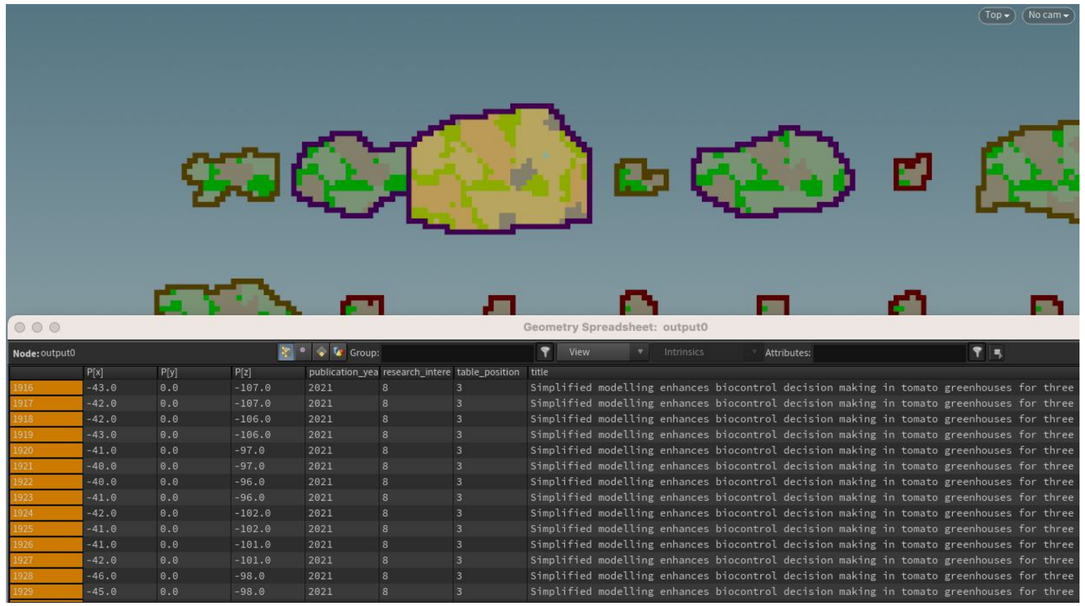
project 1

Rock Generator / DESIGN_6400_AU23



A **parametric model** built in a 3D procedural modeling software called **Houdini**, that imports parameters from a reference management tool called **Zotero**.

#state change



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1916	-43.0	0.0	-107.0	2021	8	3	Simplified modelling enhances biocontrol decision making in tomato greenhouses for three
1917	-42.0	0.0	-107.0	2021	8	3	Simplified modelling enhances biocontrol decision making in tomato greenhouses for three
1918	-42.0	0.0	-106.0	2021	8	3	Simplified modelling enhances biocontrol decision making in tomato greenhouses for three
1919	-43.0	0.0	-106.0	2021	8	3	Simplified modelling enhances biocontrol decision making in tomato greenhouses for three
1920	-41.0	0.0	-97.0	2021	8	3	Simplified modelling enhances biocontrol decision making in tomato greenhouses for three
1921	-40.0	0.0	-97.0	2021	8	3	Simplified modelling enhances biocontrol decision making in tomato greenhouses for three
1922	-40.0	0.0	-96.0	2021	8	3	Simplified modelling enhances biocontrol decision making in tomato greenhouses for three
1923	-41.0	0.0	-96.0	2021	8	3	Simplified modelling enhances biocontrol decision making in tomato greenhouses for three
1924	-42.0	0.0	-102.0	2021	8	3	Simplified modelling enhances biocontrol decision making in tomato greenhouses for three
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1929	-45.0	0.0	-98.0	2021	8	3	Simplified modelling enhances biocontrol decision making in tomato greenhouses for three

Publication year = noise (grain) of the ‘lichen’
Research interest = size of rock
Title = title of publication
Topic tag = color of rock outline

Goal(s)

- To visualize a research space for three topics: research machine learning, education, and gardening.

Outcome(s)

- Each reference piece saved into Zotero became a procedurally driven ‘two-dimensional’ Houdini rock.

Highlight(s)

- In generating the rocks, I assigned parameters that mimicked physical attributes such as lichen density being tied to publication year.

Research Alignment(s)

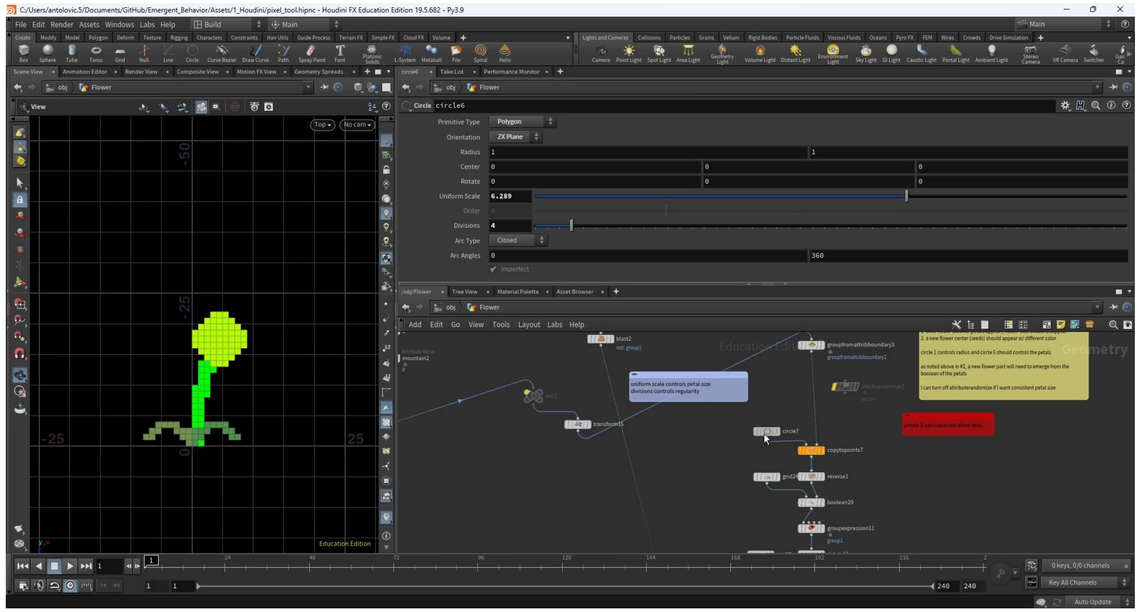
- I narrowed my interest to digital gardening and how machine learning models might assist designers with programming.

project 2

Flower Sequence Generator / DESIGN_6400_SP24

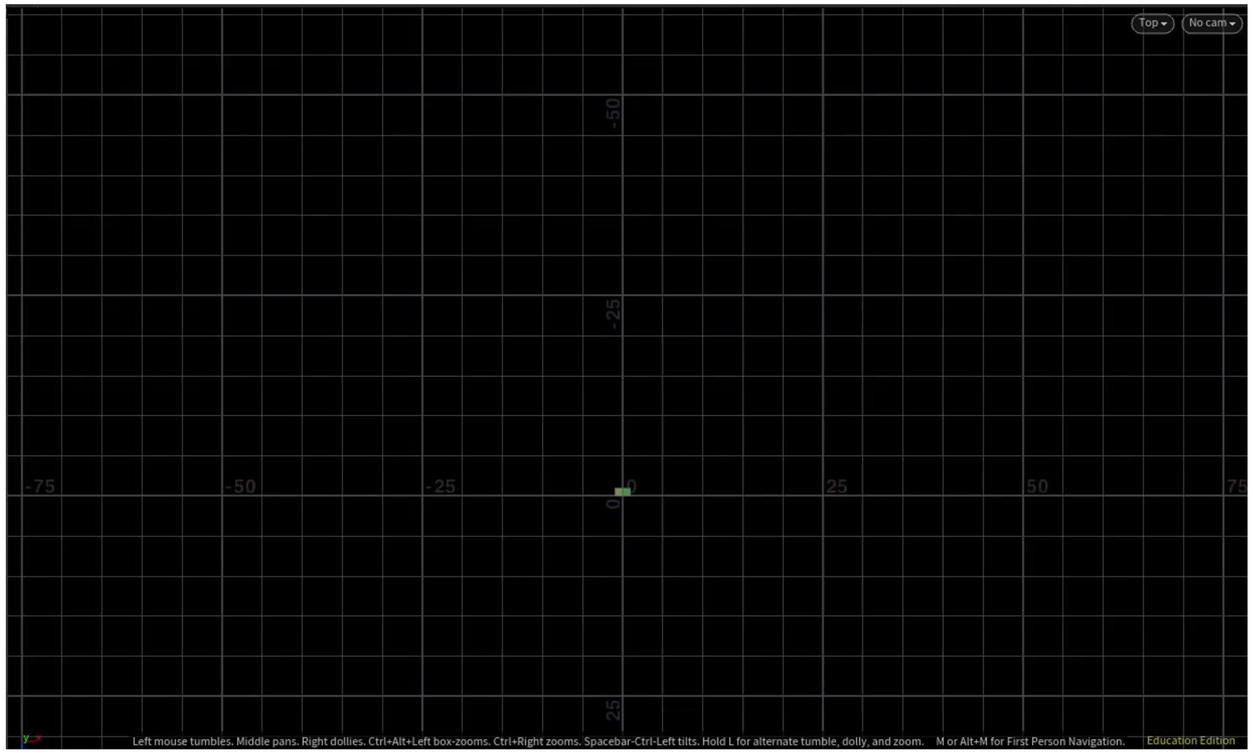
A **procedural model** that generates **fully animated sequences** from saplings to flower petals.

#state change #time



Goal(s)

- To simulate the growth of a flower.
- Create parameters for each part of a flower and tie them to one another.



Outcome(s)

- A generator capable of producing a wide variety of fully animated flower sequences.
- The sequence contained 40 frames of animation with an option to loop for 10 frames before a state change. This process repeated to equal 200 frames for one complete sequence.

Highlight(s)

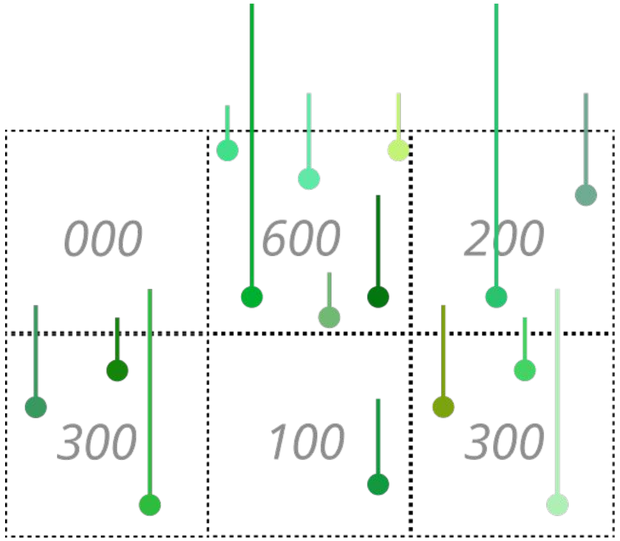
- 200 frames equalled 55 kilobytes.

Research Alignment(s)

- To mimic an entire ecosystem, this process could become frame heavy. A 1000 flowers would mean 200,000 frames.
- Moving forward, I will consider strategies from a perspective of green computing.

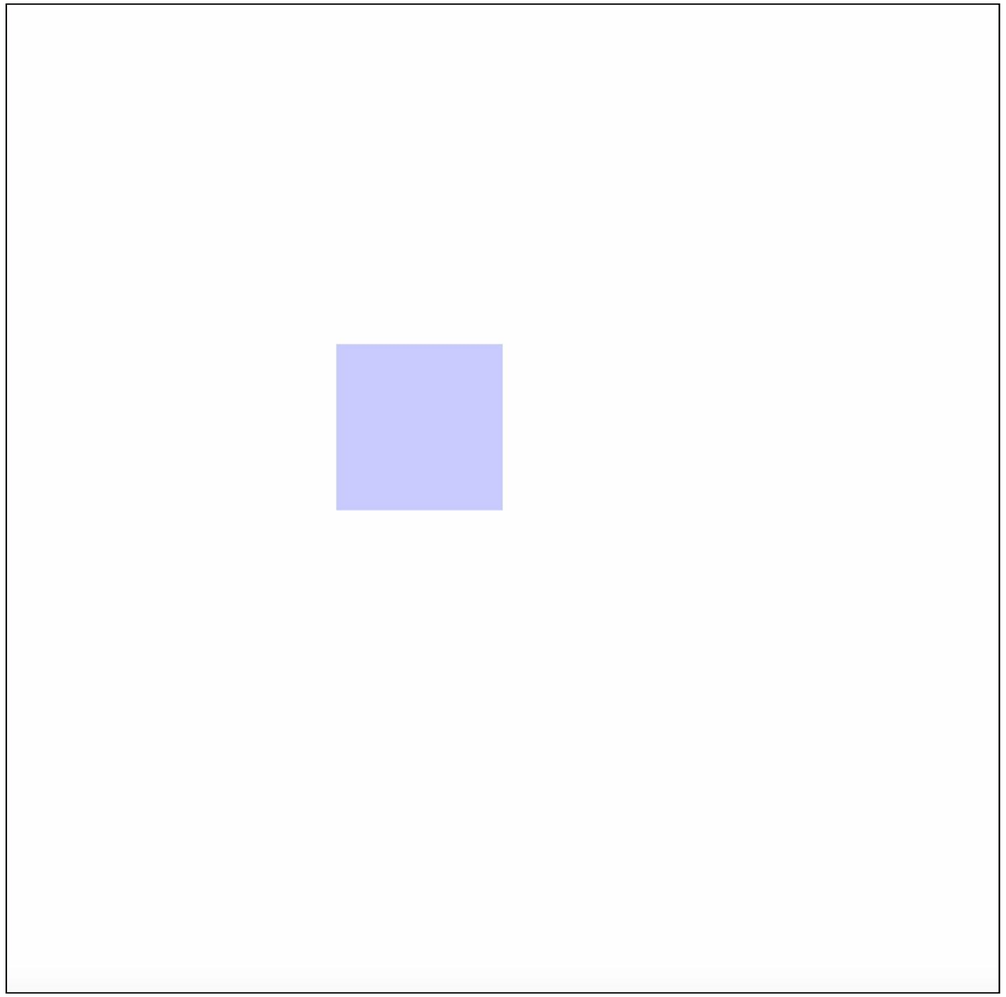
project 3

Memory Path / DESIGN_6400_AU23



An **interactive simulation** where lines **dynamically grow** based on the player's movements.

#state change #time #relationships



Goal(s)

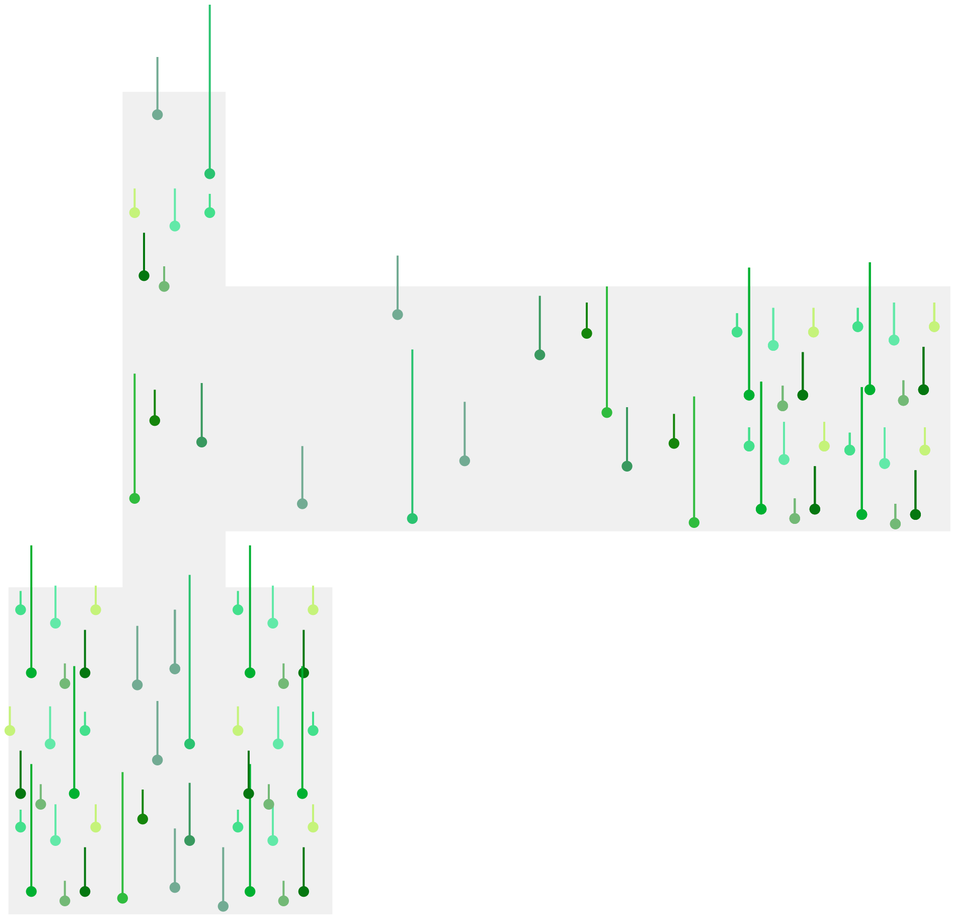
- To study an emerging technology and prototype with it.
- Use ChatGPT 4 to help me with shaders for algorithmically generating images within the game engine Unity.

Outcome(s)

- A interactive room where the player controls a square and moves to other tiles.
- Lines form in areas the player has visited and evolve based on neighboring activity and visit frequency.

Highlight(s)

- Multiple triggered tiles begin to form pockets of life. If left on their own, they fade more rapidly.

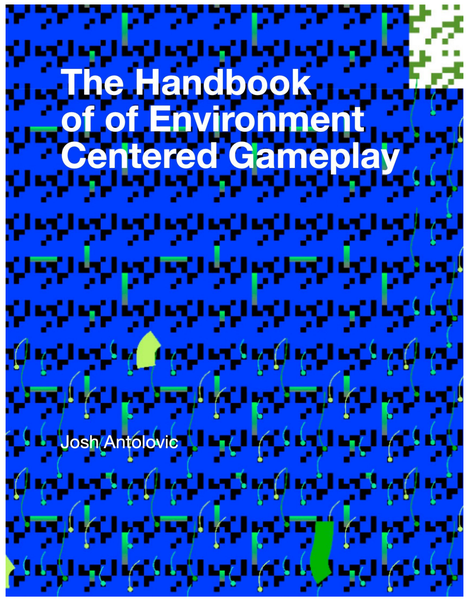


Research Alignment(s)

- I considered how this simulation might function in irregularly shaped rooms and with AI non-playable characters.
- I learned about using the shader-based plugin 'Shapes' by Freya Holmér through ChatGPT, as it lacked extensive reference documentation

project 4

Handbook Conjectures / DESIGN_6300_SP24



Three conjectures corresponding to three topical sections
in my **Handbook of Environment-Centered Gameplay**.

#state change #consequence #time #relationships

Conjecture 1 on Interaction
#state change #time #relationships #consequence

Goal(s)

- **For topical section ‘Interaction’:** a sketch of an interactive vignette where a player can move objects around, with their behavior varying based on the geographical context.

Research Alignment(s)

- I'd like to develop physical map prototypes that allow people to place objects over several days. Each day, I would adjust the state of each object based on its context and occasionally add new objects.

Conjecture 2 on Immersion

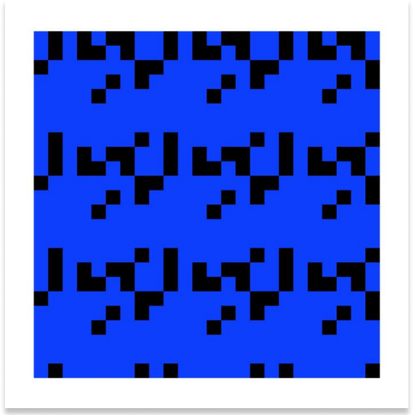
#state change #time

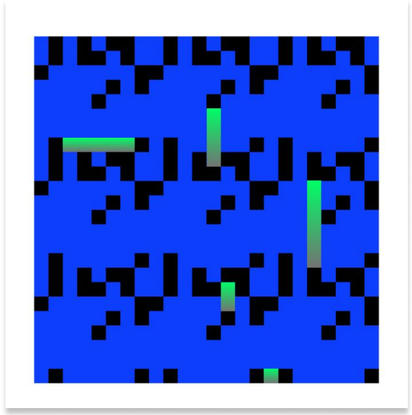
Goal(s)

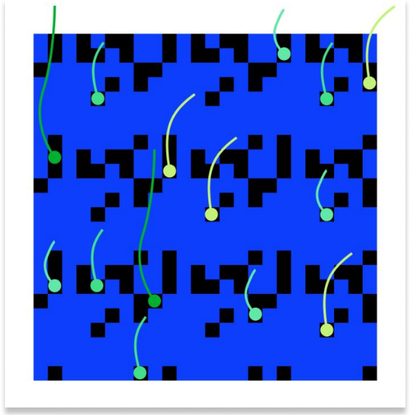
- To immerse a user in tree and forest time via a productivity app.

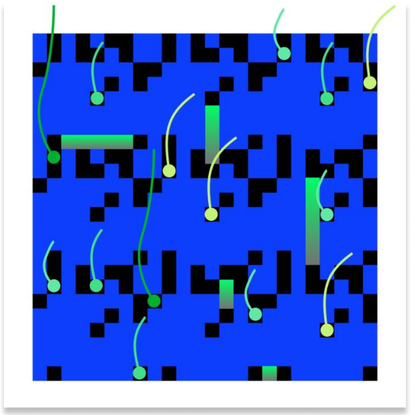
Research Alignment(s)

- This project would challenge the user's sense of time while immersing the user in the real world by 'hijacking' their phone to allow a digital forest to grow. They might even find themselves aligning with tree time.









Conjecture 3 on Visual
#relationships

Goal(s)

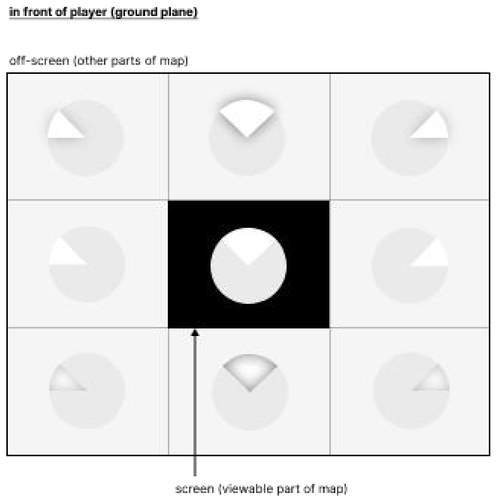
- **For topical section ‘Visual’:** To add visual depth to a 2D tile based environment using ‘pixelated’ tiles as coordinates for other visual medium to spawn on.

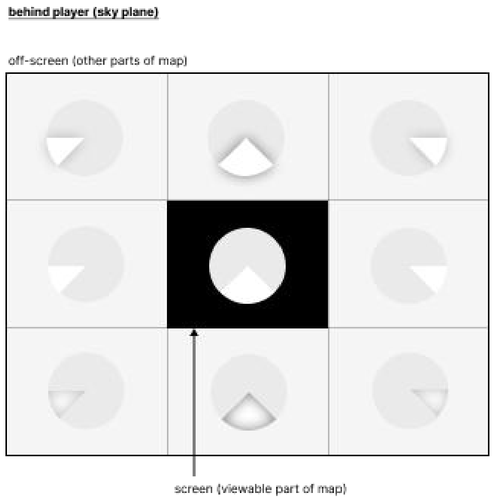
Research Realization(s)

- By combining gradients and vectors with an enlarged 'pixel' grid, I achieved an ecosystem-like depth while developing a coordinate system.

project 5

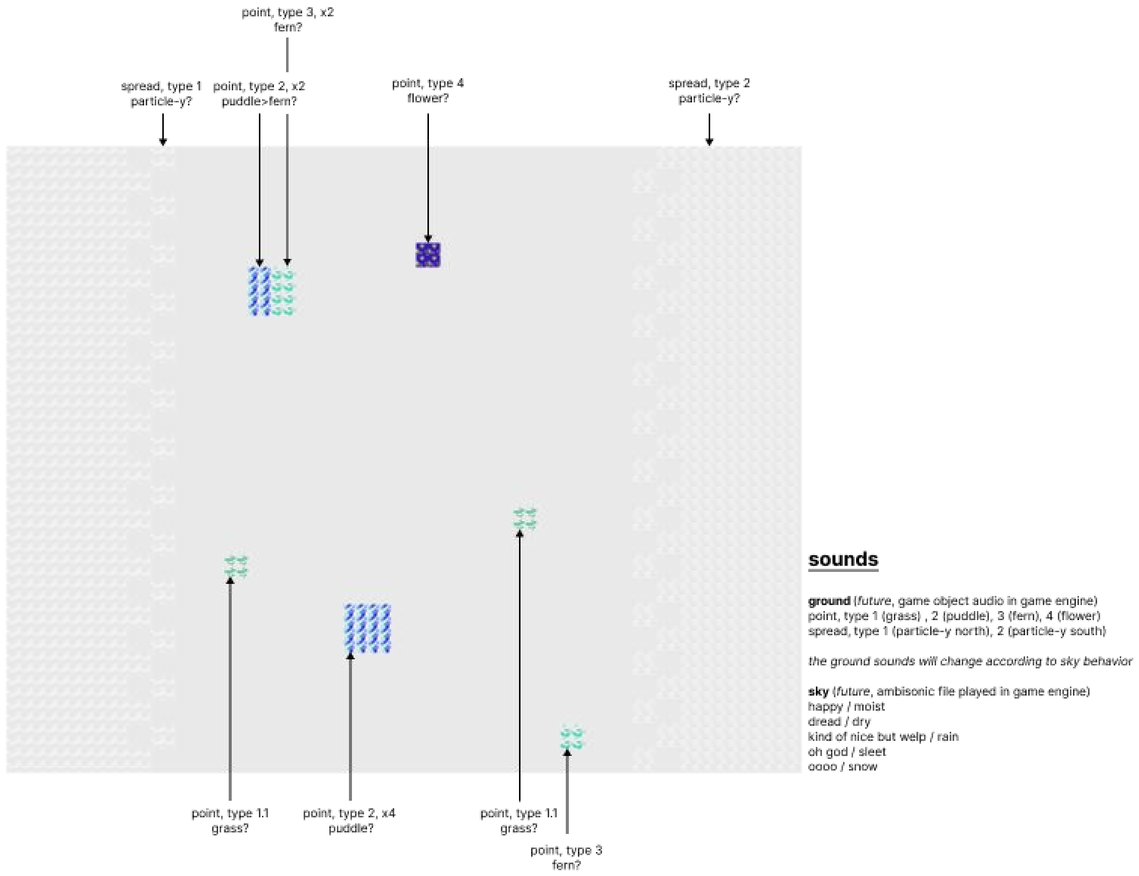
Sound Garden / ACCAD_5500_SP24





A sound garden **audio experience**.

#time #relationships



Goal(s)

- To create a spatial audio (360-degree) sound project.
- Create the sound of an ecosystem.

Outcome(s)

- I learned to record audio with different microphones and use a digital audio workstation called Reaper.
- The map was 2D, so I had to think of creative ways to spatially position the sound.

Highlight(s)

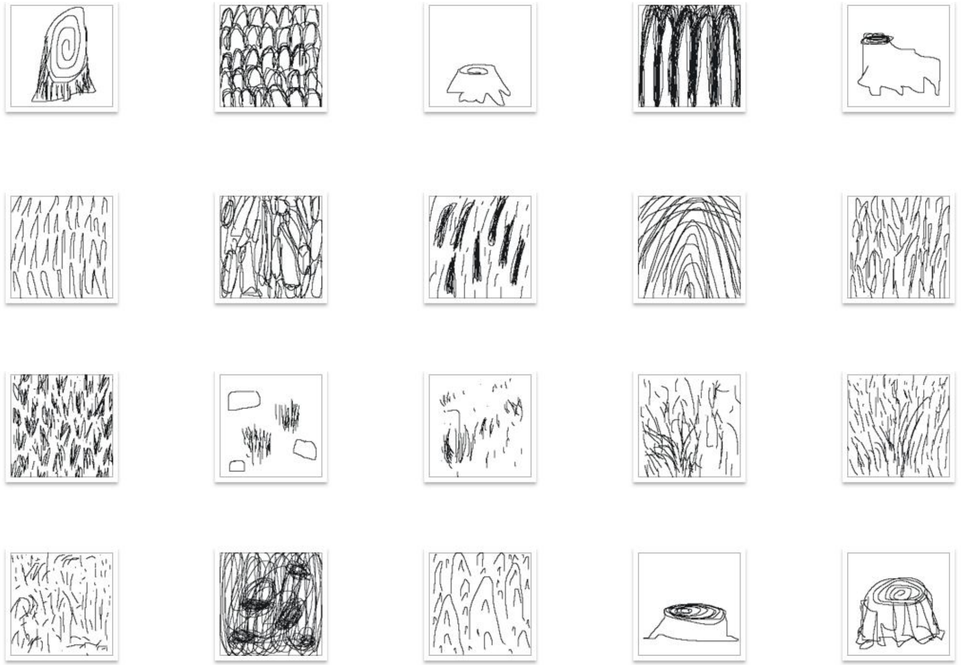
- Since the map would be facing the user, I placed the sound of the ‘ground’ in front of the user, whereas sounds from the ‘sky’ came from behind the user.

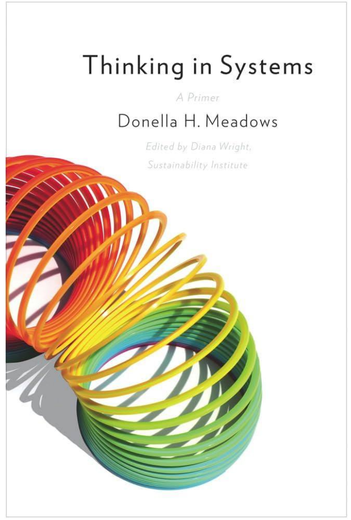
Research Realization(s)

- Sound can alert players to events or changes, a strategy for immersion and informing about environmental shifts that I had previously undervalued.

Extracurricular & Wrapping Up

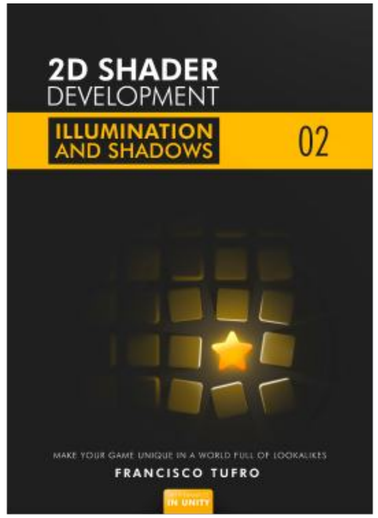
Doodles, site visits, books, GPU programming, moving forward, & schedule.

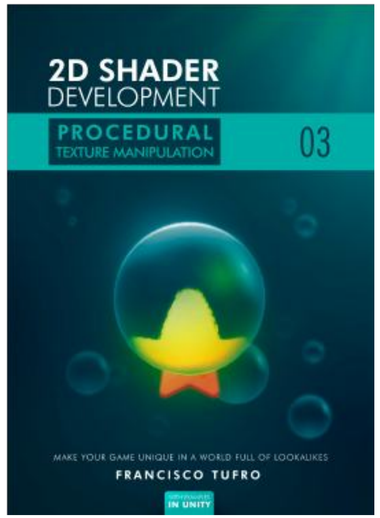



Thinking in Systems
A Primer
Donella H. Meadows
Edited by Diana Wright,
Sustainability Institute

&


2D SHADER
DEVELOPMENT
FOUNDATIONS
01
MAKE YOUR GAME UNIQUE IN A WORLD FULL OF LOOKALIKES
FRANCISCO TUFRO
IN UNITY


2D SHADER
DEVELOPMENT
ILLUMINATION
AND SHADOWS
02
MAKE YOUR GAME UNIQUE IN A WORLD FULL OF LOOKALIKES
FRANCISCO TUFRO
IN UNITY


2D SHADER
DEVELOPMENT
PROCEDURAL
TEXTURE MANIPULATION
03
MAKE YOUR GAME UNIQUE IN A WORLD FULL OF LOOKALIKES
FRANCISCO TUFRO
IN UNITY

Autumn 2024
DESIGN 6400 - Studio
LARCH 5610 - History and Theory 1
DESIGN 6100 - Methods and Tools
CSE 5542 - Real Time Rendering

Spring 2025
DESIGN 6400 - Studio
ACCAD 6003 - Computer Game Art and Design 2
LARCH 5620 - History and Theory 2

Autumn 2025
Thesis

Spring 2026
Thesis

Moving Forward

- Continue creating interactive vignettes.
- Go to conferences (GDEX & SIGGRAPH).
- Gather qualitative and quantitative data from play testing.
- Evaluate from reflective and observational methodologies.

portfolio & slides available @ https://joshantolovic.com/