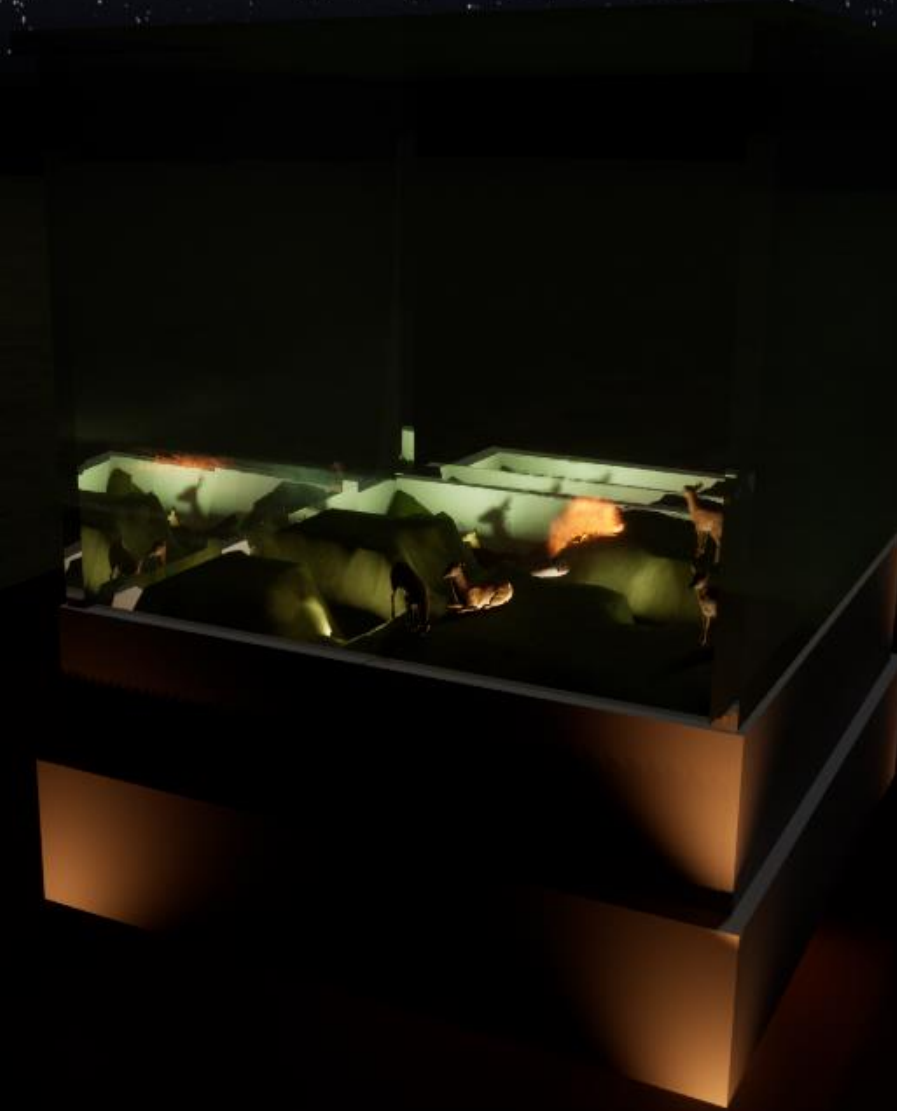# EPIMETHEUS

Advanced Creative Computing Documentation
by Avika Pulges

# Contents

Lessons from Past Experiences:
POP UP SMASH PRO

At the Work in Progress exhibition, my team and I debuted Pop Up Smash Pro, an interactive game merging conductive tape, a touch Arduino board, and Processing to allow users to physically 'smash' overwhelming digital notifications. Enhanced with early internet aesthetics and notification beeps synced with on-screen alerts, the game offered a blend of simplicity and nostalgia.

Despite its warm reception, we noticed a user interface confusion where participants mistook a side keyboard intended for game restarts as the main control, a lesson we integrated into our future designs. Users were also unclear about the game's end due to the stopwatch mechanism used instead of a traditional scoring or timer system. Moreover, participants often overlooked instructions to press a keyboard to start the game, causing confusion about the game's functionality. These insights were crucial for enhancing user interface and experience in future designs.
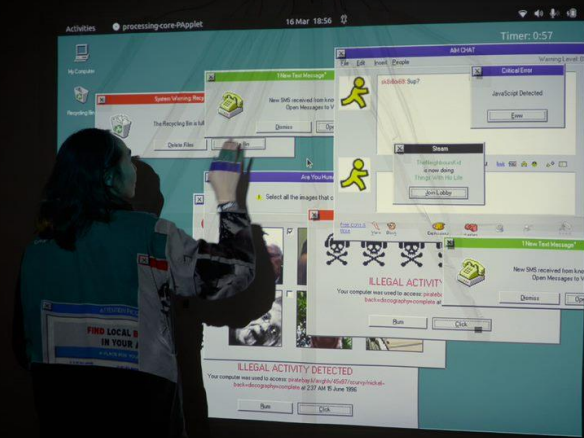
Lessons from Past Experiences: Curation

Along with Ileana Park, I had the privilege of serving as the Creative Director for the. This opportunity provided valuable insights into gallery interactions which I am going to outline below.

1. Accessibility is paramount for both space and games. Design for everyone.
2. Multiplayer experiences can be challenging since it is difficult to gather multiple people in a gallery space.
3. Intuitive interactions within 10 seconds are crucial, people will not try for longer than that.
4. Eye-catching elements are necessary among other exhibits to draw in engagement.
5. Flow, build up to more intense experiences with simpler ones along the way.

These lessons profoundly influenced my approach to future game design and were incorporated into my final project.

Initial Concept Brainstorm

The initial concept of my project underwent significant changes, ultimately resulting in a very different final product. However, during the brainstorming phase, several key principles guided my initial concept development.

Conceptual Inspiration:

- Prioritizing simulation over a structured storyline, allowing the world to be influenced by interactions within it.

- Exploring duality, revealing the contrast between seemingly benign or charming appearances and underlying narratives of sadness or danger.

I drew substantial inspiration from stage performances, particularly from Cabaret. In this context, the characters, illuminated by vibrant lights, were portrayed as victims of circumstances. The absence of a linear story allowed the narrative to unfold organically as characters impacted one another.
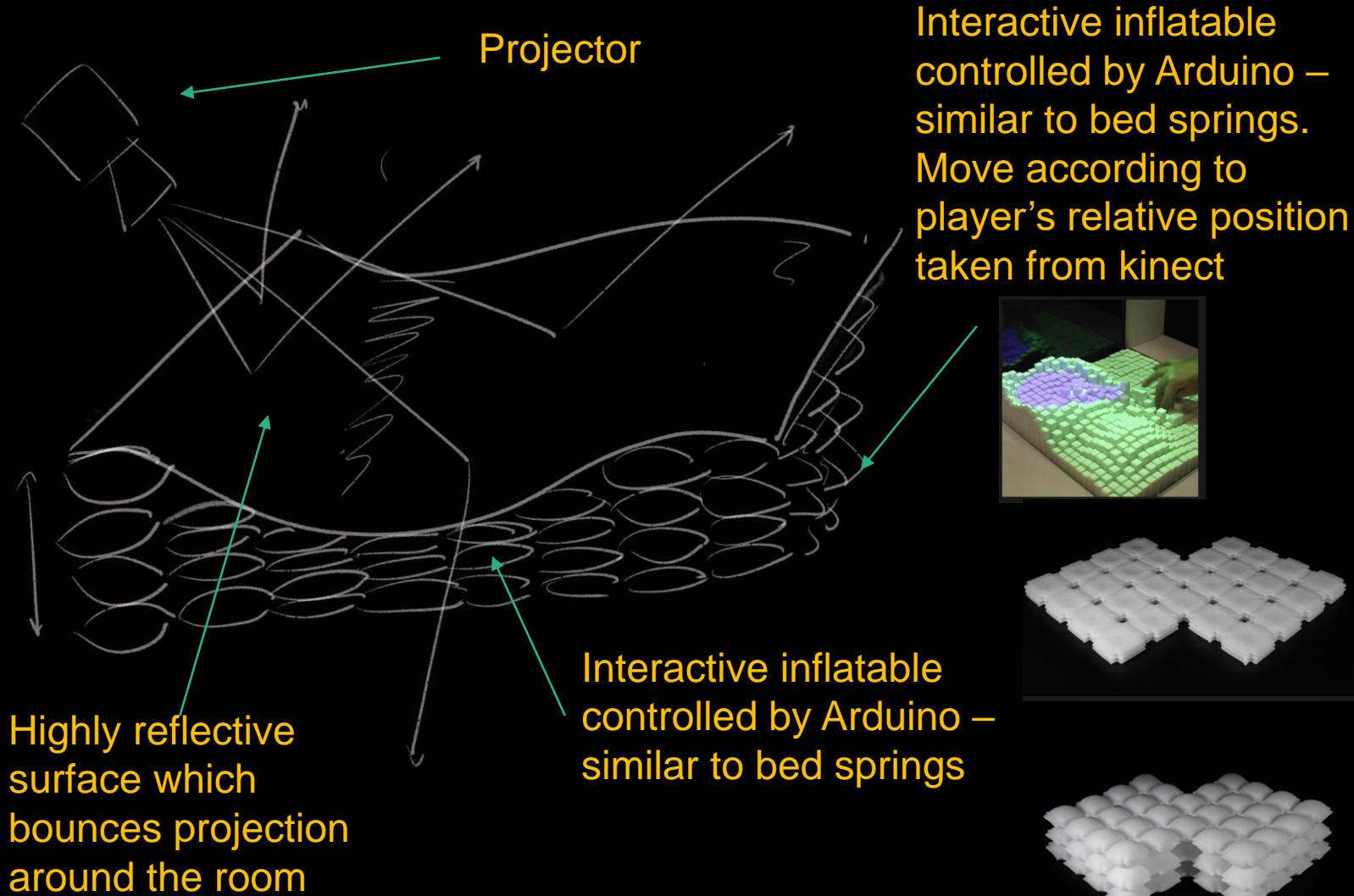
Technical Inspiration:

- Utilizing projection on non-flat surfaces to create an immersive visual experience.

- Emphasizing immediate interaction without the need for a learning curve, allowing users to engage effortlessly upon entry.

- Designing an experience akin to attending a play, where the unfolding narrative surrounds and involves the participant as an active character.

These inspirations shaped the initial concept, leading to the exploration of innovative visual presentations, the emphasis on interactive simulations, and the intention to create an immersive and participatory experience reminiscent of a theatrical production.

Midjourney images created during ideatic

Initial Technical Sketches and Ideation

Projector

Interactive inflatable controlled by Arduino – similar to bed springs. Move according to player's relative position taken from kinect

Highly reflective surface which bounces projection around the room

Interactive inflatable controlled by Arduino – similar to bed springs

https://selfassemblylab.mit.edu/liquid-printed-pneumatics/
https://tangible.media.mit.edu/project/inform/

Taking inspiration from MIT's self assembly and Media labs and the Kakehi lab, my initial design was to create what is essentially an interactive deconstructed disco ball using inflatables which move according to the player's relative position in a physical space. The projection will then bounce off the moving surface changing the environment of the entire room.

This change of the entire room will be accompanied by voices of innocent characters telling sordid tales of their lives. As the inflatables move, the character projections will be fractured, conveying their tone.

Fabrication Experiments

Initially, my focus was on developing the mechanics of the inflatables. I needed the inflatable to act as a spring, allowing uniform changes in height. However, I soon realized the challenges of achieving uniform inflation that allows for vertical movement without manual bending. Given the absence of a liquid injector in the Creative Coding Institute (CCI), I decided to explore an alternative technique called AccordionFab, as introduced by Takehi et al. (2018), which involves using a laser cutter to create layered inflatables using thin polyethene film and parchment paper.

To ensure successful implementation, I conducted experiments to optimize the laser cutter settings and designs. The objective was to achieve precise welding of the plastic sheets without causing them to melt and tear. Employing a combination of parchment paper and silicone sheets, I then prevented unwanted welding between different inflatable layers enabling the creation of multiple layers, similar to a spring.

Initial manual spring inflatable

AccordianFab in laser cutter

Yamaoka, J., Nozawa, K., Asada, S., Niiyama, R., Kawahara, Y., & Kakehi, Y. (2018). AccordionFab: Fabricating Inflatable 3D Objects by Laser Cutting and Welding Multi-Layered Sheets. In UIST '18 Adjunct: Adjunct Proceedings of the 31st Annual ACM Symposium on User Interface Software and Technology (pp. 160–162). doi:10.1145/3266037.3271636.

AND THEN THE LASER CUTTER BROKE...

Unfortunately, right before I finished my fabrication experimentations, the laser cutter broke. I attempted to continue fabricating manually using heat sealers and soldering irons, however, the results were incredibly unreliable, and not very functional.

Due to time pressures I then decided to change my idea and focussed more on the computational environment and play experience rather than complicated physical mechanics.

Despite encountering issues that necessitated a change in my project's direction, my fascination with the concepts of simulation and duality persisted. I remained dedicated to the idea of enabling players to influence the world and witness the emergence of a storyline from their actions.

To maintain the essence of my initial concepts, I made a significant pivot by shifting the players' influence from the physical room's environment to a digital world. The core principle remained unchanged: as soon as someone enters, the environment is instantly affected.

To achieve this, I developed the concept of utilizing Kinect depth data to manipulate the landscape terrain within the Unreal Engine. The alterations made to the digital landscape would subsequently impact the environment and the entities residing within it. This realisation allowed me to fulfill my initial vision of a simulation where storylines would organically emerge from the interactions between characters. In this unique context, the player takes on the role of the terrain, becoming a character in their own right.

Final Concept :
EPIMETHEUS
(originally called Felling Giants)

The concept of Kinect depth data influencing the terrain instantly evoked thoughts of how human presence leaves a lasting impact on the world. Inspired by this notion, I decided to delve deeper into the idea, aiming to emphasise the concept of human influence on the environment. Initially, I envisioned incorporating small fires that would spread as players interacted with the terrain, symbolizing how human inventions, innovations, and civilizations often lead to the destruction of the natural environment and its inhabitants. This interaction between the fire and the terrain would, in turn, affect the virtual animals residing within the landscape.

To enhance the overall experience and reinforce the concept, I conceived the idea of encapsulating the entire landscape within a box. This approach would create a visual metaphor, presenting the player as a god-like observer, looking upon a world displayed before them. By employing this perspective, I sought to evoke a sense of grandeur and omnipotence, enabling players to perceive themselves as being in control of a miniature universe.
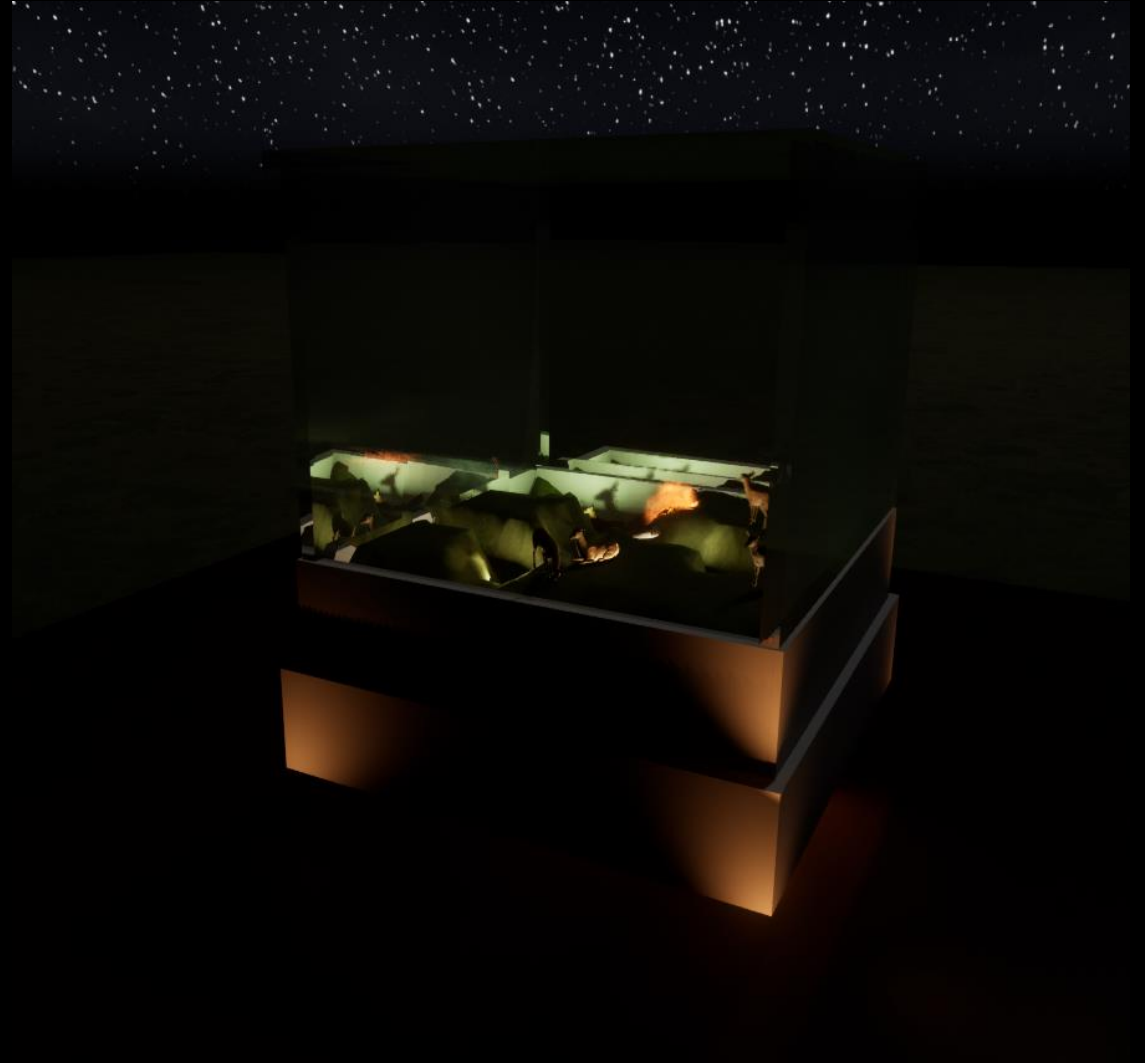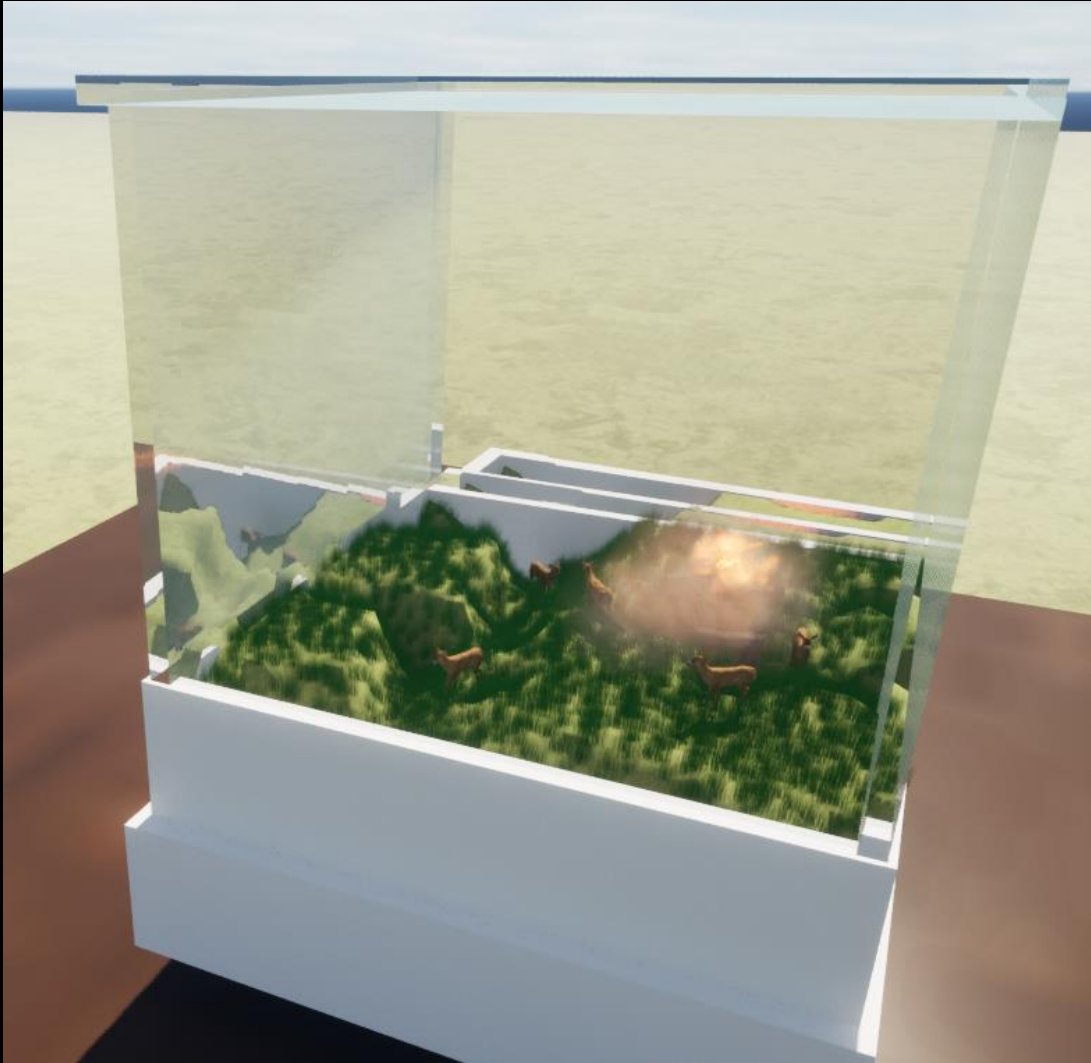
In naming the game Epimetheus, after the Greek titan who represents "afterthought," I intended to provoke contemplation and questioning. The choice alludes to the mythological figure's association with Prometheus, Epimetheus' brother who both created humans and gifted humanity fire. By raising the question of whether Prometheus's act was truly beneficial, despite its destructive consequences, I sought to explore the ethical implications of our actions as humans and the potential impact on the world we inhabit. Was Prometheus' right to give man fire even if we burn the world?

The name Epimetheus serves as a catalyst for introspection, inviting players to ponder the consequences of our choices and their potential ramifications for our environment.
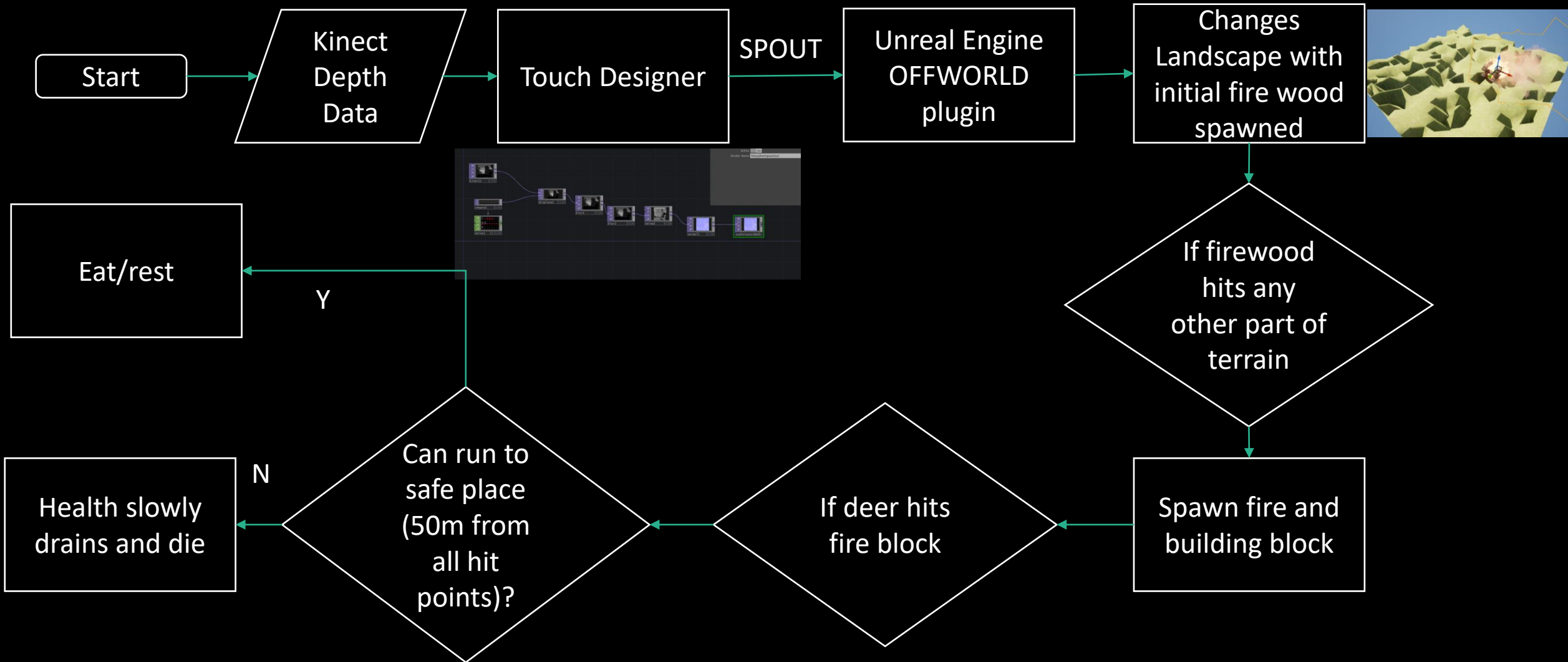
EPIMETHEUS' 2 Maps Day/Night

Initially 2 maps, day and night was created. Although the aesthetics of the night map was preferred, player preferred the day map since it was easier to see the spawned blocks

Game Mechanics

Start → Kinect Depth Data → Touch Designer →(SPOUT)→ Unreal Engine OFFWORLD plugin → Changes Landscape with initial fire wood spawned

Changes Landscape with initial fire wood spawned → If firewood hits any other part of terrain → Spawn fire and building block → If deer hits fire block → Can run to safe place (50m from all hit points)?

Can run to safe place (50m from all hit points)? —Y→ Eat/rest

Can run to safe place (50m from all hit points)? —N→ Health slowly drains and die

Custom C++ Landscape Mechanics

The most challenging aspects of the project revolved around implementing real-time changes to the landscape based on Kinect depth data since Unreal Engine does not natively support real-time landscape modifications.

Initially, I employed a plugin called OFFWORLD in conjunction with TouchDesigner to stream Kinect data into Unreal Engine using SPOUT. This setup enabled me to affect the landscape's material, creating the illusion of a dynamically changing environment. However, I encountered a limitation: the collision mesh remained static and did not respond to the modifications, rendering it ineffective for the intended purpose.

To overcome this obstacle, I had to embark on a learning journey. I delved into understanding and implementing a custom C++ class that would utilize the SPOUT render stream. This allowed me to achieve real-time changes to the landscape object itself, ensuring that modifications to the collision mesh accurately affected the world in response to the Kinect depth data. This custom class became instrumental in enabling the seamless integration of the dynamic landscape changes within the project.

Initial experiments allowed material changes and the illusion of landscape changes without collision changes (Ball doesn't move)

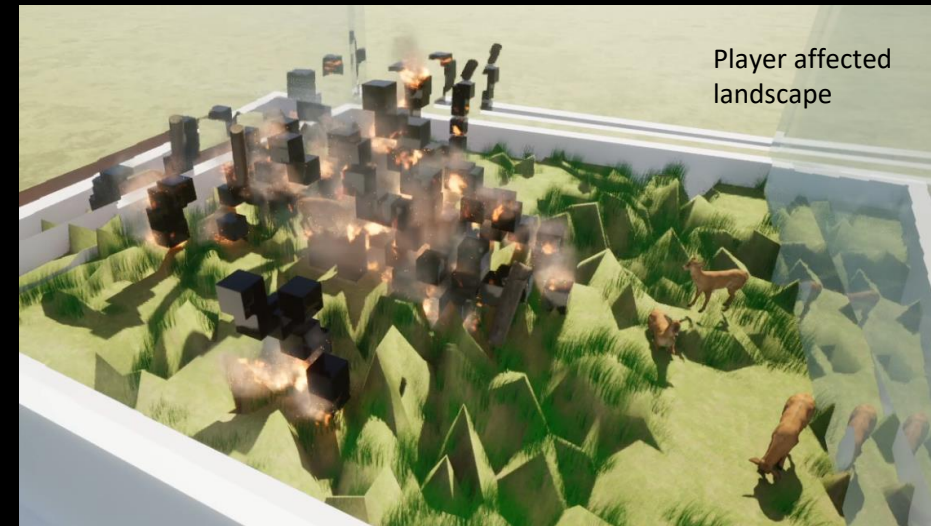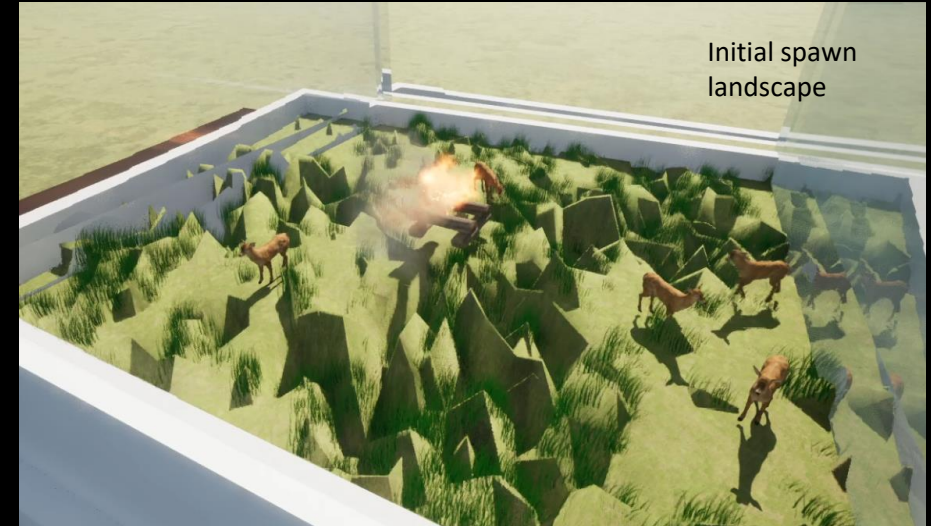Custom C++ landscape with changing collision (Ball Moves)

Blueprints: Affecting the environment

The initial landscape presents a serene scene with grass, firewood, a blazing fire, and grazing deers—a picturesque and idyllic terrain. However, as the player moves and influences the landscape, the firewood becomes scattered due to the physics of a changing terrain, causing the fire to spread accordingly. Wherever the fire touches the ground, it spawns blocks symbolizing human buildings, which appear as glossy black structures that contrast with the natural grassy landscape.

Within this environment, the deers inhabit the grassland. However, as players move and the fire spreads, the available space for the deers to live diminishes. Initially, I followed a tutorial by Matt Aspland to establish the basic animal AI, which included behaviours such as eating and sleeping, whilst walking and running will deplete their energy and increase their hunger. Building upon this foundation, I incorporated additional mechanics, such as making the deers flee to safe areas when encountering burning black blocks. If a deer becomes trapped and unable to escape, it sustains damage and eventually perishes.

This combination of interactive elements creates a dynamic ecosystem, where the players' actions directly impact the landscape, the spread of fire, and the survival of the deers, highlighting the consequences of human presence and development on natural habitats.

Initial spawn landscape

Player affected landscape

Aspland, Matt - https://www.youtube.com/watch?v=Ywn9gsfJ9qo&list=PLQN3U_-lMANNZtjAcKP8-VA7I8n13l1Cm

Play-testing and Feedback

After conducting tests with friends and family, I received intriguing and valuable feedback on the game, which was generally well-received. The game successfully achieved its initial goals of accessibility, clear messaging, and intuitive mechanics. However, during the testing phase, unexpected observations arose due to the simulation nature of the game without a defined storyline or objective.

Each player exhibited unique behaviours when interacting with the game. Some players experienced feelings of guilt and ceased playing upon accidentally killing a deer, while others actively pursued the elimination of all the deers. Some participants focused on maximizing the spawning of black boxes, likely driven by curiosity or a desire to experiment.

Interestingly, in subsequent tests, the introduction of a metric indicating the deer body count, without explicitly assigning points, had a significant impact on player behaviour. The disclosure of this metric led to an increased inclination among players to actively kill the deers and a reduction in feelings of guilt. This finding suggests that the presence of a measurable metric subtly influenced players' actions and their overall perception of the game.

Moreover, when the count changed to a verbal warning, such as "you killed a deer," players initially stopped and sought clarification on whether they should refrain from killing the deers.

These diverse player responses and the influence of presented metrics provide valuable insights into the impact of gameplay elements on player behaviour, engagement and overall experience even in the exact same simulation environment, and the considerations of small gameplay elements should be considered throughout the design process to tailor the game's message.

Human Reflection

Initially, every player's primary goal was to create as many black boxes as possible. The players reasoned that this was their only available course of action when questioned. However, the reactions towards the killing of deers differed significantly among the players. Some halted their gaming activities, others shifted their objective towards eliminating as many deers as possible, while a certain group remained indifferent to the deer's fate, focusing solely on generating more black boxes.

Interestingly, a tendency towards deer eradication was observed when multiple players were engaged simultaneously. They felt less culpability in this action, possibly because the blame was diffused among the group. This collective play led to an increase in their interest in producing more black boxes, reducing their concern for the deer.

The game intriguingly mirrors real-world perspectives on environmental impacts. Do we relentlessly pursue progress and development, ignoring the damage inflicted on nature, just because it appears to be the only path available to us? The game, Epimetheus, prompts its players to ponder their part in this intricate scenario, echoing the real-world views where some individuals prioritize advancement, others exploit the environment for gains, and some strive to counteract this due to their moral reservations.
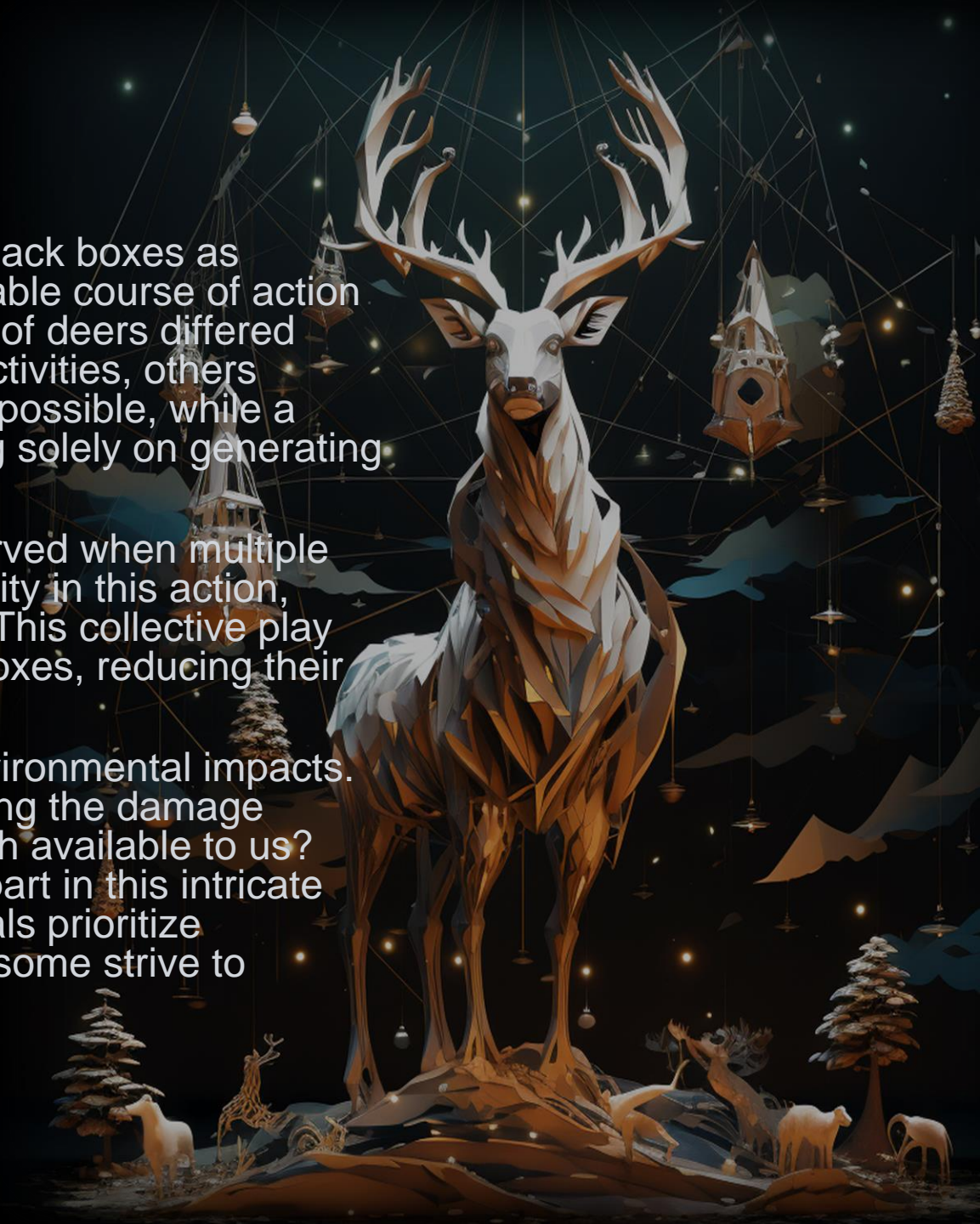
Retrospective

PROS:

- The game achieved the original goals that I have set for the game design.

1. Accessibility – the game can be played standing up or sitting down

2. Flexible – the game can have 1 or multiple playing at the same time

3. Intuitive interactions within 10 seconds – play testing revealed players knew straight away what the interaction was

4. Eye-catching elements – fires, deers and lighting elements were used to make the game eye catching

5. Flow – the game starts off with an idyllic landscape and waits for the players to get used to the interaction before spawning burning boxes, which eventually overwhelms the screen and kills the deers

6. Successfully coveys the message of human impact on the environment

CONS:

- There is no sound so the player cannot be fully immersed

- There is no start and end to the game, so the player does not know when to stop

- Sometimes the blocks created will block the fixed camera angle

- It is often not obvious when the deer dies because it is hidden by the blocks

Conclusion and Future Plans

In conclusion, I am pleased with the accomplishment of most of my initial goals and the positive feedback received during playtesting. However, due to time constraints, there were certain aspects that I was unable to fully realize.

Moving forward, my future plans involve bringing the game beyond a mere flat projection and integrating it into a physical environment. I envision incorporating large inflatable human figures positioned around the room within the Kinect's projection space. These inflatable humans would symbolize mankind, and interactive actions, such as pushing a button to "deflate" them, would represent the act of "killing" these figures. This physical interaction would result in the fire gradually diminishing and the deers returning. This addition aims to address the feedback received regarding a perceived sense of helplessness when faced with the spreading fire, providing players with a tangible means to extinguish it.

Furthermore, to enhance the immersive experience, I intend to incorporate sound elements. By integrating audio cues and effects, I aim to create a more engaging and multi-sensory environment for players.

Overall, I am excited about the potential for further development and expansion of the project. By integrating it into a physical space, incorporating inflatable humans, and enhancing the auditory experience, I aim to create a more impactful and immersive game that encourages meaningful interactions and reflection on our relationship with the environment.

Github link:
https://github.com/moonrabbitt/FellingGiants

Game demo link:
https://youtu.be/hDPQZvUuvOk