WAR & MUSIC

The Prequel to the Tale of Seraphina

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DesignMorphine Master of Science in Computational and Advanced Design
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“The best way to predict the future is to design it”

Buckminster Fuller

Acknowledgment

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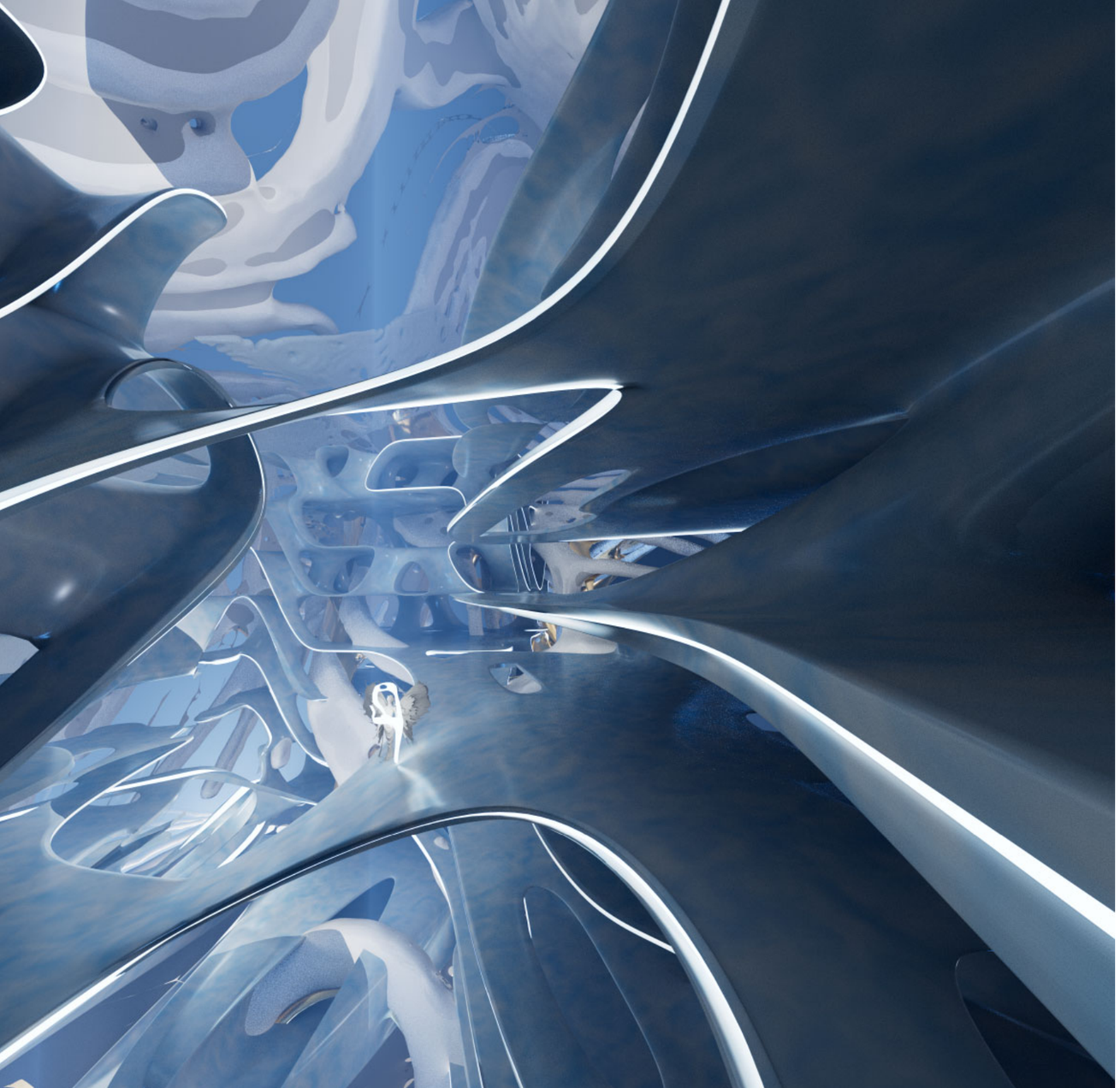
Special gratitude to family, Shari Franzetta and Michaelene Franzetta, and to Noah Levey for their amazing support and encouragement throughout this program.

Program Manifesto

Everything humanity has designed so far, is limited and based on the way our bodies are designed and work, the way they experience reality around us. However, in this age and time, we have reached the crossroads where technology can and will eventually shape, not only our minds but our body, as well. In this sense, designing the future entails, first and foremost, designing the body that will live that future. Challenges inevitably arise and demand innovators and pioneers to overcome them; new tools and new technologies are required to materialize the answer; limits and boundaries will be crossed, and the equilibrium will change. In this journey, the compass will be a scalable notion of the human condition. Housing, transit systems, and the ways one moves around in the city, as well as, the whole structure of the city itself, are essential aspects one has to consider when designing for this new reality. By changing the very unit, the whole world is built around, the human body, we are no longer concerned with just designing parts of the world we live in. We are designing the whole world we live in. It’s not a mere design process, it’s cosmogony.

Pavlina Vardoulaki Pryor
Creative Director, DesignMorphine



Concept

This project envisions an alien world through the lens of quantum physics, the study of matter and energy at their most fundamental level, to depict the intense conflict and aggressive discord between religious and political groups with polarized beliefs. It investigates the tragic consequences of socio-political polarization and the resultant turmoil as factions vie for dominance. In this exploration, we implement the allegory of Adam and Eve discovering the fruit of knowledge, metaphors for historic acts of devastation—including the first atomic bomb from World War II, historic diasporas by subjugated peoples, the cold war, and contemporary ideological polarization dividing nations.

We introduce an enchanted alien environment existing within an asteroid belt, inhabited by a species known as the Verde, whimsical creatures with a propensity for music and a natural disposition for peaceful coexistence within their habitat. This harmony persists until the discovery of a seductive force that heightens the senses and bestows power upon those who wield it. As an homage to the original group from which this story emerged, we center the storyline around the savior character Seraphina. The world described in this project serves as the backdrop for the preexisting conditions that Seraphina will resolve.

Outline

Chapter 01 - Prosthesis

Chapter One focused on the development of a character and its pet. The Verde species lives on a tree floating in an asteroid belt in space. Its wings were imagined to have the ability to communicate through the colors reflected through her wings. In this world quantum music rules all and is the focus of all efforts put forth by this species called the Verde.

Chapter 02 - Corpuscle

Focusing on the core habitat of the prosthesis this chapter imagined a dwelling unit for the character. Since the realm is in the middle of a Quantum musical war, the dwelling unit needed to be protective and to conceal within it valuable artifacts.

Chapter 03 - Amalgamation

The creatures that once rested under the open canopy of branches and thrived in harmony within the natural realm began industrializing their habitat. Several tribes rooted their foundations within canyons, which held the capacity to multiply the resonance of quantum sounds serving as both protection and propagation of their race and music. Such a tribe included the Verde of the canyon city, Luminalis.

Chapter 04 - Kinesis

The arms race ignited a rivalry to best each tribe in their music and acquisition of musical notes leaking from between dimensions. This necessitated the development of a public vehicle capable of both local and space travel as well as to be fit to travel for attacks. Equipped with protective features to ward off surprise attacks the vehicles possessed proficiency in flight and terrestrial travel, enabling voyages to the far reaches of the asteroid belt while ensuring safety and adaptability for various environments. Burrowing into the underground spaces of the tree necessitated local, private transportation was equipped to traverse through the city and underground.

Chapter 05 - Cosmogony

The Foundational Network Pathway represents the natural pathway system of the tree, enabling characters to construct their paths. The Primary Core Network represents the first artificial network carved by the characters, based on the natural pathways through the tree. The networks of Luminalis and the Dark Enigma illustrated the diaspora of character tribes and their bifurcation in residency due to ideological differences. The Dark Enigma tribe migrated to the tree’s top, seeking a musical crescendo with sultry tones, while Luminalians and their allies preferred cooler, melodic tones in the canyons below.

War & Music

In the vibrations of a string, we find the dance of particles; in the harmony of music, we touch the pulse of the universe.
-- Anonymous

What we have called matter is energy, whose vibration has been so lowered as to be perceptible to the senses. There is no matter.
-- Albert Einstein

The quest to subvert opposing factions of political or religious doctrines pervades the history of humanity. Polarity in ideologies perpetuates belligerent acts, from terrorist attacks to riots to cataclysmic measures such as airstrikes into opposing territories. In this story, we employ the metaphor of music, “the organization of different sound frequencies,” as a cultural, religious, and/or political ideology. We introduce the fictional concept of “quantum music” to symbolize the seductive potential and formidable power to subvert opposing ideologies through violent acts of dominance. Using this paradigm, we elucidate that, to subvert one by means of a “quantum” attack, the destruction of core values for those subjugated equally annihilates the very essence of their being at an atomic or soul level.

This world focuses on three main tribes or regions within the tree planet: The protagonist city of Luminalis, a city tucked within one of the tree canyons; their opponents, the Dark Enigma, who migrate to the top of the tree to best fit their style of music; and the rogue, migrant tribe, allies to Luminalis.

When the ancient Verde discover how to harness the mystical force of quantum energy to play on a physical instrument forged from the tree sap of the Great Ancestor tree, the frequencies emitted from the instrument intensity their senses with a heightened reality. However, the instrument also exhibits a cataclysmic side effect: When music played on the quantum harp cannot harmonize with other coexisting music, the frequencies result in a cataclysmic explosion. The Verde discover this in an explosion that nearly demolishes their planet. Yet, despite the devastation, the overwhelming allure of the enhanced reality and power of the harp propogates the temptation to play it. After the explosion, the desire to possess such an instrument and to experience such a frequency -- especially

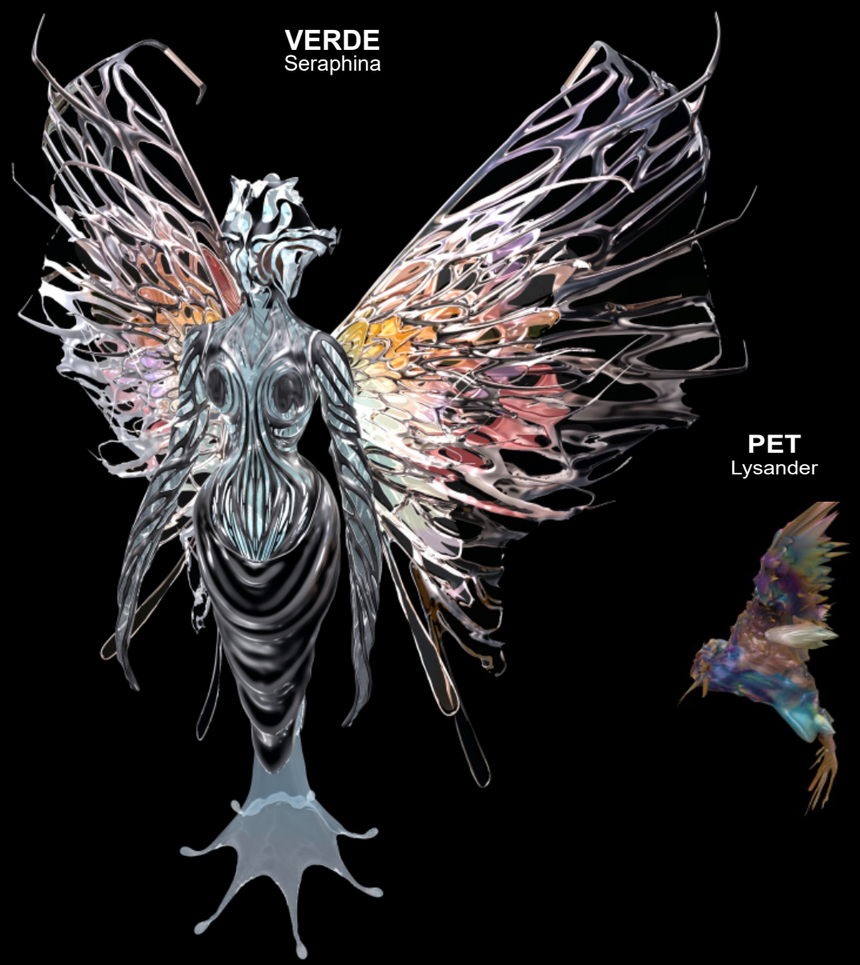
following the destruction of their verdant skyline and lush landscaping -- transfixes the minds and souls of the Verde with an overwhelming desire to play their particular style of music using the quantum instrument. However, knowing that only one form of music can play at once ignites a radical shift in the relations of the Verde. Once a creature unknown to spite, jealousy or rage, the Verde covet the haro with the desire for the intoxicating experience of playing such an instrument.

The Verde gather in masses, groups of their own musical genre, with the group initiative to gain control of the harps. Thus, the Verde segregate and tribes are formed. A great diaspora followed as the tribes emigrate to various regions, distal to their original congregation as to escape the potential of catastrophic cacophony sounding from the otherworldly notes escaping the enchanted instrument. Symphony halls became war rooms teaming with strategy to possess all quantum instruments. The creatures that once rested under the open canopy of branches and thrived in harmony within the natural realm began industrializing their habitat with structures built for two purposes, war and music.

Infrastructure emerged as did technology. Reaches for power stretched far into the reaches of space where, between dimensions, the Verde sought quantum musical notes to collect and return to their homes. Threats loomed of attacks, either by the threat of quantum symphonies of the opponents to destroy their territories at the sacrifice of their own lives for the glory of the quantum music reigning their kind.

Hope seemed but an illusion and the seduction of the quantum music only strengthened from generation to generation. Only one music could play. Only one could rule.

But whose music would it be?



Chapter 01 | Prosthesis

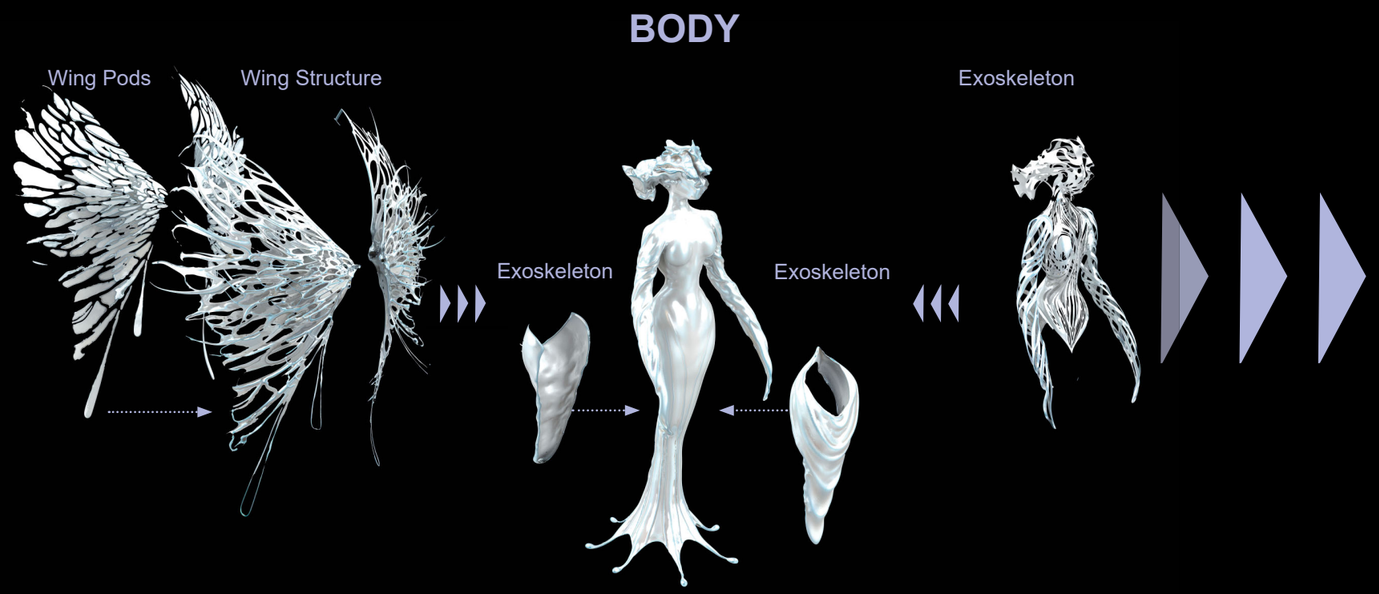
Chapter One focused on the development of a character and its pet. The hero of the story Seraphina lives on a tree floating in an asteroid belt in space. Her wings were imagined to have the ability to communicate through the colors reflected through her wings. In this world quantum music rules all and is the focus of all efforts put forth by this species called the Verde. Her faithful companion Lysander holds ancient secrets to the realm and is more than just a pet.

Created using Maya and Z-brush and rendered in Maya Arnold.

PROSTHESIS
Midjourney Inspirations

PROSTHESIS
Verde Diagrams

EXPLODED RENDER DIAGRAM



BODY + EXOSKELETON

Body

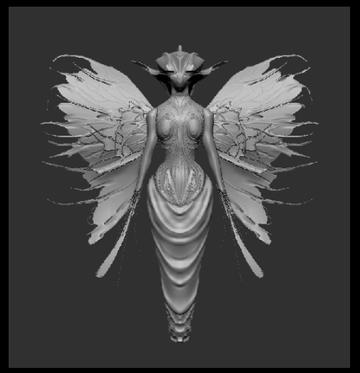
Iridescent protoplasm that carries photons and acts as an envelope for other networks like cellulose fiber network

Exoskeleton

Resin cells emitted during the organism's growth solidify on the surface, forming highly impermeable layers to gases and water, while gas exchange occurs through lighter, spongy areas. Takes place through lighter spongy areas.

PROSTHESIS
Progress

Body form



Full Prosthesis Assembly

Wing Pod Coloring

Wing Structure Detailing

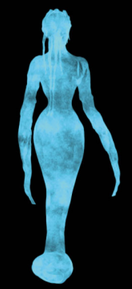
Wing Form Finding

Body Exo Separation

A/O of Base Geometries

A/O of Base Geometries 2

PROSTHESIS
Progress: Head

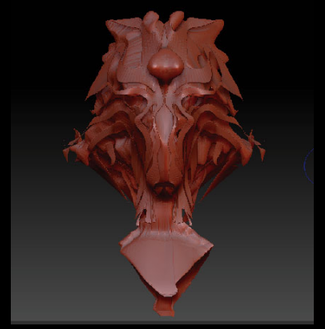


Body Form

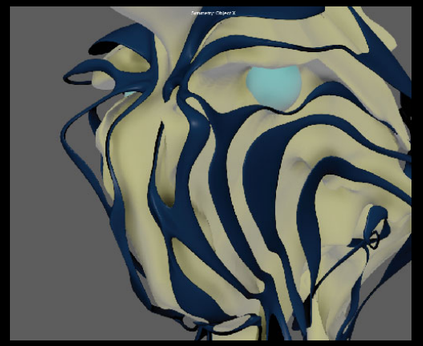
Body Form + Exo

Exo + Endo

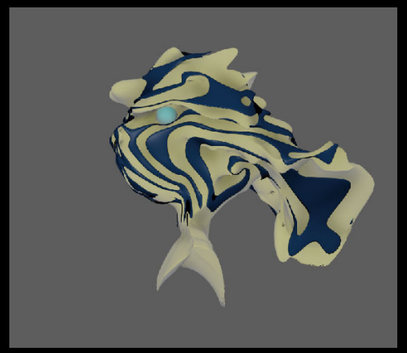
Exo Sleeves



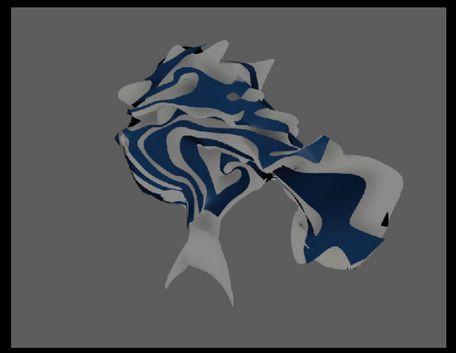
Head Sculpting in
Z-brush



Placement of Eyes



Side Head Articulation



Side Head Refinement

PROSTHESIS
Wing Architecture

Wing Structure

Wing Pods

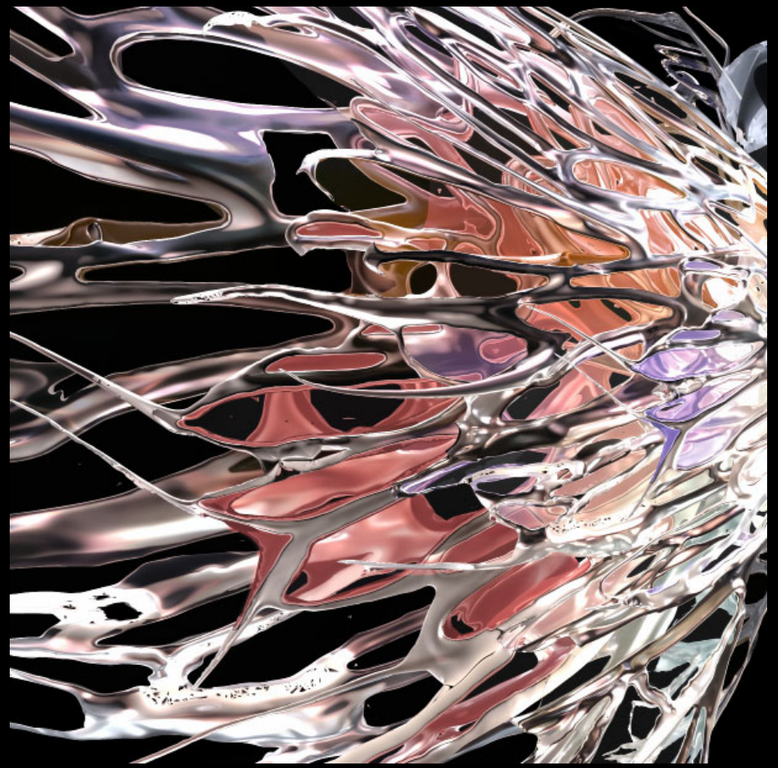
Wings

Bioluminescent hollow tissues form the frame of the wings. This network carries photons collected from the pods. These photons vibrate at various frequencies created by the organism and give them different colors which are used as a form of communicating expressions and emotions. Stacked membrane wings, or wing pods, have small pores that absorb photons(light) as an energy source. These pores also act as receptors to different frequencies.

PROSTHESIS
Details

PROSTHESIS
Details: Wings, Torso & Arms

Wing Detail



Torso + Arm Detail

PROSTHESIS
Details: Arm Bark & Pet

Arm Bark Detail

Pet Lysander

PROSTHESIS
Rigged Poses

Chapter 02 | Corpuscle

Focusing on the core habitat of the prosthesis, this chapter imagined a dwelling unit for our character Seraphina. Since the realm is in the middle of a Quantum musical war the dwelling unit needed to be protective and to conceal within it valuable artifacts

Built by creating a base model in Maya, and using Rhino Grasshopper to grow lines on top of the base model, converting them into pipes, brining them into Z-brush for smoothing, and rendering using Maya Arnold.

With our tutor’s help, we shifted colors along a single line and offset them between lines by iterating through tree branches. We added an offset and started each line with random, unordered points to maintain the ordered increments of the branches. Fins were added by selecting, scaling, and lofting each line individually. Protected Spaces inside with defensible outpost on the exterior.

MIDJOURNEY
Overall Base Form

Inspiration

After collaborating on Midjourney images, the team explored base forms with two specific purposes: Music and War.

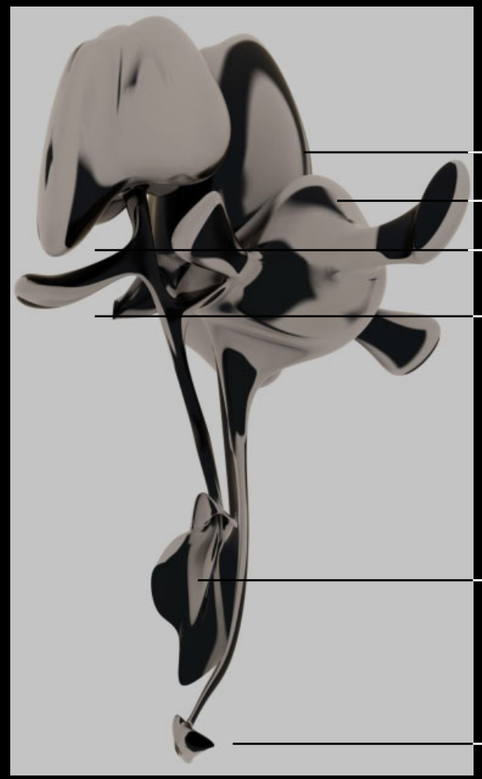
Concepts that defined the Corpuscle nodes included a defense outpost equipped with protruding armatures and turret stations, strategically positioned for optimal directional advantage; a symphony hall or musical religion shrine, designed to connect with deeper reality and music, located at the top of the structures, offering protection from above while remaining open; and a mushroom cultivation chamber, suspended below the main structure.

The symphony hall would be a space to play the honored music. Inside they would keep their sacred Quantum Harps. Furniture for such a space would include musical grenades resembling organic fruits; musical turrets, large stationary weapons situated on the defense posts; and quantum musical satellite dishes, akin to octopus suckers, extending in multiple organic directions for sending and receiving signals.

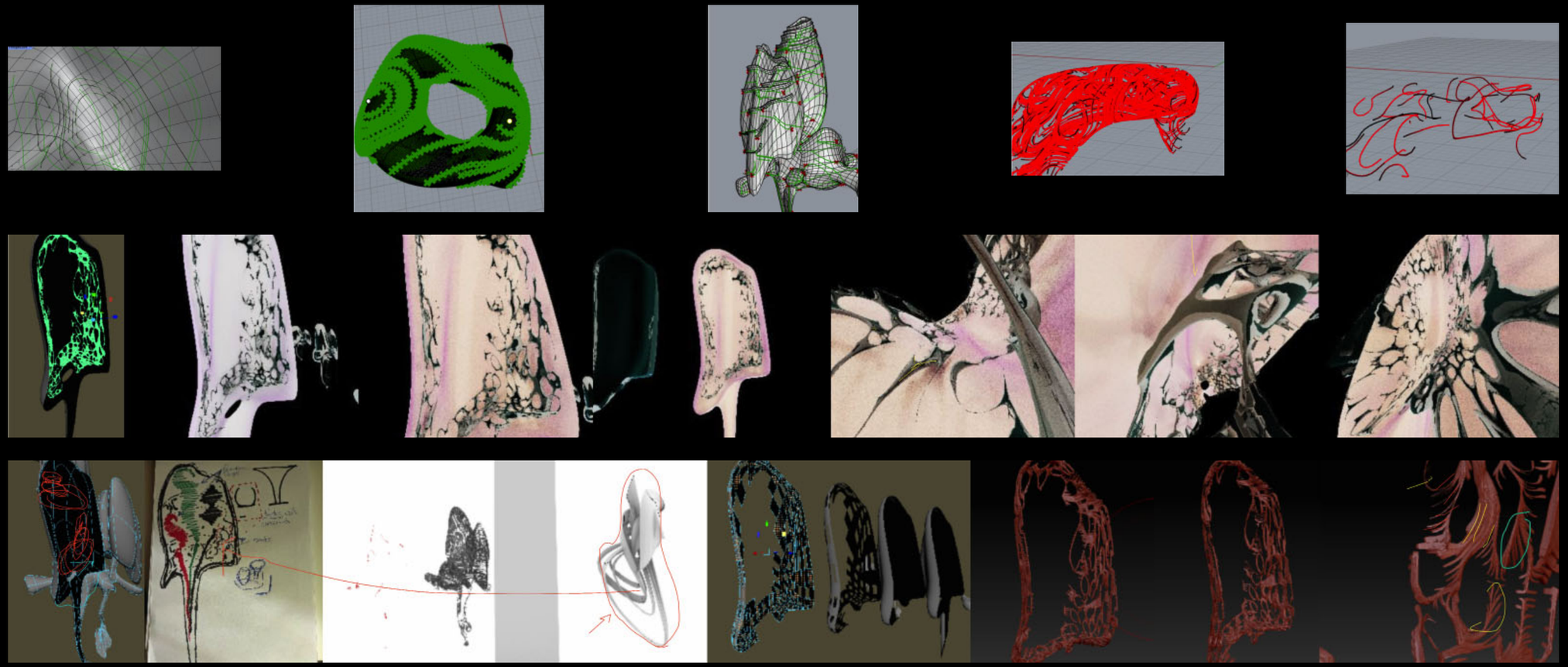
The design language incorporated elements like cross-section rings extruded from fins that bend parametrically.

EXTERIOR BASE FORM
Design Language

Space Diagram



EXTERIOR BASE FORM
Progress



EXTERIOR
Five Corpuscle Layers

Interior Gold

Volumetric Noise visualized in Gold

Sap Layer 1

Delicately constructed sap spread over the whole surface

Sap Layer 2

Delicately constructed sap spread over the whole again

Sap Layer 3

A thick structural layer of sap mainly solidifying the base structure

Exterior Gold

A final Garnish of Gold articulated the exterior for flash

EXTERIOR
Possible Variations

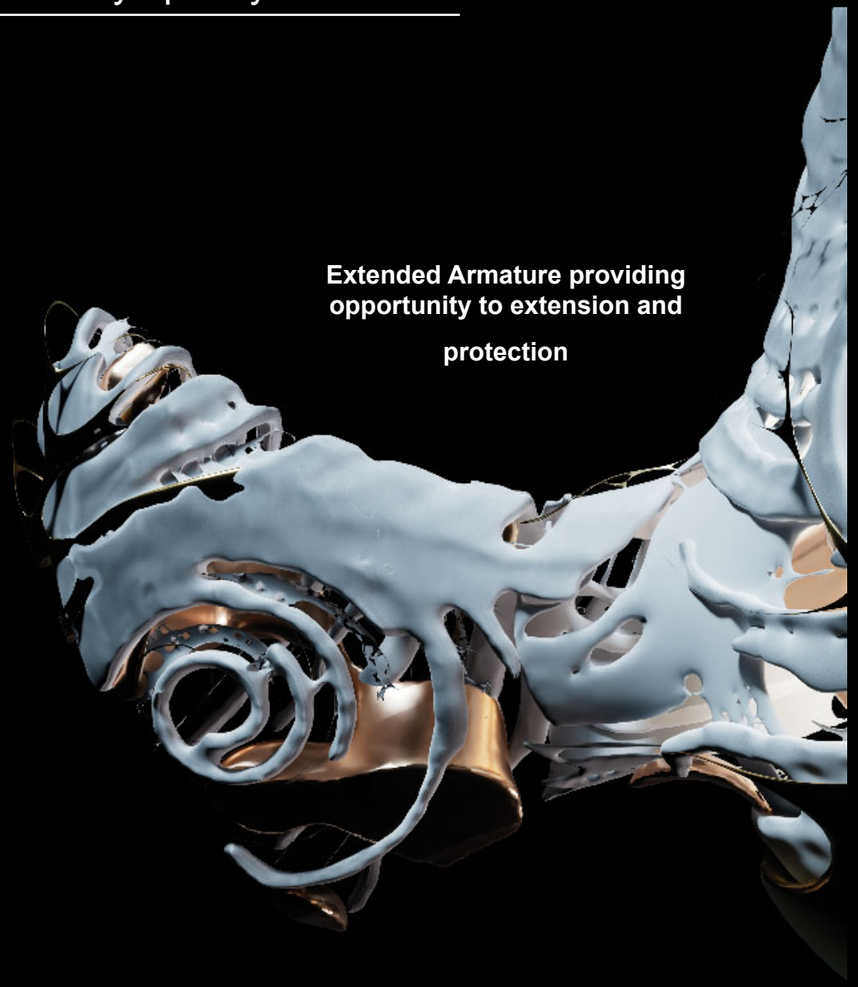
Variation 1

Variation 2

Variation 3

Variation 4

DETAILS
Defense, Network & Symphony Hall

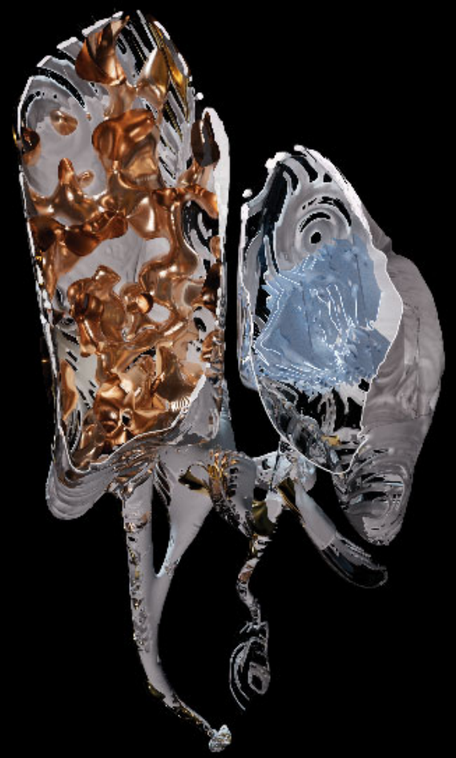


Extended Armature providing opportunity to extension and protection

Symphony hall interior space used for religious musical ceremonies

War room used for weapons manufacture and war council meetings

DETAILS
Side View & Interior



Side View
Symphony Hall & War Room

Exposed Interior
Liquid Volumetric Noise

FURNITURE
Quantum Instruments

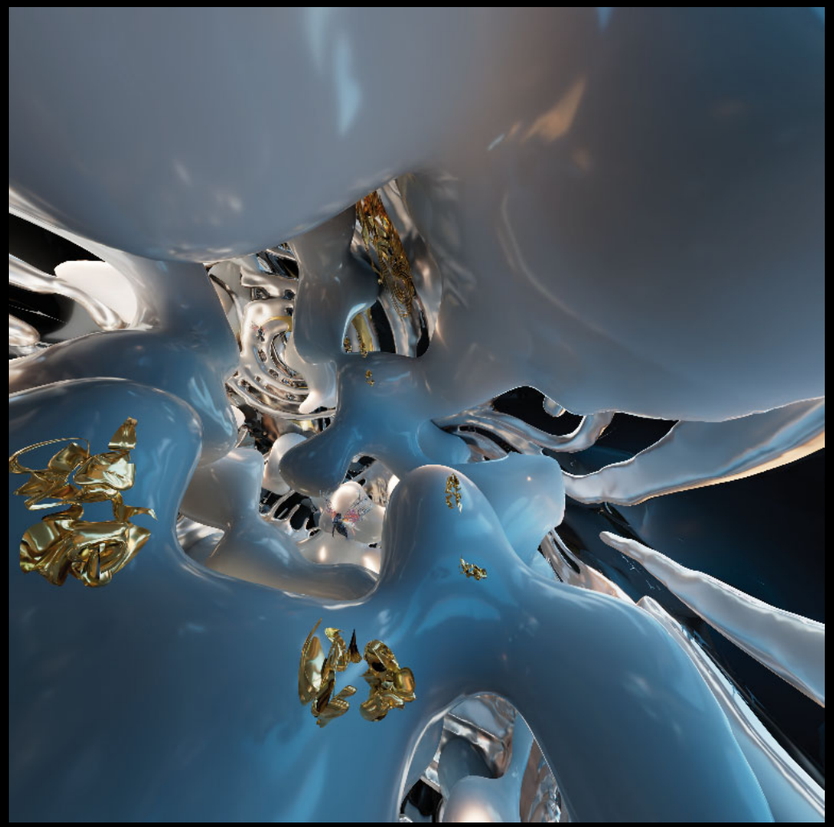
Quantum Tenor Harp

The First Quantum Harp

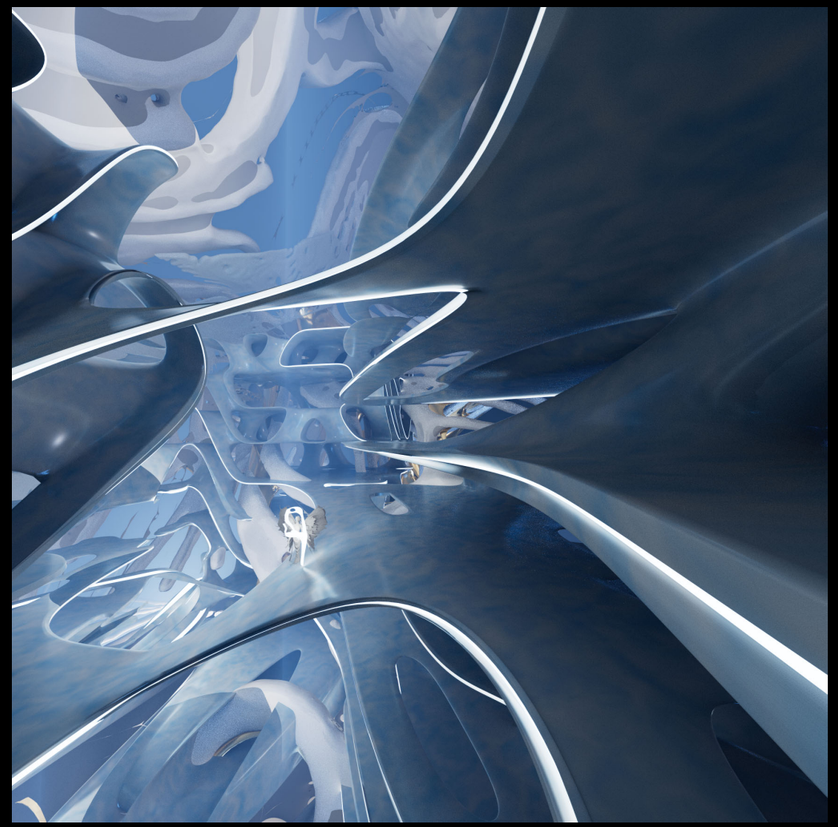
Quantum Music Bass Harp

INTERIOR SPACES
Symphony Hall & War Room

The Symphony Hall



The War Room



CHAPTER 03 | Amalgamation

The creatures that once rested under the open canopy of branches and thrived in harmony within the natural realm began industrializing their habitat. Several tribes rooted their foundations within canyons, which held the capacity to multiply the resonance of quantum sounds serving as both protection and propagation of their race and music. Such a tribe included the Verde of Luminalis.

Dissecting geometry from the Corpuscle’s base model enable usable components to manually and computationally form into new permutations of conglomerate forms using Maya, Blender, Rhino, and Grasshopper.

MIDJOURNEY
Environment: Base Exploration




Chapter Three MidJourney Exploration

Midjourney images married tree images with musical motifs, such as musical instruments and musical staffs. With a distinct preoccupation with both militia and music, both themes played into prompts to cultivate the environmental aesthetic. Gathering spaces imagined for both war rallies and symphony halls fed into prompts blended with tree and other bioorganic themes. Additional prompts included phrases from Sun Tzu's military handbook, *The Art of War*, which prompted imagery of pathways and movement, which later inspired explorations with the visual movement of geometry produced from cymatics.

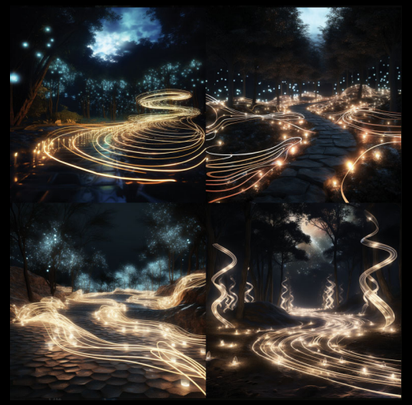
Materials included the ivory and gold hues of the previous chapter, as well as colors extracted from Substance Painter’s RGB output of the Corpuscle’s copper and gold hues. These tones introduced the flattened, somber hues, fit for the morose prequel tale that described a sullen, dystopian world waiting for hope in the next chapter.

MIDJOURNEY
Environment: Base Exploration

MIDJOURNEY
Environment: Musical Inspiration

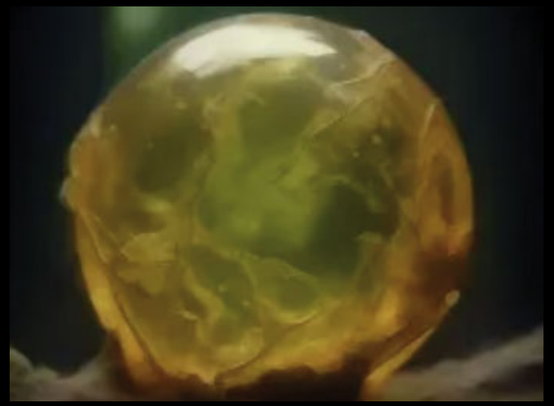
MIDJOURNEY
Environment: Final Explorations

MIDJOURNEY
Public Spaces



MIDJOURNEY
Towers

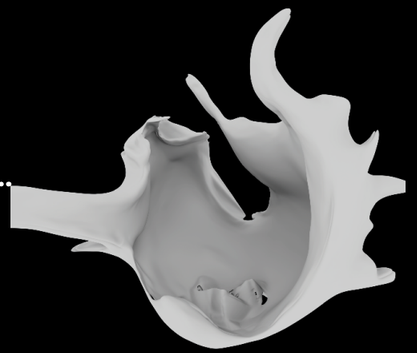
MIDJOURNEY
Materials



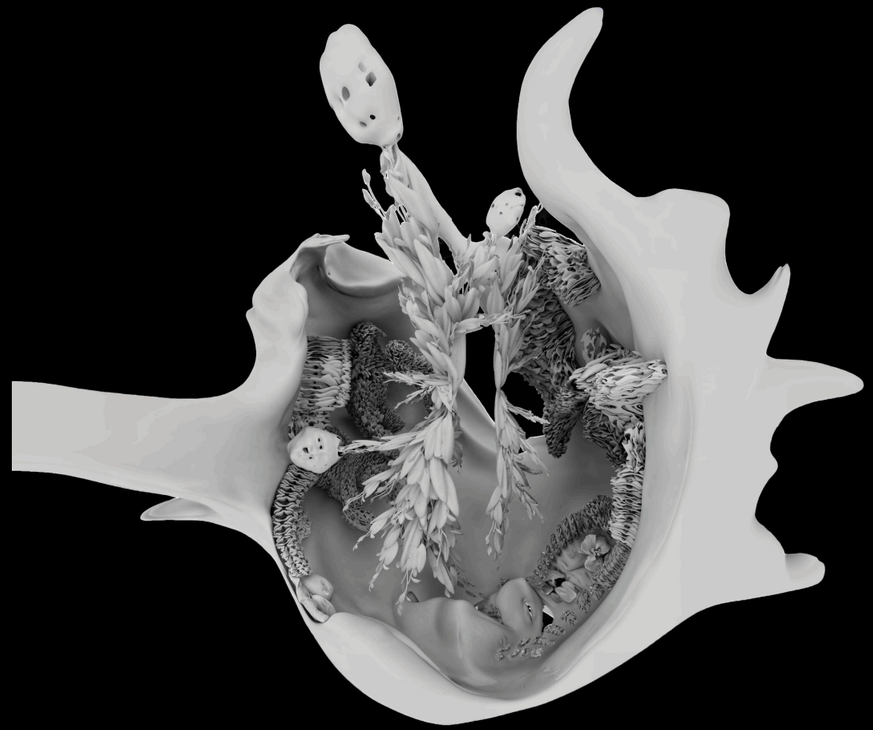
MIDJOURNEY
City Environment

Feeds or prompts describing from MJ images of previous chapters and toxic algae

V1
Modeled in Houdini



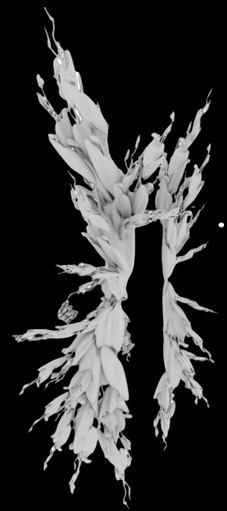
Final Model



MIDJOURNEY
Central Urban Towers

The tower concept included a bio-organic “triad” or tri-unit structure erected in the center of the city

V1
Modeled in Blender



Final Model

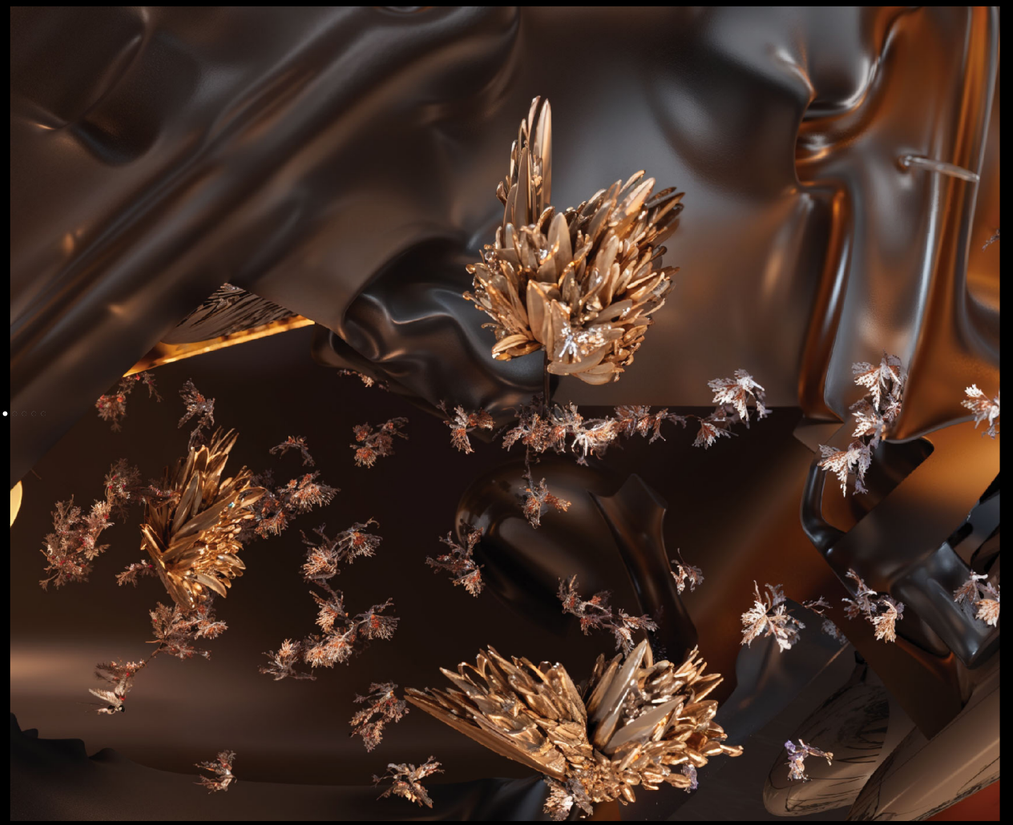
MIDJOURNEY
Public Spaces

The environment of the tree was considered in selecting bio-organic geometry to serve as inspiration for central public spaces

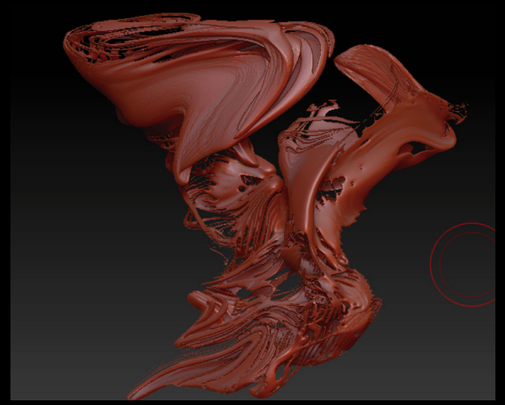
V1
Modeled in Maya + Grasshopper

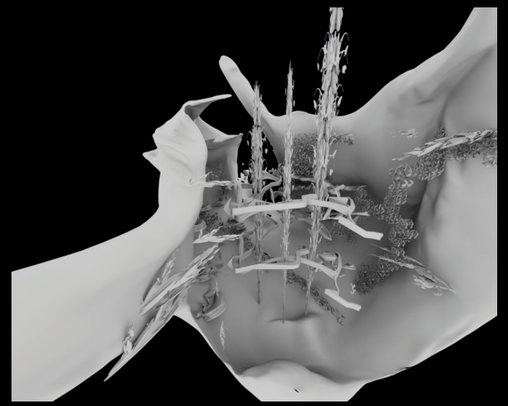
Public spaces were designed to resemble floating musical notes

Final Model



PROGRESS
WIP





Chapter Three Work in Progress

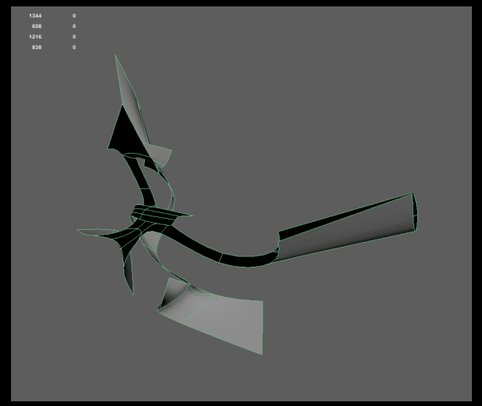
Processes for this chapter focused on creating an environment for a bioorganic culture with a penchant for music and myopic focus on war. The militant lifestyle of this creature required both combative and protective components, while the drive to seek power through the cultivation of music necessitated musical elements. After experimenting with iterations including multi-tiered geometry representing unconventional trees and other abstract forms possessing the filigree texture of the corpuscle, a canyon environment was ultimately selected for its acoustic nature and its subtle resemblance to our Midjourney image marrying a tree environment to a French Horn.

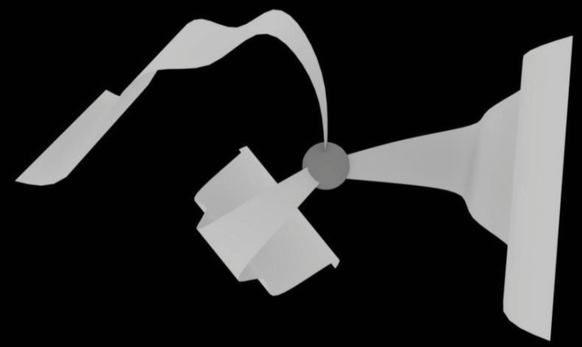
In earlier iterations, experiments in Blender produced physical representations of music, making the use of bringing 2D cymatic geometry into 3D representations that could be manipulated into levels within the environment and public spaces. Other experiments included exaggerated geometry, illustrating the low gravity of the environment and the warped reality of this quantum world. Ultimately, these forms, though dynamic, proved unsuccessful for the final outcome. More subtle geometry from the Catalog of Parts replaced these motifs.

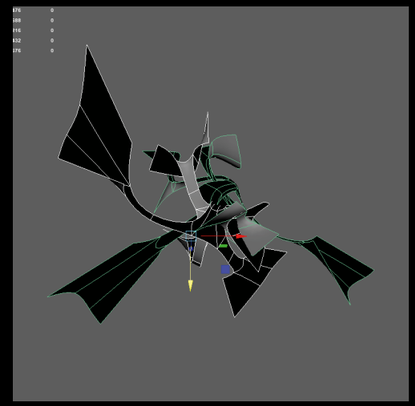
Processes involving steps from the classic military treatise handbook, *The Art of War.* The quote “Do not encamp in low-lying ground. Do not linger in dangerously isolated positions,” inspired the residential units that lined along the canyon walls. With the manual residential model too large to include other geometry, various iterations were tested in Blender. These experiments ultimately failed, promoting Grasshopper as the proper software to produce the desired geometry.

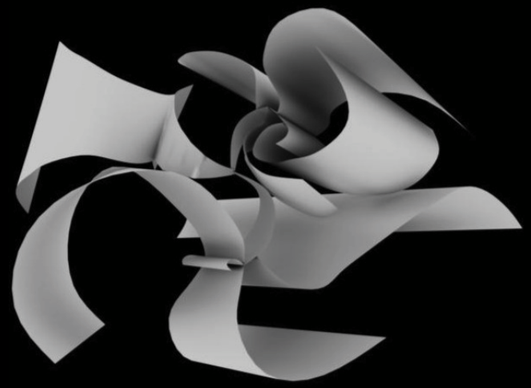
Finally, geometry for public spaces was tried in Grasshopper, but ultimately formed geometry too clean to suit the original model.

ENVIRONMENT PROGRESS
Tiered Unconventional Tree Shape



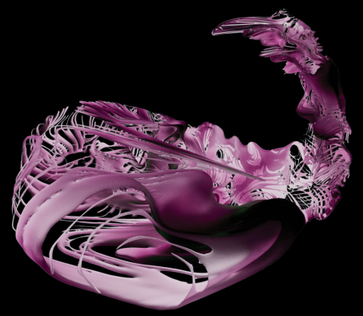




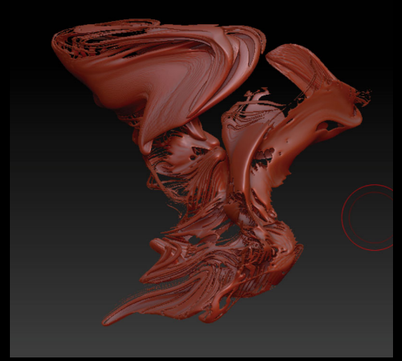


ENVIRONMENT PROGRESS
Iterations Inspired by MJ & Corpuscle

CorpusIce Textured Environment

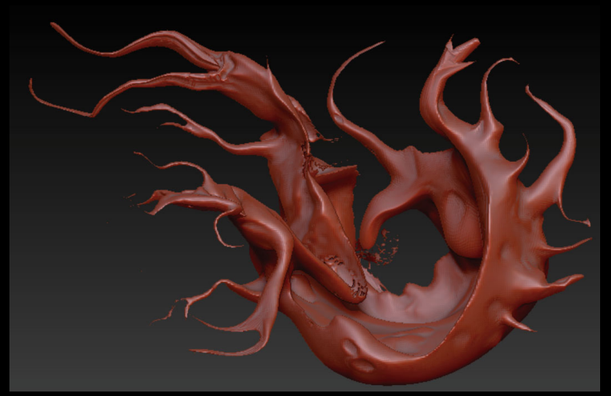


Modeled in ZBrush



Modeled in ZBrush

Inspired by Midjourney Images



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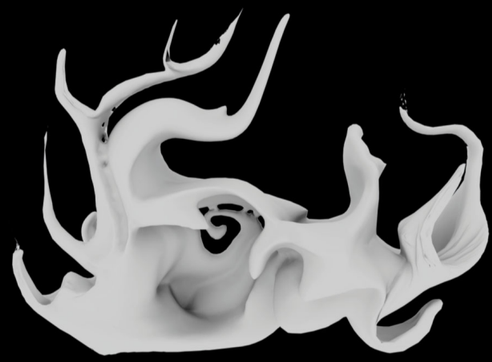
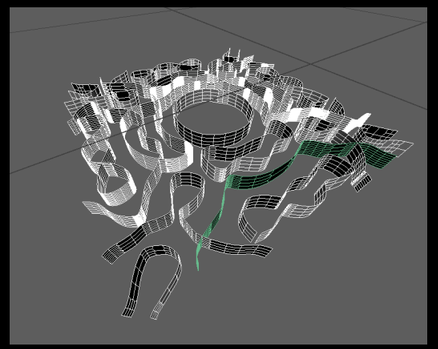


Modeled in ZBrush

ENVIRONMENT PROGRESS
Experiments with Cymatic Netting

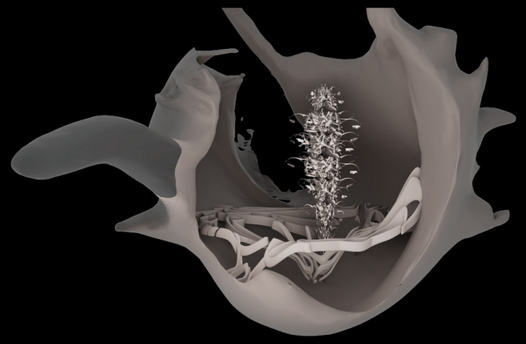
Experiments with Cymatic Netting



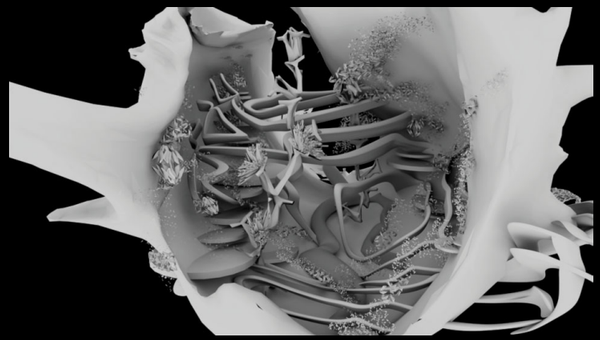
Modeled in Blender

Modeled in Blender

Cymatic within Environment

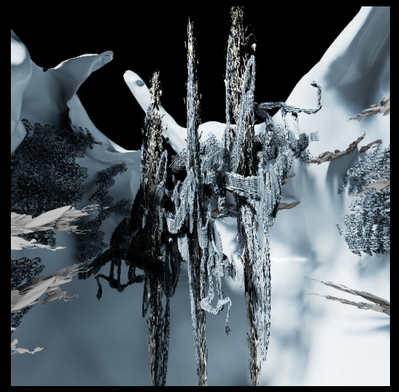


Modeled in Blender + Maya

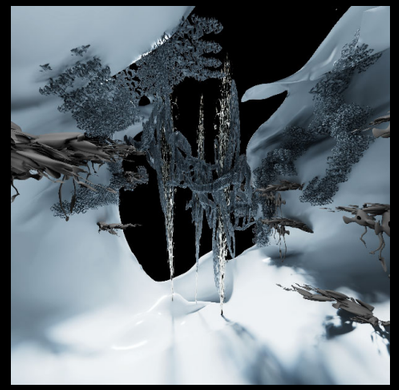


Modeled in Blender + Maya

ENVIRONMENT PROGRESS
Tower Iterations



Modeled in Maya + Blender



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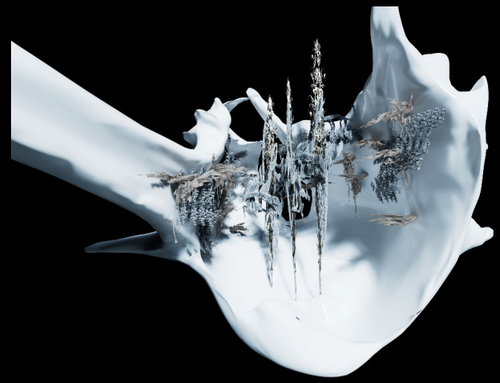
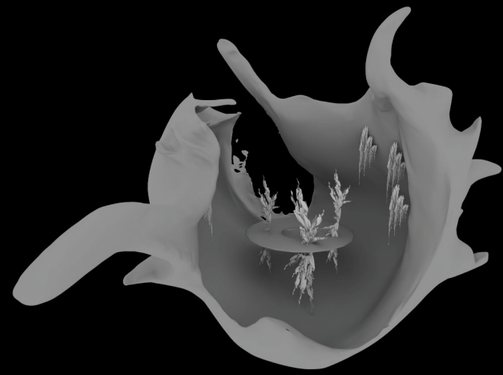
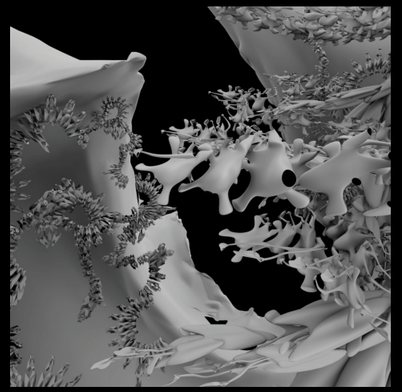


Modeled in Maya + Blender

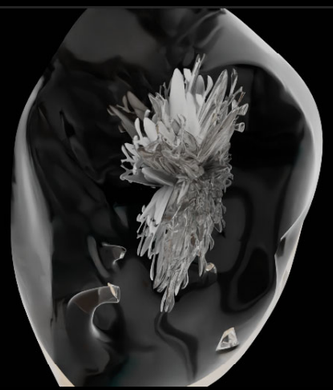


Modeled in Maya + Blender

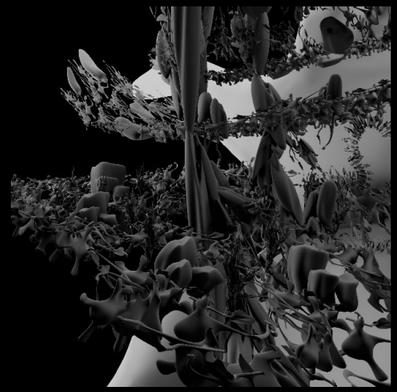
ENVIRONMENT PROGRESS
Public Space Iterations



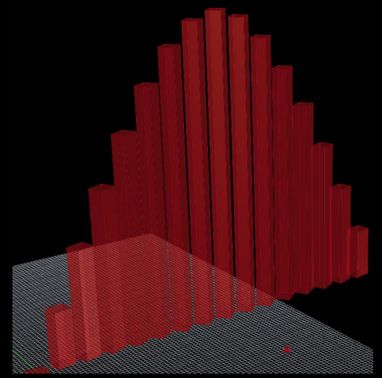
Modeled in Blender



Modeled in Maya + Blender



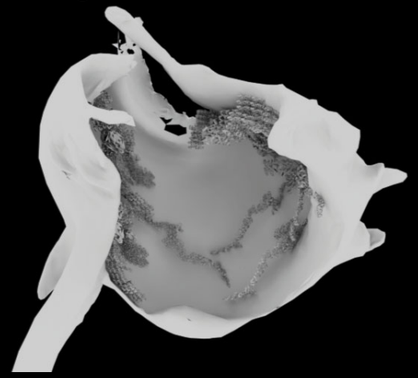
Modeled in Blender



Modeled in Grasshopper

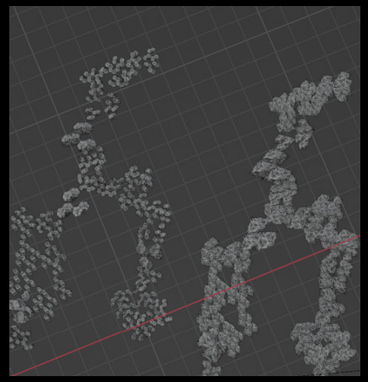
ENVIRONMENT PROGRESS
Residential Tessellation Experiments

Original Residential Model

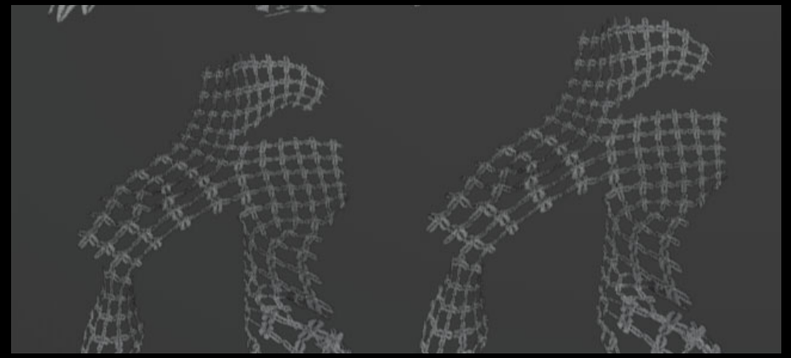


Modeled in Maya

Tessellation in Blender



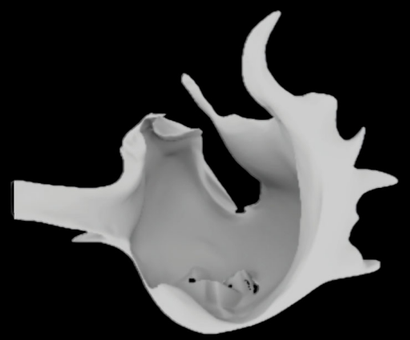
Tessellations in Blender



Tessellation in Blender

AMALGAMATION
Layered View

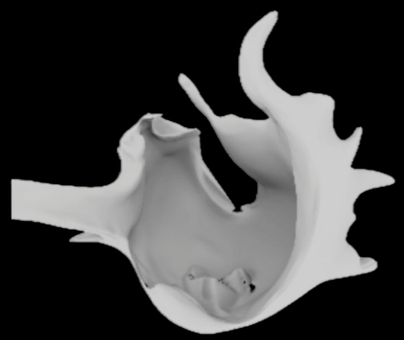
Level 1



Environment: Inner Shell

The canyon formation within the Great Tree's branches contains a smooth inner shell

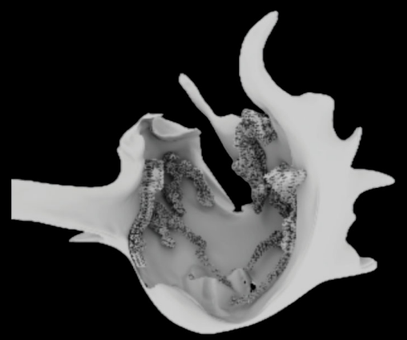
Level 2



Environment: Outer Shell

A 3D "bark" texture extrapolated from the Corpusle applied about the exterior of the canyon using normal maps in Arnold

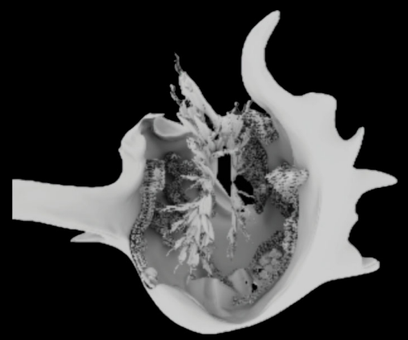
Level 3



Residential

Modeled in Maya and reproduced computationally in Grasshopper, the conglomerates units line the interior shell in four connecting *h* formations

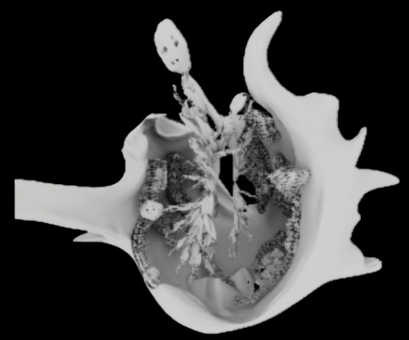
Level 4



Towers

Modeled in Blender, units extrapolated from the Corpuscle rotate and multiply into mirroring *L* formations. Three resulting free standing conglomerates centralize the urban landscape.

Level 5



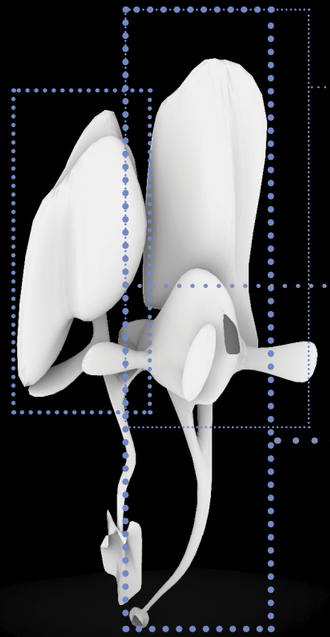
Public Spaces

Modeled in mainly in Maya and with some Grasshopper assemblage, three public spaces sit upon the edge of the towers in glass bubbles containing a gold structure.

CATALOG OF PARTS

The parts used to build the city of Luminalis derived from disassembled from the Corpuscle. The dismantled components were further developed by means of manipulating and contorting, including methods such as multiplying, scaling, and mirroring. These base units later conjoined to build large scale models that served to form the city metropolis and residential architecture.

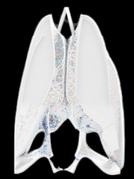
Units shown in the diagram to the right include those from the catalog that were implemented into the building of the city.



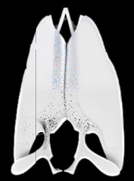
Base Residential Unit

Main Residential Shape

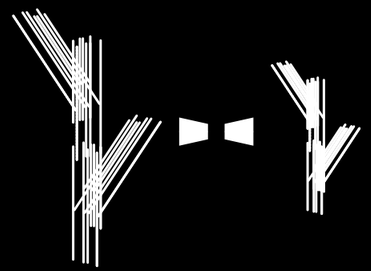
Base Public Space Unit



Base Urban Tower Unit

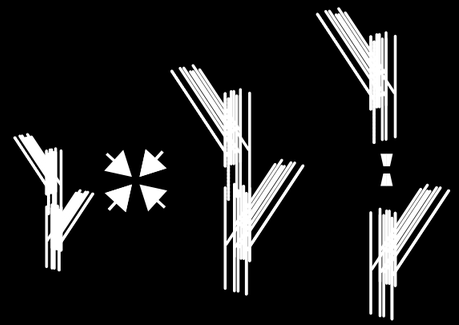


Level 5



Final units are flipped horizontally.

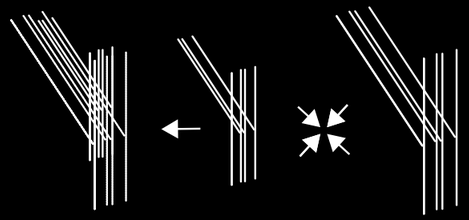
Level 4



The final grouping flips both horizontally and vertically before conjoining together from top to base and is then duplicated into units scaled down.

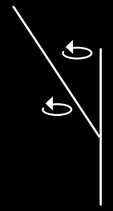
CATALOG OF PARTS
Urban Towers Logic

Level 3



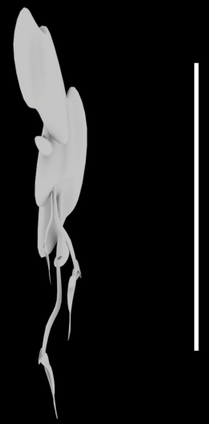
Multiple units conjoin in the L formation. One set is duplicated and scaled before conforming to the original grouping.

Level 2



Unit doubled, rotated 22.5 degrees forming an *L* configuration

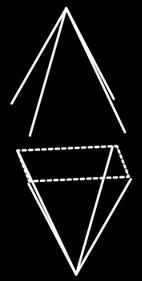
Level 1



Original Catalog of Parts unit extracted from the Corpuscle

CATALOG OF PARTS
Residential Units Logic

Level 4
Nested Unit



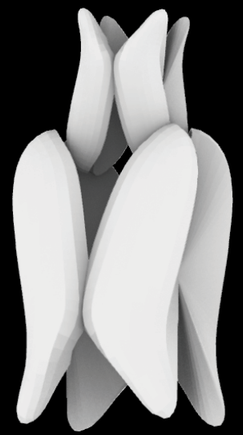
The nested structures that disperse around the main residential units conjoin in two tetrahedron formations flipped and conjoined along the base of each tetrahedron.

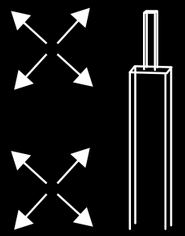
Level 4
Main Residential unit

The main residential building blocks consisted of four conjoined groupings of units rotated to meet at a 22.5 degree angle. The rotated units are then flipped along the base, forming a flat configuration.

CATALOG OF PARTS
Residential Units Logic

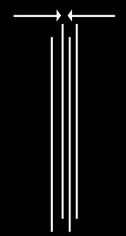
Level 3





Conjoined units duplicate. One set of duplicated units scale to a quarter of their size. The smaller grouping flips, the top unit conjoining with the bottom.

Level 2



Four units conjoin.

Level 1

Original Catalog of Parts unit

Towers

In the city center erected a triad of towers proudly reaching their gold fingertips beyond the mouth of the canyon to accept their suns' warmth. The low gravity of Luminalis allowed the towers' tall, slender bodies to hover above the ground unrooted. By rotating, clustering, and mirroring the components, the units branched to form the structures.

Created in Blender, corpuscle pieces assembled into an *L*-shape formation. Materials and normal maps extrapolated in Substance Painter provided white and gold materials.

Residential

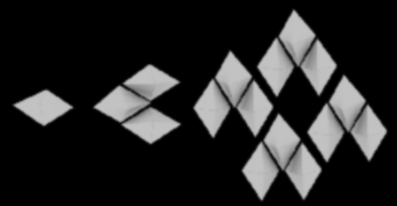
Layers of residential units laced the sidewalls of the canyon with thick wasp-like units, suspended from sneak attacks. Their homes built inside of thick nests sided with canopied terraces and pointed edges as forewarning to their opponents.

Inspired by the excerpt from the classic military treatise handbook, *The Art of War*, “Do not encamp in low-lying ground. Do not linger in dangerously isolated positions,” the residential units line along the canyon walls.

Created originally in Maya using *h*-shaped formations, the geometry was reproduced in Maya, Rhino and Grasshopper.

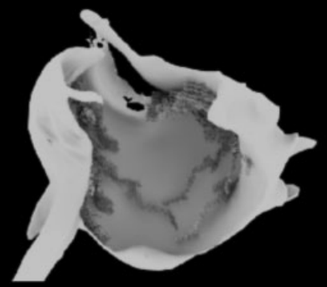
RESIDENTIAL CONSTRUCTION
Process: Steps 1 to 3

1
Basic Logic



2
h Configuration

3
Manual
Configuration



Residential Process Steps 1 to 3

The concept of the residential structures of the environment reflect the storyline detailing the transition of the Verde characters from their Utopian existence to their war-like culture. In their idealic paradigm, the ancestors species resided above ground, under the canopy of the Great Tree's boughs, vulnerable to the elements and to others. As their focus shifts to power and their culture bent on militia, the Verde burrow into the tree's undergrounds, hidden and protected by architecture resembling thick, wasp nest-like geometry.

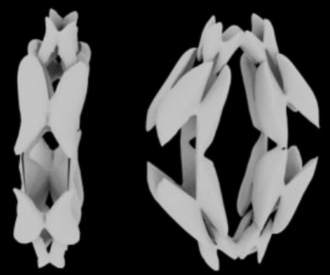
Implementing the geometry from the Catalog of Parts, residential units were constructed into four main interconnecting *h* configurations, lining the inner shell of the city environment. The initial construction outline was executed manually in Maya. Following a 3:4 rhythm theme, three base units from the catalog were combined into a base conglomerate followed by an additional grouping into a set of four. Same-scaled pieces of this final conglomerate connected, sprinkling enlarged conglomerates rancomly placed. To create depth, copies of these formations layered over the original units four layers thick.

RESIDENTIAL CONSTRUCTION
Process: Step 4

4
Reconfiguration Using Quad Draw

Quad Draw over
Original Geometry

Populate Configuration
with Parts from Catalog



Public Space Process Step 4

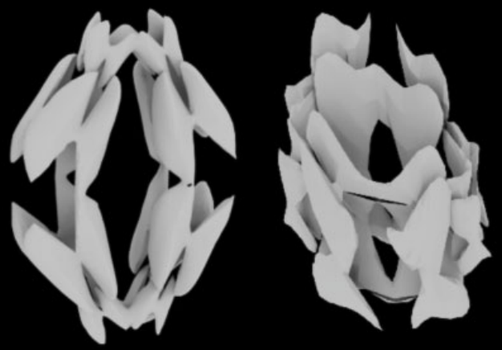
Due to the exorbitant file size yielded by the multiple layers of intricate patterns, the geometry prohibited the inclusion of additional geometry, which required a new method to recreate the formation. Tracing the original model with a quad draw method in Maya, the templated geometry exported into Rhino where new geometry from the Catalog of Parts was introduced. This new geometry not only served the purposes of creating more of the wasp nest-like aesthetic, but offered a lower polycount best suited for repeating patterns. Both units exported into Rhino for manipulation in Grasshopper.

RESIDENTIAL CONSTRUCTION
Process: Step 5

5
Units Conformed to Outline by Warping and Scaling in Grasshopper

Units Twist as Graduate in Scale

Individual Units



Residential Process Step 5

Once both units were introduced into Grasshopper, the implementation of Twisted Box Two SubDs and Graph Mapper features generated a warped array of units along the geometry of the quad-drawn template, twisting the units as they scaled in clean Bezier curves that lined the curvature of the round, irregular environment.

To further manipulate the geometry, randomly placed attractor points distributed about the framework of the quad drawn mesh, pulling the unit shapes into alternate directions. This method both allowed the opportunity to manipulate the geometry to either adhere to or project away from the lining of the environment, as well as it enabled aesthetic opportunities of interest.

RESIDENTIAL CONSTRUCTION
Process: Step 6

Full Model

Individual Segment

Residential Process Step 6

As a final measure, the geometry re-imported back into Maya where the individual parts were manually rotated and moved for aesthetic preference.

Public Spaces

Set inside of a transparent bubble, a technological marvel is born that can absorb the music notes of opponents. The bubbles float at the tips of the urban towers. About their periphery, the padding of soft fluttering from thousands of Verde wings fluttered around these spaces with maddening bellicose.

This design was attempted computationally in Grasshopper by arraying geometry along a curve before scaling and rotating the geometry by distance control points, the result proved less satisfying than the manually modeled geometry.

Created in Maya and Blender.

PUBLIC SPACE
Process: Steps 1 to 3

1

Middle C 4th Diapason (Diaposon 1):

Graduate Scale + Rotate Diapason

2

Graduate + Rotate Scales up and down Return to Middle C

3

Graduate Scale Up + Rotate Diapason 1

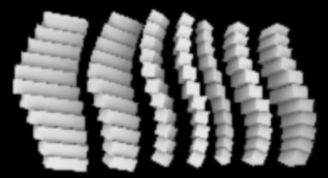
Public Space Process Steps 1 to 3

Modeled in Maya and Blender, the Public Space incorporated the process of rising and falling musical scales, recognizing each base unit as musical notes configured into diapason. The original units representing notes elongated into a slender formations of the original unit. Beginning in what would be commensurate to the classical diapason's Middle C, rows of units rotated incrementally while progressively scaling up and down the full six-count scale of diapason that returned to the original Middle C position at the end of each row.

PUBLIC SPACE
Process: Steps 4 to 6

4

Scale down + Rotate fourth diaposon to Diapason 7

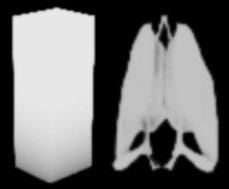


5

Base Structure

6

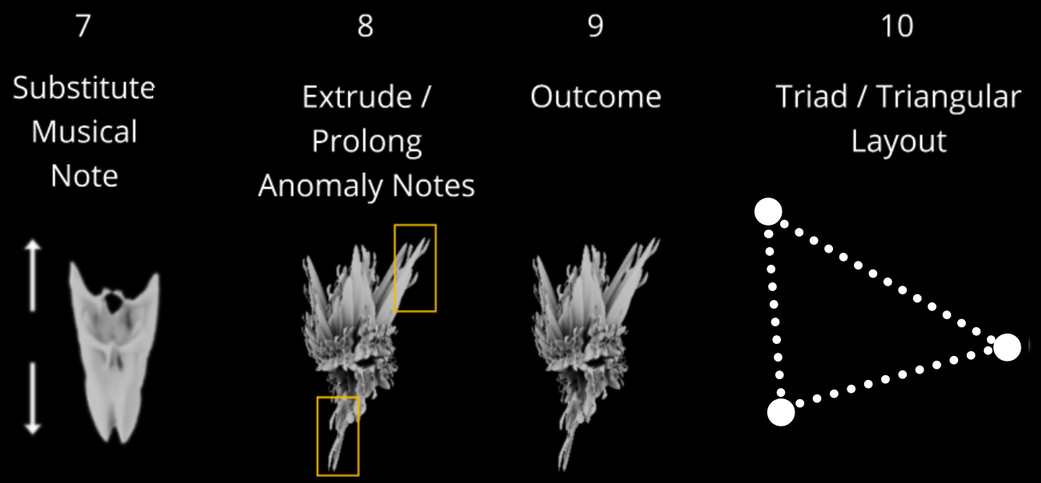
Substitute Musical Note



Public Space Process Steps 4 to 6

The scaling and rotation process was created in series of modifications where move, rotation, and scale transformations were applied. The remaining six rows were manually duplicated from the original row, scaled and repositioned. Catalog of Parts units replaced the simple unit.

PUBLIC SPACE
Process: Steps 7 to 10



Public Space Process Steps 7 to 10

The final geometry was manually manipulated by elongating units in random locations. The arrangement of the resulting units positioned within the public spaces using the concept of triads, represented by an isosceles triangle.

Chapter 04 | Kinesis

The Kinesis chapter incorporated detailed research on aesthetics and conceptual elements to cultivate the aesthetic of the transportation elements for the world of Luminalis. Such themes included musicality and combative bio-organic species, such as the Parasitic Protozoa, algal toxins, and mycelial combat. Other themes incorporated included the choice of Möbius strip geometry as its relationship to the study of Quantum Physics and its implementation in studying topology, quantum field theory, and condensed matter physics. Fed into Midjourney along with reference images from previous chapters and hand sketches provided the framework for our base models that would later be cultivated in or disassembled and reconstructed in Houdini.

Other aspects considered when designing these vehicles included aspects of functionality for the Quantascape and the activities of the characters. Such competencies including protective detailing to guard against surprise attacks and other defensive measures; and enabling pastime activities such as fishing for musical notes. Both vehicles required both terrestrial and aviation abilities. Both vehicles utilized Houdini in different capacities to model and Arnold to render.

MIDJOURNEY
Concept

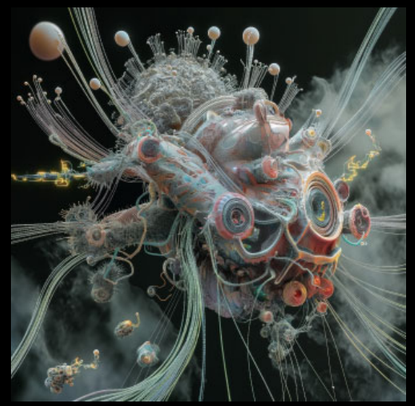
Midjourney Explorations

Midjourney played a paramount role in this chapter to define abstract concepts, such as war, music, and quantum physics. Using visual representation of bioorganic geometry and marrying these images to the aesthetics of previous chapters greatly aided in maintaining consistency with the bioorganic geometry of previous chapters. Research aimed at targeting key combative bio-organic species. Species implemented in Midjourney prompts included algal toxins and mycelial combat. Particular emphasis in visual research included the combative parasite, Parasitic Protozoa, for its similar geometric form to the Corpuscle.

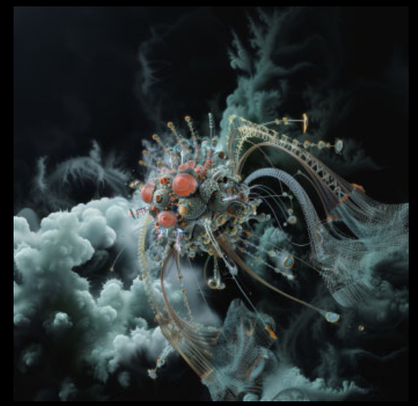
Other themes incorporated into Midjourney prompts included implementing Möbius strip geometry for its relationship to the study of Quantum Physics. In the field of Quantum Mechanics and Quantum Computing, physicists implement the Möbius strips to study topology for purposes such as designing quantum circuits, learning new states of matter, and understanding quantum phase transitions. Incorporating the Möbius strip subtly honored the geometry prevalent in quantum studies without introducing overly representational elements tied to Earthly reality. Furthermore, when curved into multiple loops, the Möbius strip subtly evokes musical representations with its arabesque shapes similar to that of musical symbols, such as the G Clef.

Tying these themes into themes into visual representations from previous chapters produced a cohesive framework for our base models that would later be cultivated or disassembled and reconstructed in Houdini.

MIDJOURNEY
Vehicles



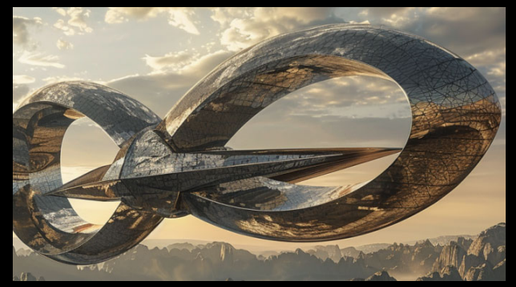
130



131

MIDJOURNEY
Vehicles

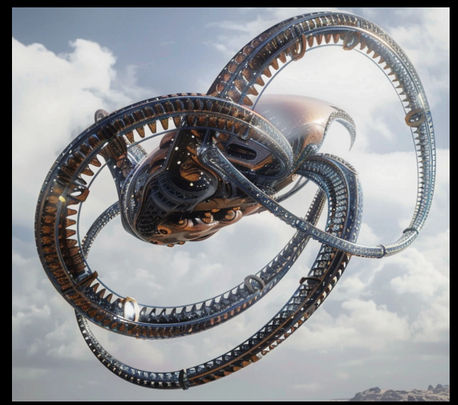
132



133

MIDJOURNEY
Vehicles

134



135

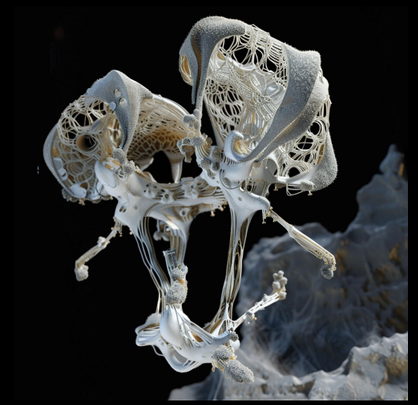
MIDJOURNEY
Vehicles

136

137

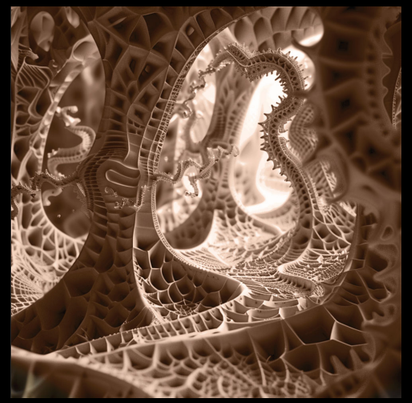
MIDJOURNEY
Vehicles

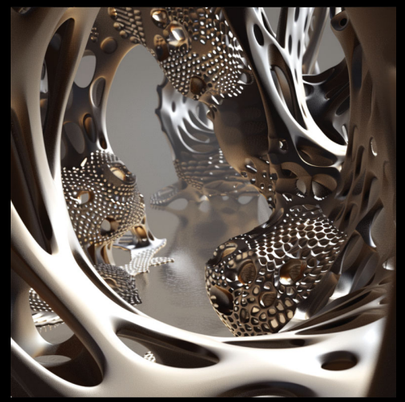
138



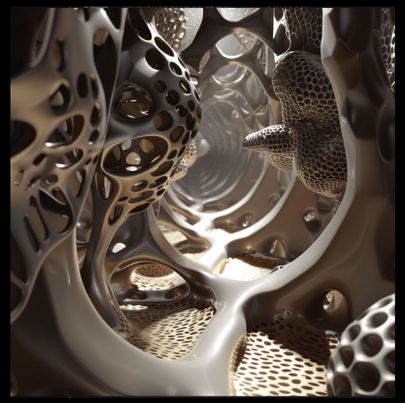
139

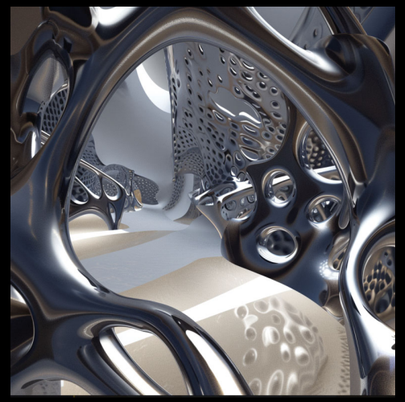
MIDJOURNEY
Private Docking Environment





140





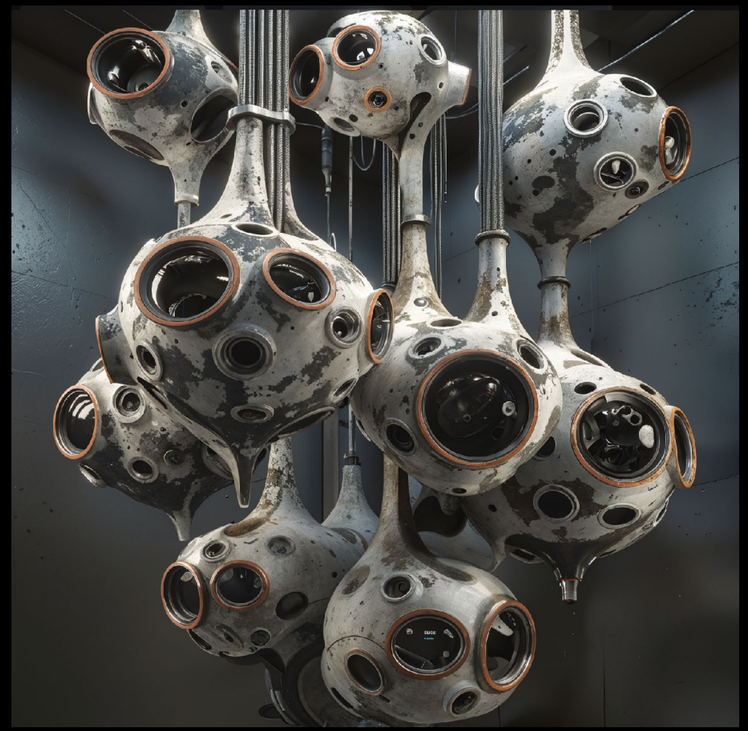
141

MIDJOURNEY
Private Docking Suspended Pods

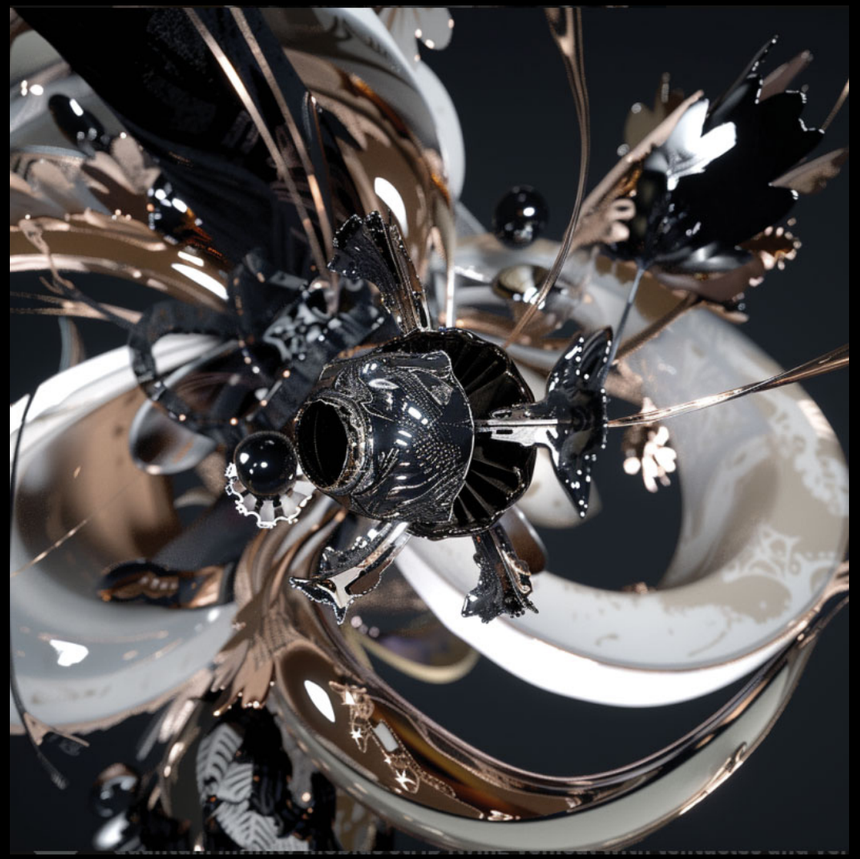
142

143

MIDJOURNEY
Private Docking Suspended Pods



MIDJOURNEY
Public Metropolitan Docking Pods



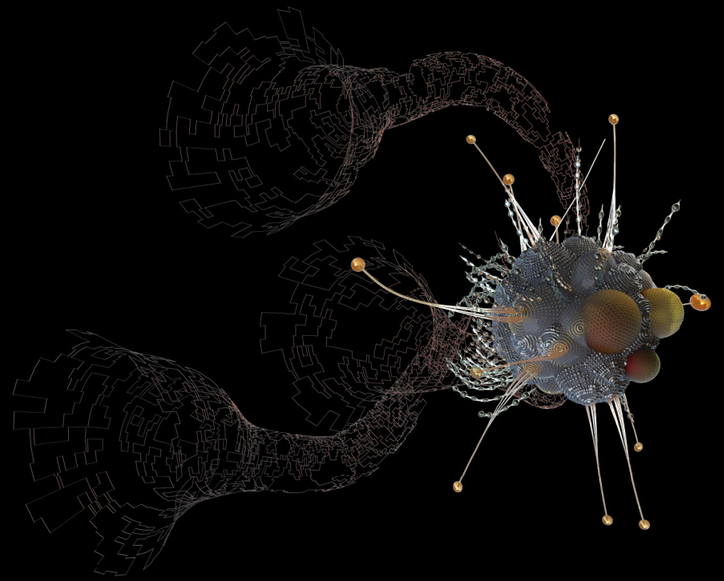
MIDJOURNEY

Private Vehicle: MJ to V1 to Final

Feeds or prompts describing from MJ images of previous chapters and toxic algae

V1
Modeled in Houdini

Final Model

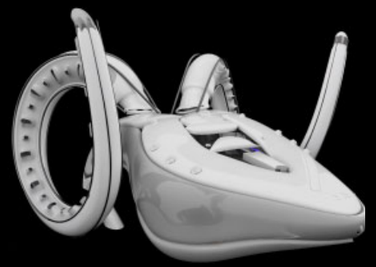


MIDJOURNEY
Public Vehicle

Midjourney image prompted with details of previous chapters, Möbius strips, and Parasitic Protozoa, a combative microorganism

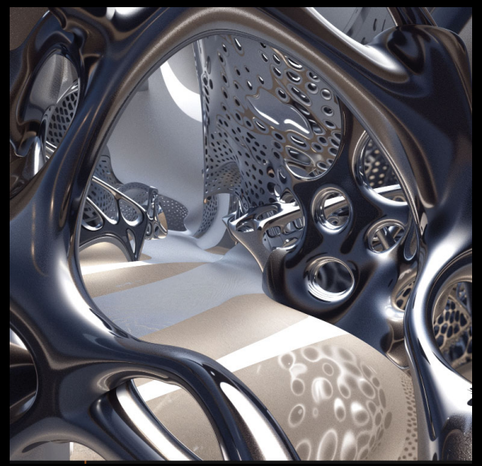
Midjourney image prompted with details of previous chapters, Möbius strips, and Parasitic Protozoa, a combative microorganism

V1
Modeled in Rhino, Houdini + Maya

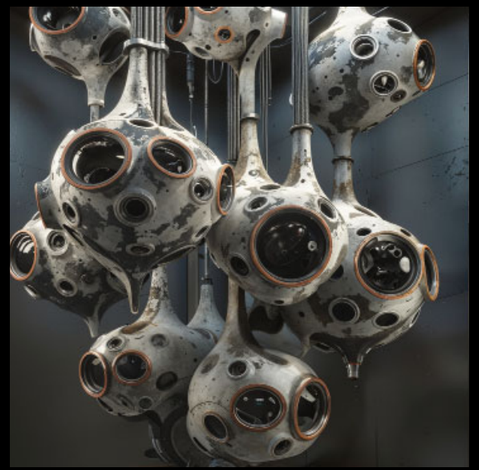


Final Model

MIDJOURNEY
Private Dock: MJ to V1 to Final

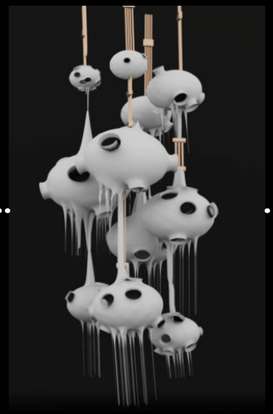


Source references from residential geometry and prompts for an underground tunnel system



Hand sketches, prompts such as trombone and pods, and reference generated the envisioned underground parking pod structure

V1
Modeled in
Houdini + Maya



Final Model

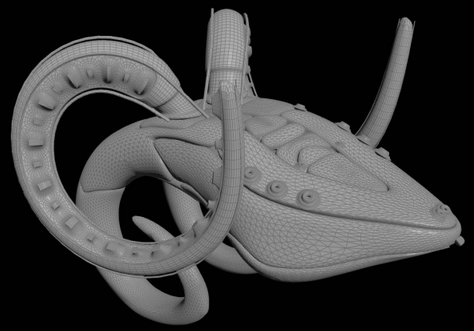
MIDJOURNEY
Public Dock: MJ to V1 to Final

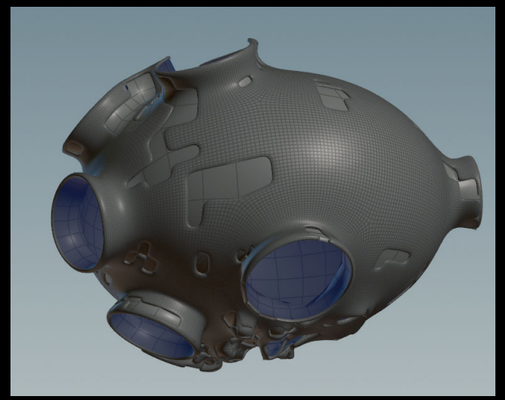
Geometry including Möbius strips combined with reference images from the Prosthesis

V1
Modeled in Maya

V1
Modeled in Maya

PROGRESS

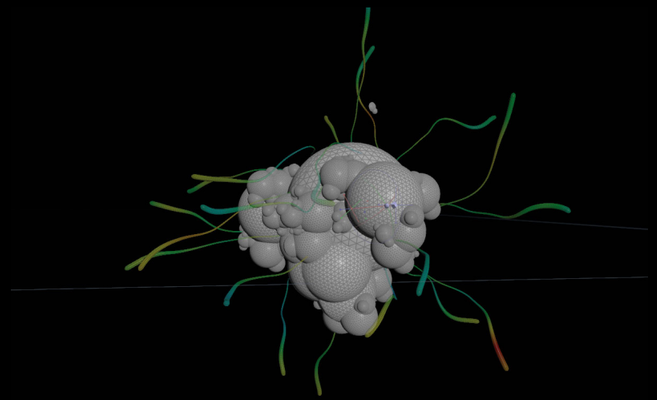




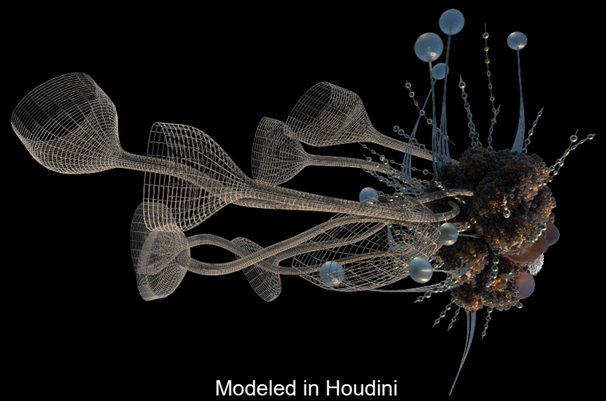
Work in Progress

Progress with the construction of the vehicles included explorations in Houdini through cultivating new geometry modeled after base forms, generating graduating geometry, weight painting, sphere on sphere scattering, and paneling. Interiors also transitioned in their designs when the purposes of each vehicle transposed from public to private and vise versa. New purposes necessitated a new design to new interiors to meet the need of the vehicle specification and overall shape.

PROGRESS
Private Vehicle

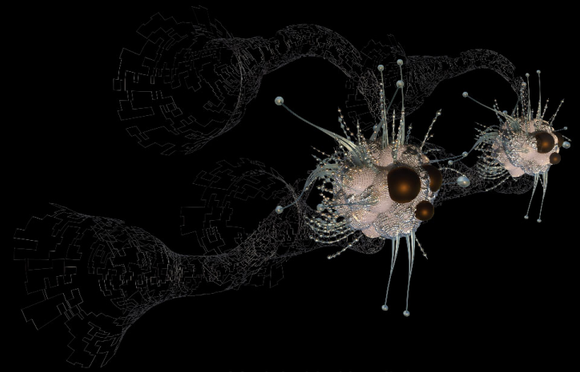


Modeled in Houdini



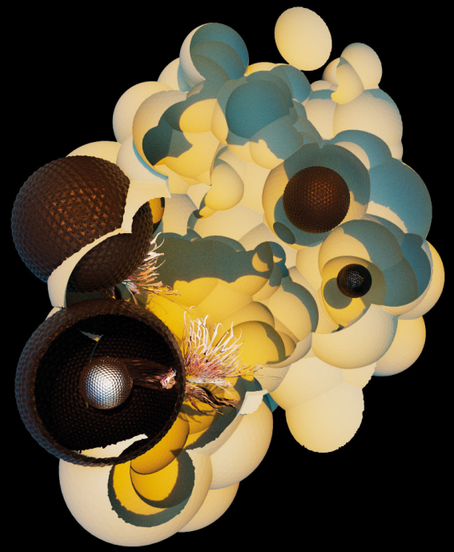
Modeled in Houdini

Modeled in Houdini

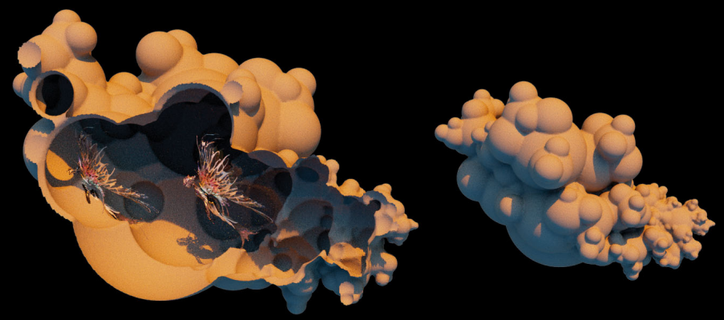


Modeled in Houdini

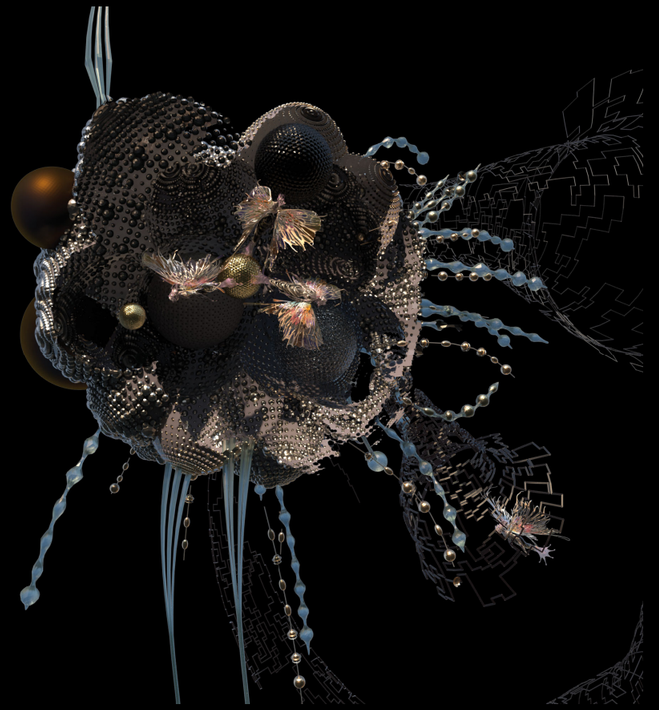
PROGRESS
Private Vehicle Interior



Modeled in Houdini



Modeled in Houdini

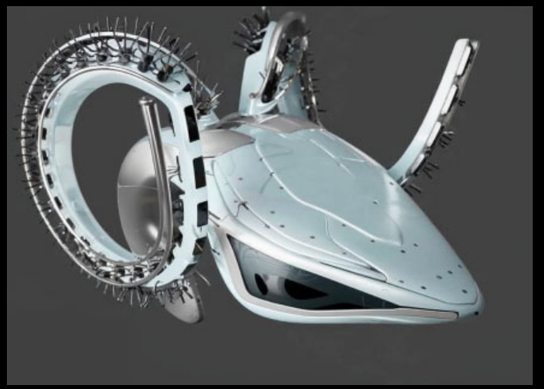


Modeled in Houdini

Modeled in Maya

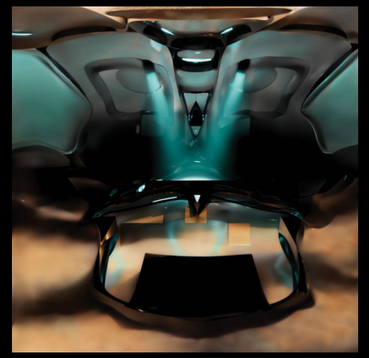
Modeled in Rhino, Houdini + Maya

Modeled in Rhino + Houdini

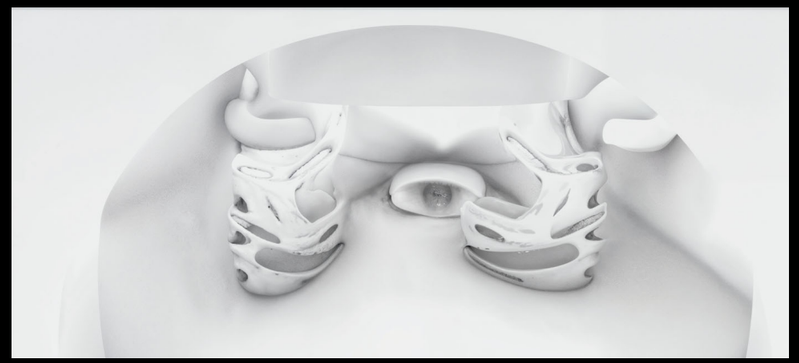


Modeled in Rhino, Houdini + Maya

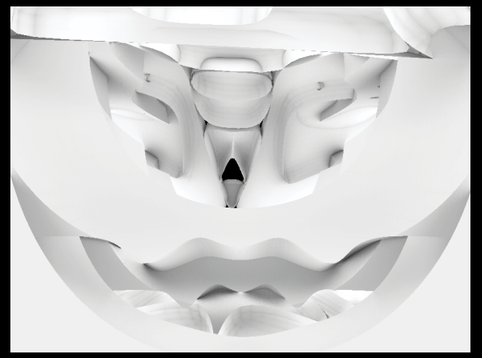
PROGRESS
Public Vehicle Interior



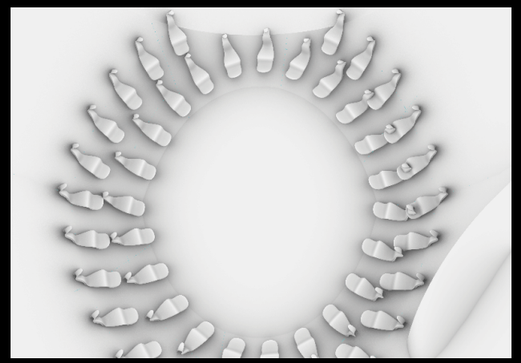
Modeled in Rhino + Maya



Modeled in Rhino + Maya



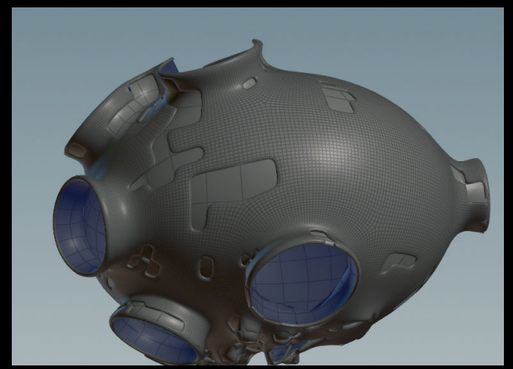
Modeled in Rhino



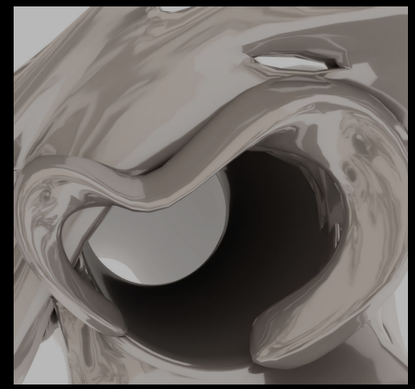
Modeled in Rhino

PROGRESS
Private Dock

Modeled in Maya



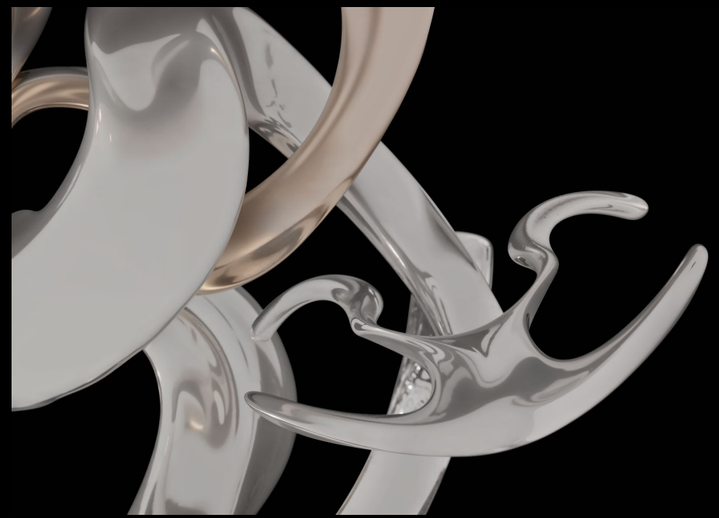
Modeled in Houdini



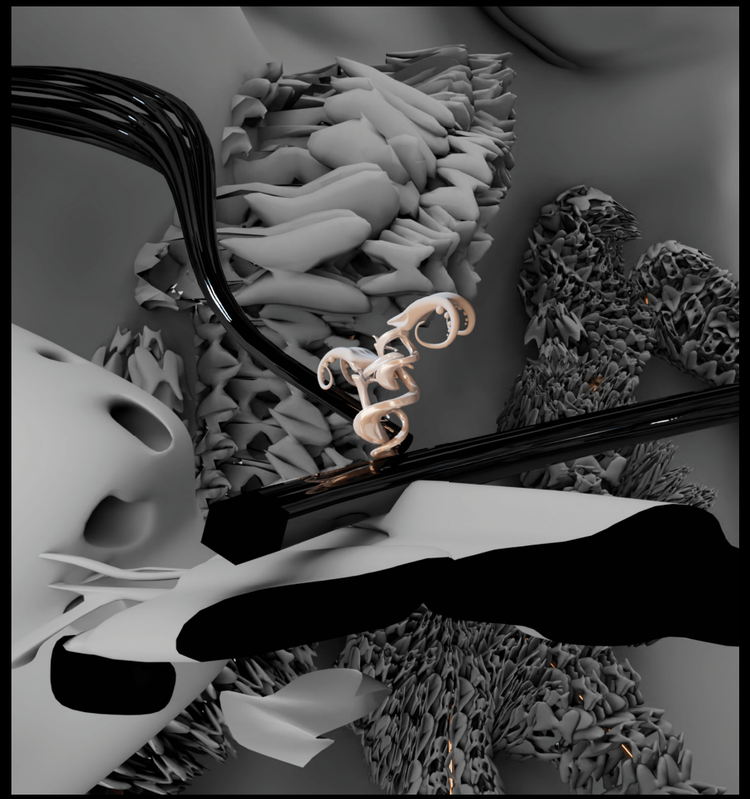
Modeled in Maya

Modeled in Houdini

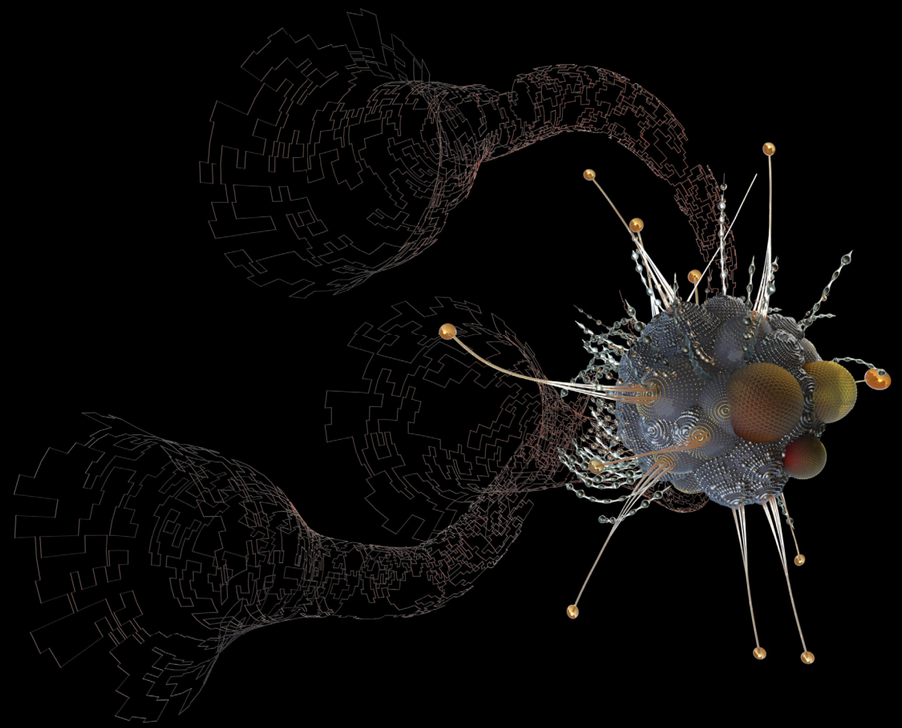
Modeled in Maya



Modeled in Maya



Modeled in Maya

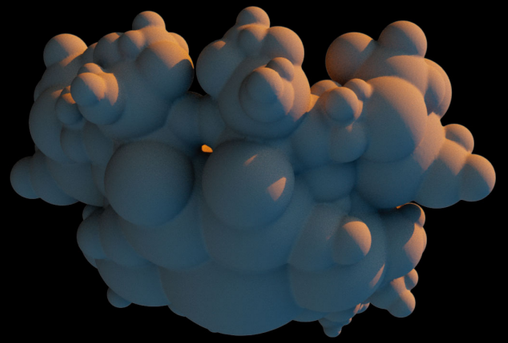


Private Vehicle

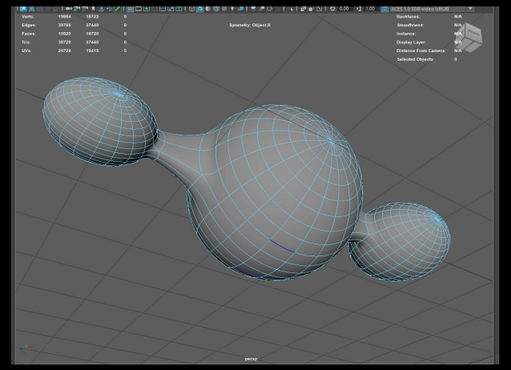
The private vehicle serves for local travel in and outside of the tree. Constructed by procedural scattering of spheres on spheres with a final boolean difference to create a unified surface, the vehicle carries a dynamism in the many possible variations contained within the meta-form. Quantum antenna project from the sides of the vehicle, helping with communications and detections. They can be controlled from the inside to help probe the environment. Cymatic nets are used to protect passengers as they enter and exit the vehicle. The nets generated by closest path algorithms boast efficient and effective material use that can be modified as desired. Three pilots can all mind meld with the machine and control different aspects of the extendable contraptions. Together this is how a trio of Verde can venture deep into the ancestor tree.

PRIVATE VEHICLE
Views

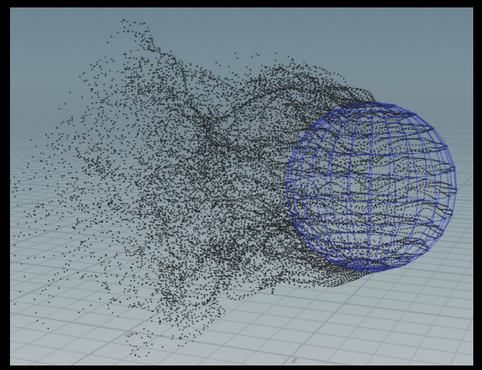
Scattering Spheres on Spheres



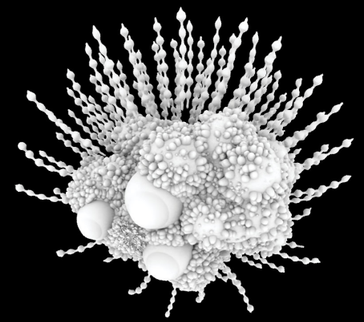
Exploring Different Base Forms



Collecting Particle Trails
Flowing from Surface

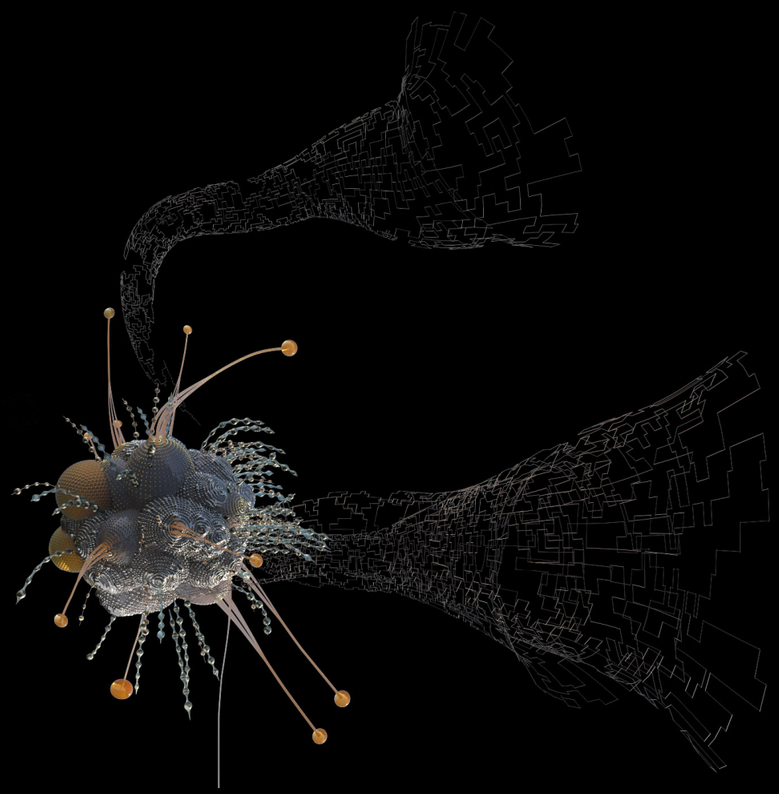


Copying a List of Items
onto a Line

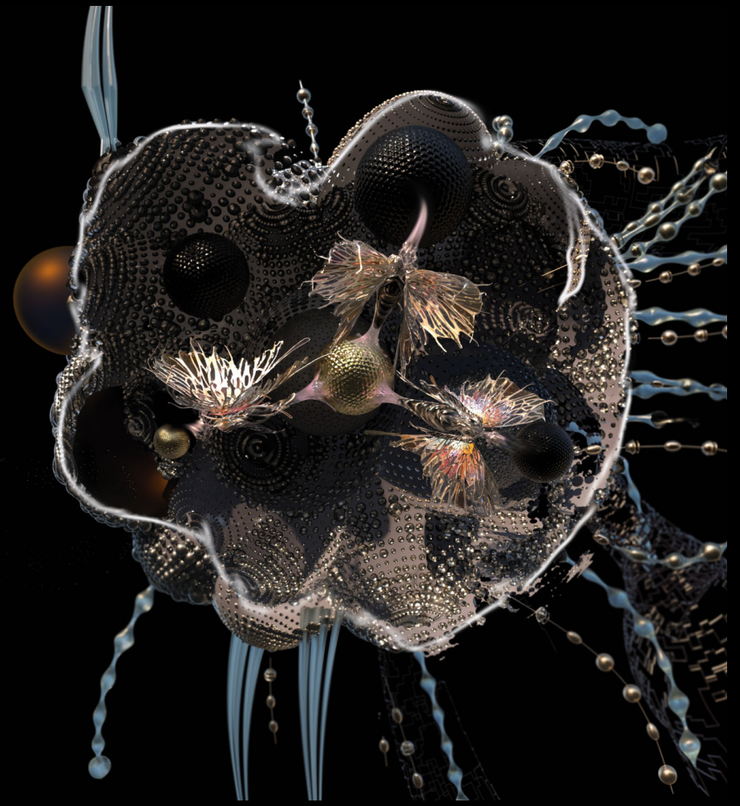


PRIVATE VEHICLE
Views

Side View

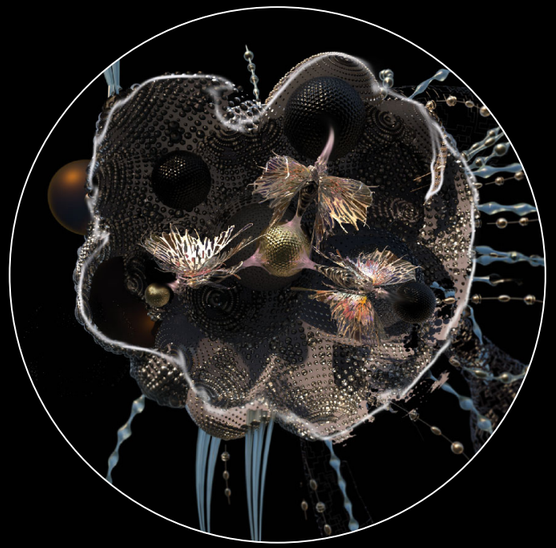


Inside View



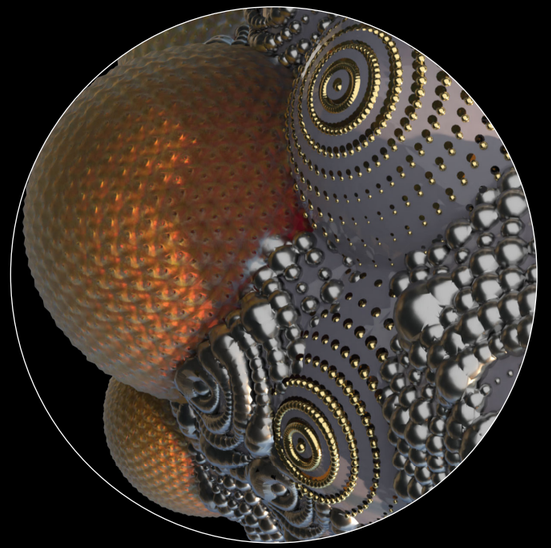
PRIVATE VEHICLE
Parts

Energy Panels



Mind melding quantum energy source to channel frequencies for travel and steering

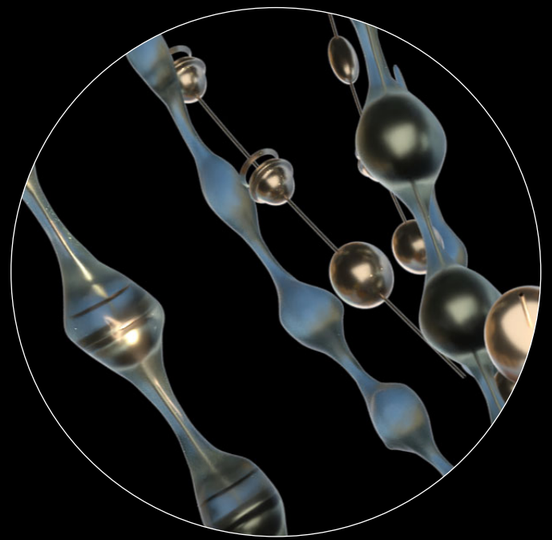
Air + Sound Protective Windows



Shields windows from quantum frequency attack and underground terrestrial debris and insects

PRIVATE VEHICLE
Parts

Air + Sound Quantum Antennae

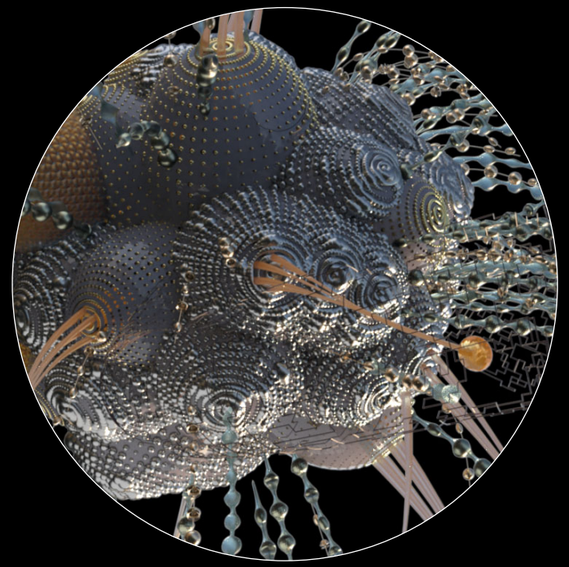


Connect to external quantum frequencies

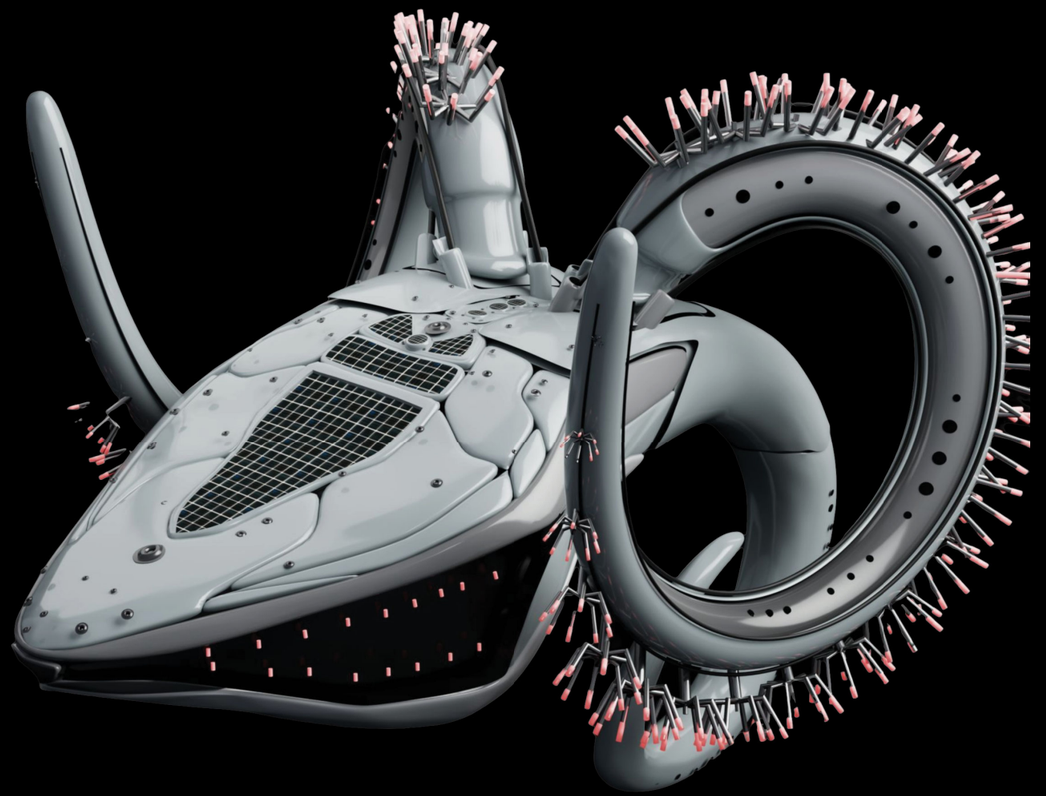
Cymatic Netting

Cymatic Netting

Energy Armour



Silver metal exterior provides protection to vehicle exterior

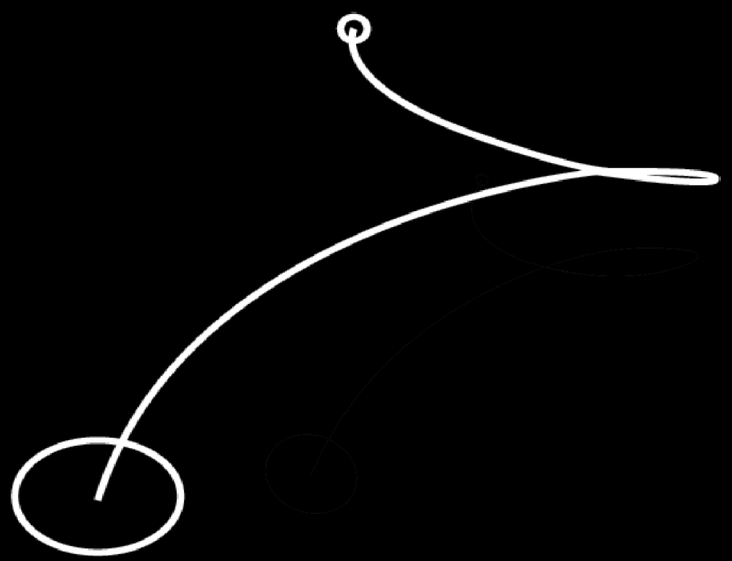


Public Vehicle

Built to foray deep into the asteroid belt and space as well as to traverse the terrestrial grounds, the public vehicle was constructed mainly in Houdini, using a procedural series of rotations and movement and scaling from a blasted and fused base model. The public vehicle can hold up to 30 individuals and is built to withstand quantum attacks. This vehicle was modeled using Rhino, Houdini, and Maya. After constructing the initial base model in Rhino, the structure was deconstructed to recreate the original legs and to design a new, secondary set. This new set featured virus-shaped spikes, which increased in size corresponding to the arm's circumference as it tapered. Houdini enabled further detailing, such as carving concave curvatures into the vehicle's internal arms and creating paneling through a series of nodes involving blasting, subdivision, and fusing techniques. Final touches to the geometry to fix minor imperfections and rendering were performed in Maya. Rendering materials and details mimicked imagery from Midjourney inspirations.

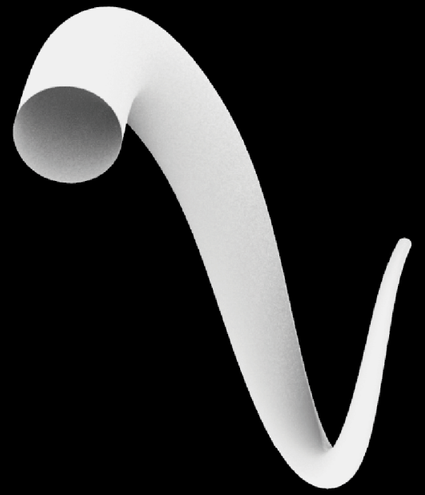
PUBLIC VEHICLE
Base Model: Steps 1 & 2

1



Simple curve created in Rhino

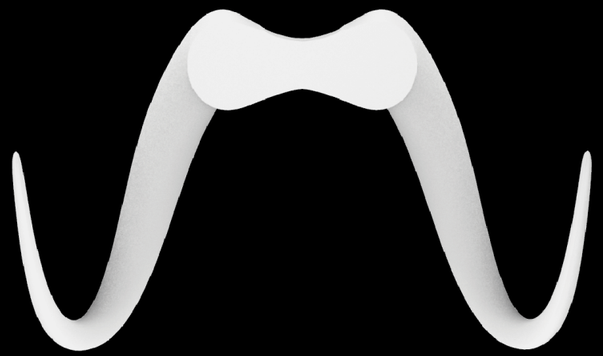
2



Piping applied to curve

PUBLIC VEHICLE EVOLUTION
Base Model: Steps 3 to 5

3



Piping transform to SubD, duplicated and bridged

4

Connected units + extruded

5

Reshaped to resemble parasite and general themes captured from MJ searches

PUBLIC VEHICLE
Reconstruction in Houdini

1

Base model legs removed to recreate in Houdini

2

Small legs recreated from curve carved from original legs

3

New small legs attached to base model head

PUBLIC VEHICLE
Reconstruction in Houdini

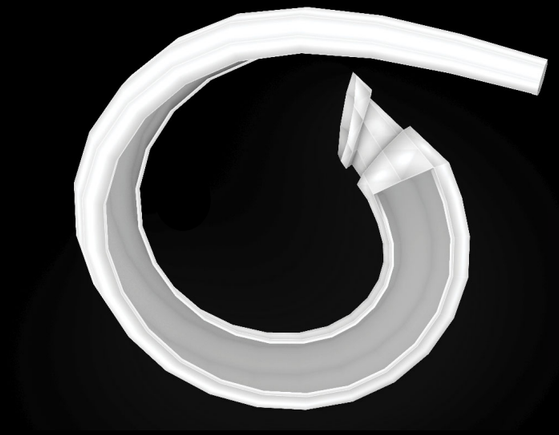
4

Paint weights on base model detailed location from where arms would sprout

5

Carved section of arms to place spikes

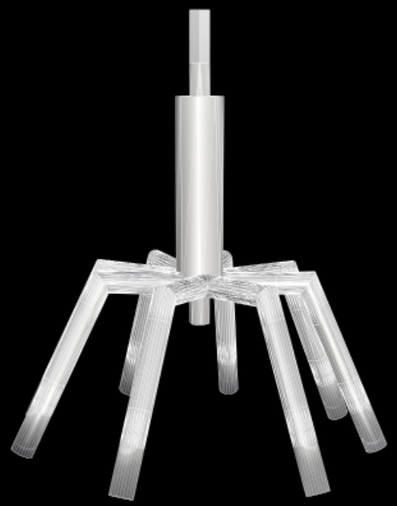
6



Connecting nozzle shaped at the end of the arm

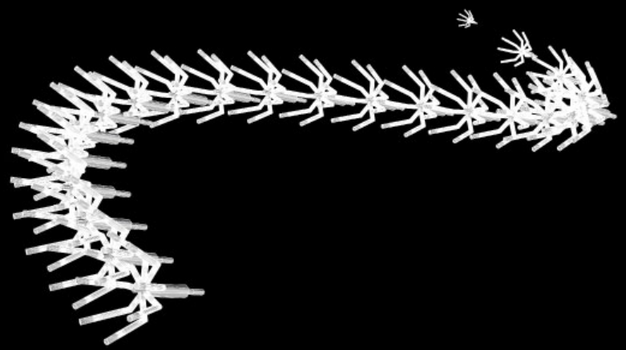
PUBLIC VEHICLE
Reconstruction in Houdini

7



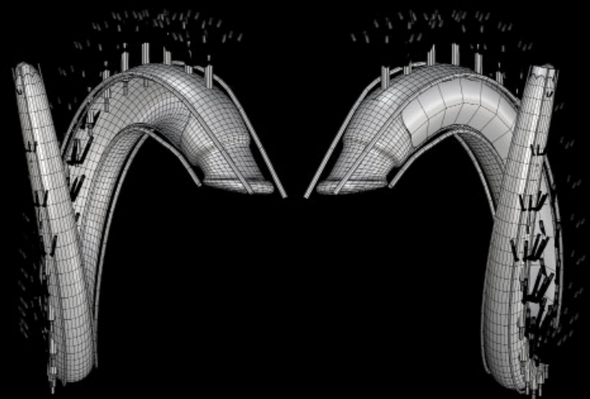
"Virus" spikes modeled in Rhino imported into Houdini

8



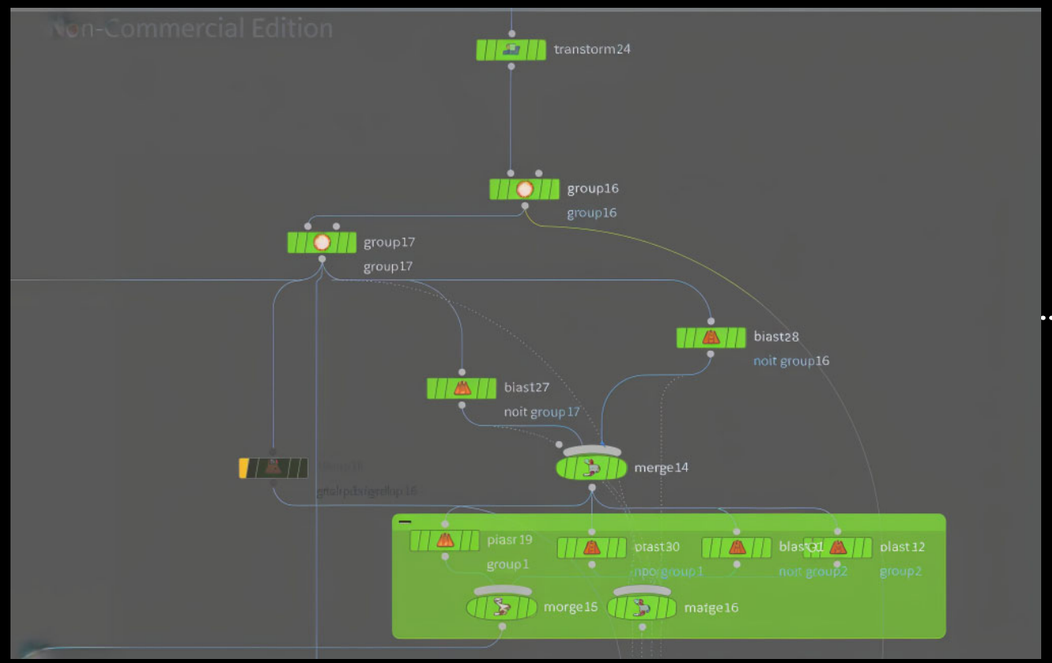
Spikes graduated along the carved open space of the vehicle arms

9



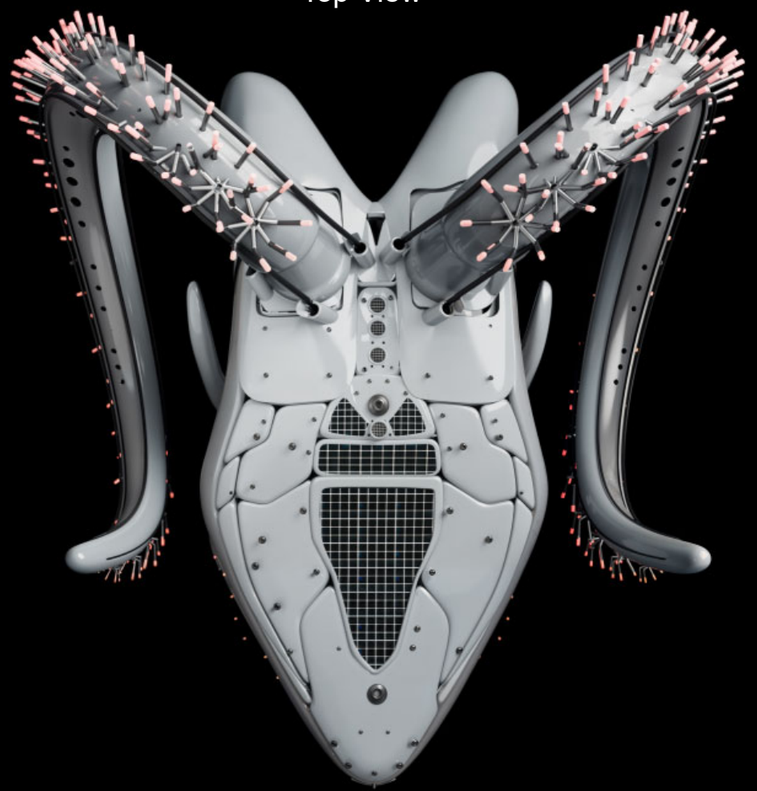
Connecting nozzle shaped at the end of the arm

PUBLIC VEHICLE
Houdini Leg Construction

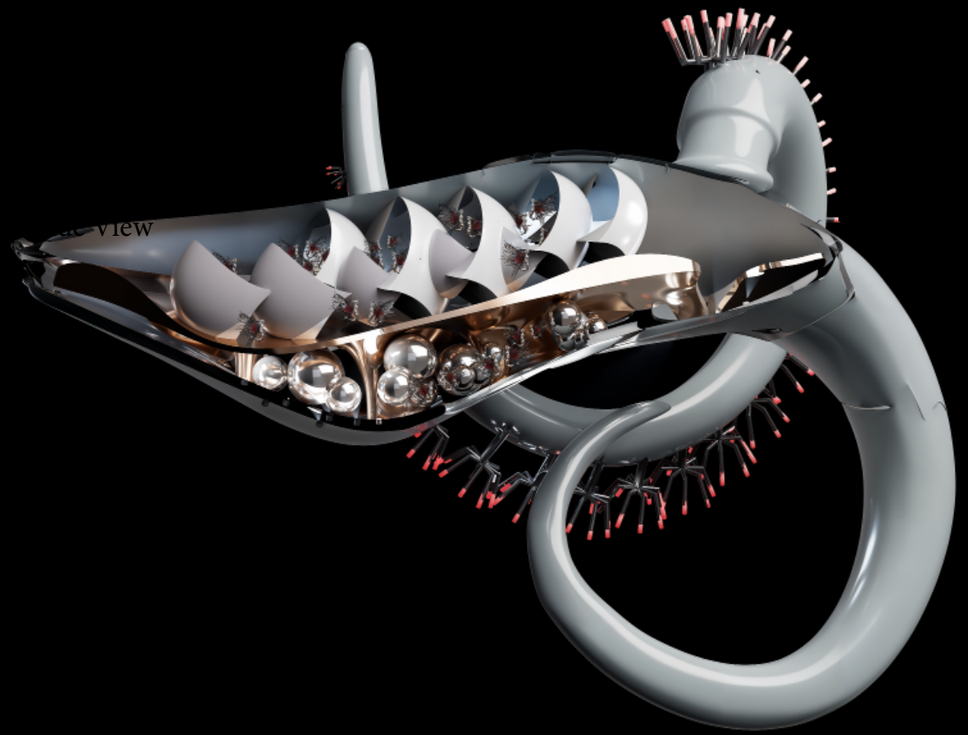


PUBLIC VEHICLE
Parts

Top View



Inside View

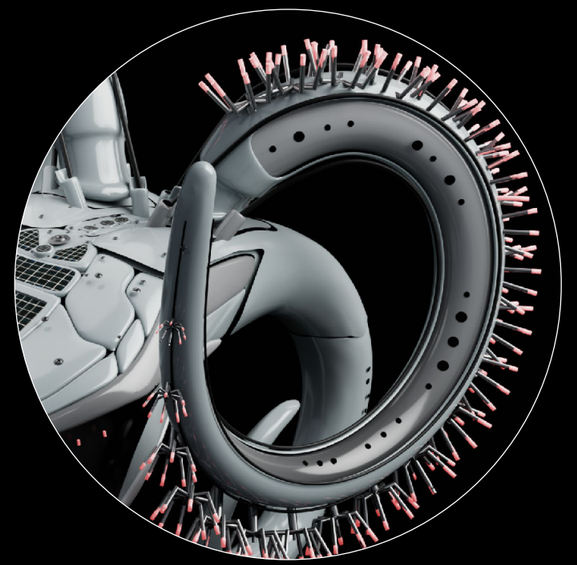


PUBLIC VEHICLE
Parts

Spiked Arms

Essential for gripping terrain and implemented to attach public vehicles during space travel while priding additional infrared lighting

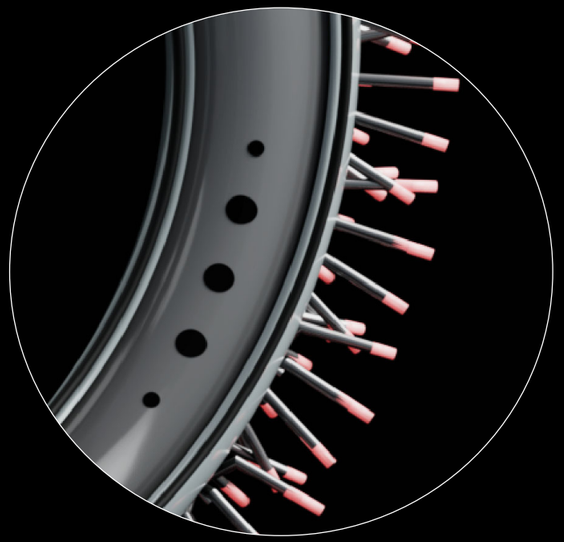
Air + Sound Circulation



Essential for terrestrial climbing and for aviation

PUBLIC VEHICLE
Evolution

Air + Sound Circulation



Essential for voyages into the asteroid belt and to travel in stealth to avoid enemy attacks

Energy Panels

Extracts quantum energy to power vehicle

Infrared Lighting

Essential for voyages into the asteroid belt and to travel in stealth to avoid enemy attacks

Public Underground Parking

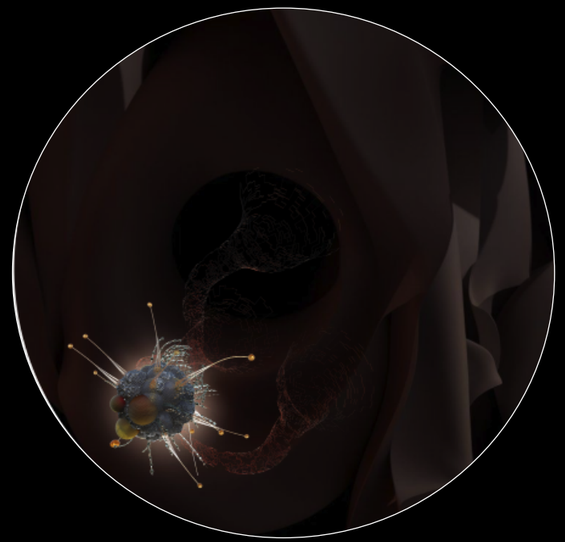
Inspired by the concept of dripping tree sap forming rotund pods fit to house the private vehicle underground, the public parking hangs from the ceiling of underground cave-like pockets inside the residential units. The units suspend from copper pipes inspired by brass instruments. At certain angles, the pipes round like the shape of a trombone.

Designating the private vehicle's mode of transportation as aerial and acknowledging the character's lack of terrestrial mobility necessitated the implementation of a suspended docking station. Additionally, the dripping pod formation united the concept of the Corpuscle's formation as a suspended unit derived from gold and solidified tree sap. Prompts into Midjourney packed all of the pillar concepts constructing this project, marrying martial and musical motifs to bio-organic inspired geometry, as well as geometry tied to themes of quantum physics and quantum mechanics. These themes materialized into imagery of rounded parking spaces married with combative bio-organic species and musical instruments.

The pods were created in Houdini by distorting and subdividing a sphere. After blasting select subdivisions for openings, grouped subdivision normals were extruded to create the dripping effects and paneling was applied to each pod. The copper pipes and grime texture were modeled in Maya.

PRIVATE UNDERGROUND DOCK
Parts 1+2

Tunnel Cave Entrance



Vehicles travel through underground residential networks through leading to cavern spaces for parking

Parking Pods

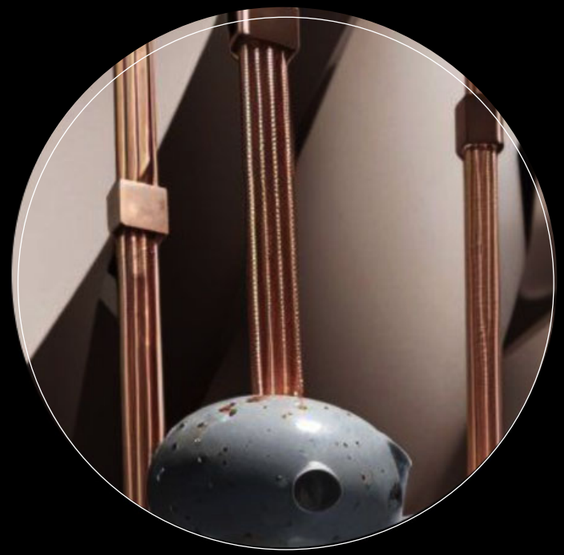
Formed from the dripping sap of the Great Tree, each pod serves as a section to multiple vehicles. Multiple pods drip from the cavern ceiling, conjoining into one multi-pod unit.

PRIVATE UNDERGROUND DOCK
Parts 1+2

Pod Entrances

Each of the individual pod openings serve as entrances + exits to parking spaces within.

Copper Connectors



Derived from copper instruments mined from the nearby asteroid belt, copper pipes help to suspend the pods from the cavern ceiling

Public Docking

Modeled in Maya using non deform bend and twist tools. Renders utilized the same materials of the public vehicle for consistency.

A challenge to each chapter included introducing abstract and complex themes into scenes into what would be represented as 2D imagery. Representing the quantum world without losing the representational characteristics that detailed the geometry we created proved to be especially challenging. In order to implement suggestive properties of a quantum world, this chapter introduced the implementation of the Möbius strip. In the fields of Quantum Mechanics and Quantum Computing, physicists implement the Möbius strip to study topology for purposes such as designing quantum circuits, learning new states of matter, and understanding quantum phase transitions. Implementing a quadrupled Möbius strip served the dual purpose of also permitting subtle representation of musical characters, namely such as geometry similar to the arabesque shapes of the G Clef.

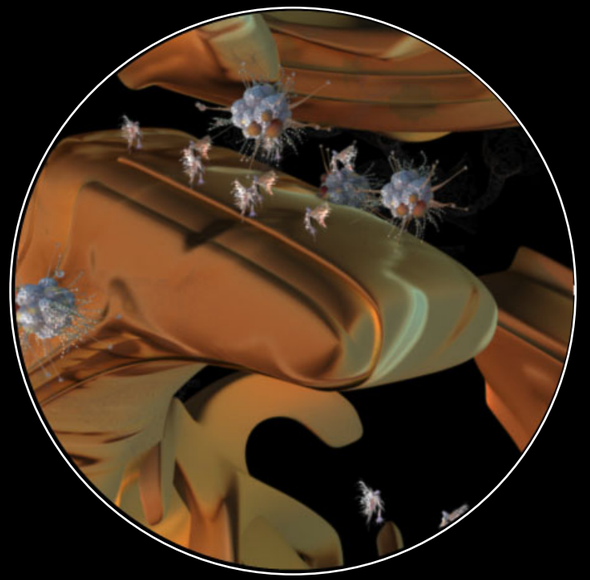
Other inspiration for this geometry included the ribbon-like tentacle features of the Prosthesis.

PUBLIC DOCKING
Diagram: Parts 1+2

Public + Private Landing

Provides additional gripping power for the public vehicle spikes to cling. Large public vehicles adhere to the dock at the nose of the ship.

Pedestrian Docking



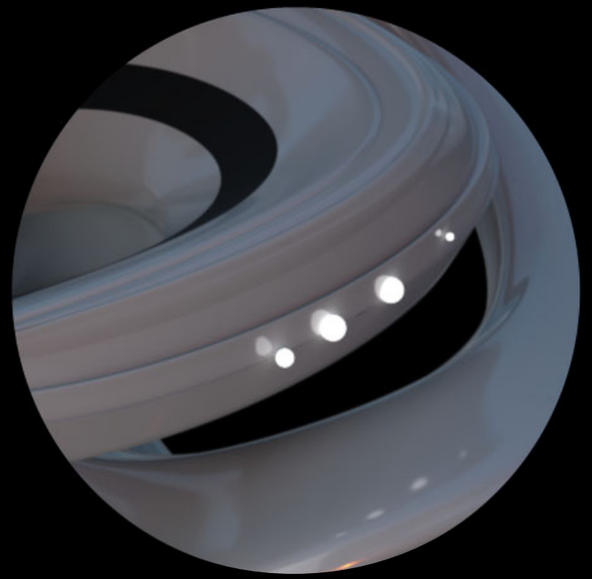
Walkway and exit for pedestrians departing vehicles

PUBLIC DOCKING
Diagram: Parts 3-5

Grippable Siding

Provides additional gripping power for the public vehicle spikes to cling

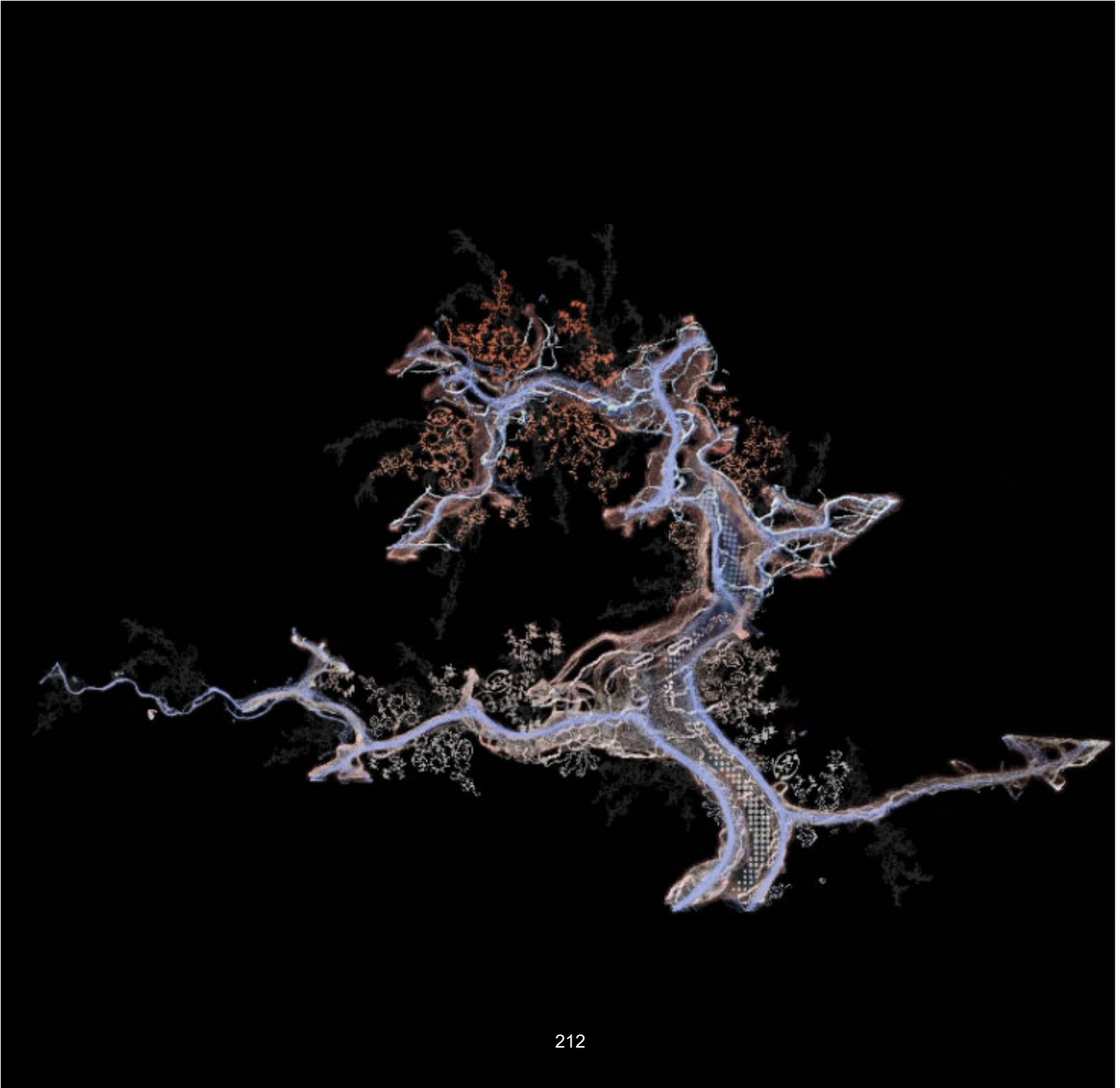
Lighting



Lines the dock to signal the location of the dock and the trajectory of the docking path to traveling vehicles

Magnetic Track Path

Line the central curvature of the pathways along the dock to maintain order and safety by pulling on the weight of the vehicles in the low gravity field



Chapter 05 | Cosmogony

Layers of the map were generated using the Grasshopper plug-in, Nuclei. Each layer involved ten to twenty iterations. Based on a world existing within a tree with two opposing tribes and one ally to the protagonist tribe, the simulations aimed to create three network layers: The Foundational Network Pathway; the Primary Core Network; the networks of Luminalis and their allies; and the network of the Dark Enigma

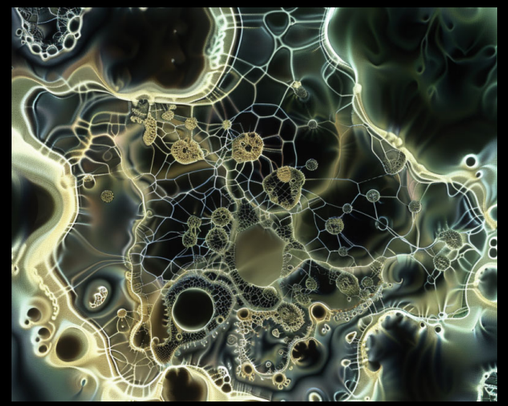
The Foundational Network Pathway represents the natural pathway system of the tree, enabling characters to construct their paths. The Primary Core Network represents the first artificial network carved by the characters, based on the natural pre-existing pathways. The networks of Luminalis and the Dark Enigma illustrated the diaspora of character tribes and their bifurcation in residency due to ideological differences. The Dark Enigma tribe migrated to the treetop, seeking a musical crescendo with sultry tones, while Luminalians and their allies preferred cooler, melodic tones in the canyons below.

The Process

The simulation generated in Nuclei incorporated working with an existing image set into ambient occlusion along with block-out shapes to distinguish the acute outlines and to produce various permutations of these networks best suited for both aesthetic means and to illustrate the narrative. Refining voxel settings within the gradient map and bifurcating simulations of diverse permutations enabled us to create the pathways essential to the storyline.

MIDJOURNEY
Concept



MJ Explorations

Contriving the shape of the Great Tree specified geometry suggestive of branching and Midjourney prompts relating story themes. Such themes included wood burrowed creatures, such as termites, who build networks within wood; wood; tree silhouettes; blends of trees; and string and brass instruments. Images produced were blended with one another as well as to cityscape imagery.

MIDJOURNEY

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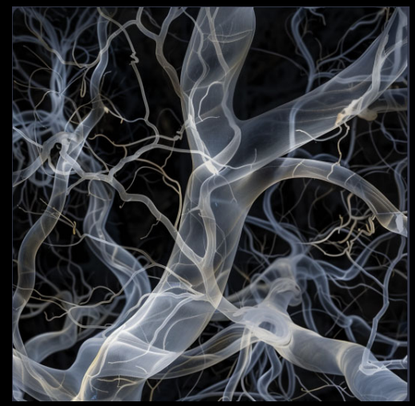
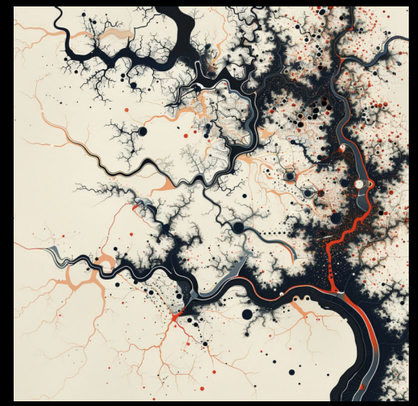


217

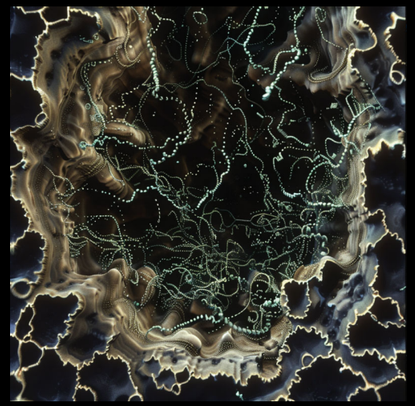
MIDJOURNEY

218



219

MIDJOURNEY



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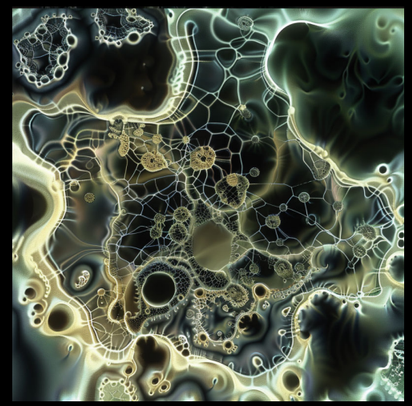
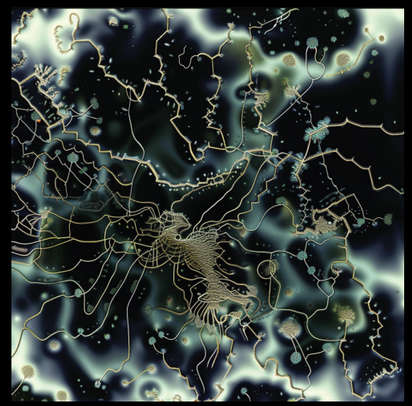
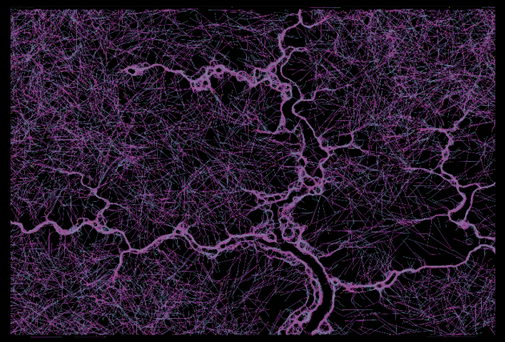
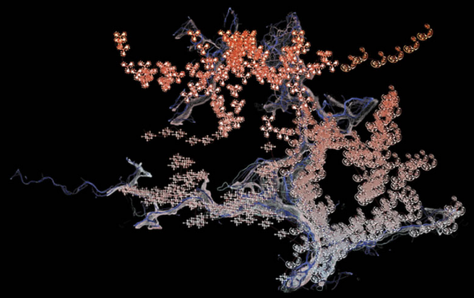


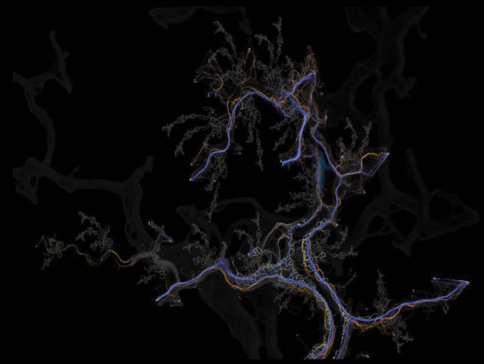


221

PROGRESS







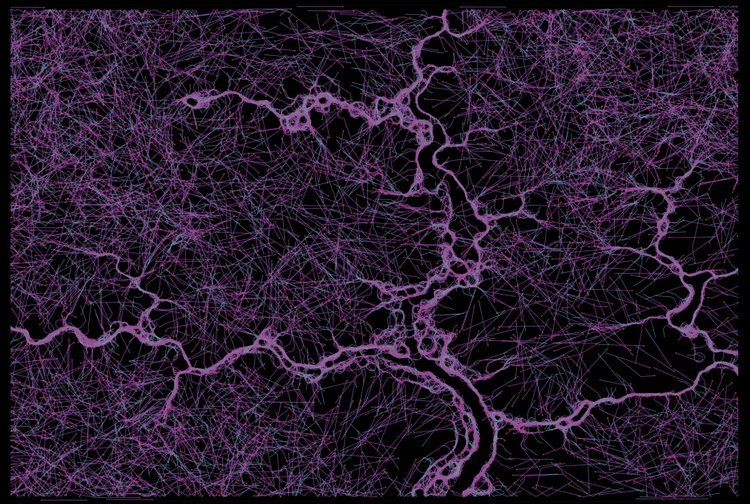
Work in Progress & Simulation Experiments

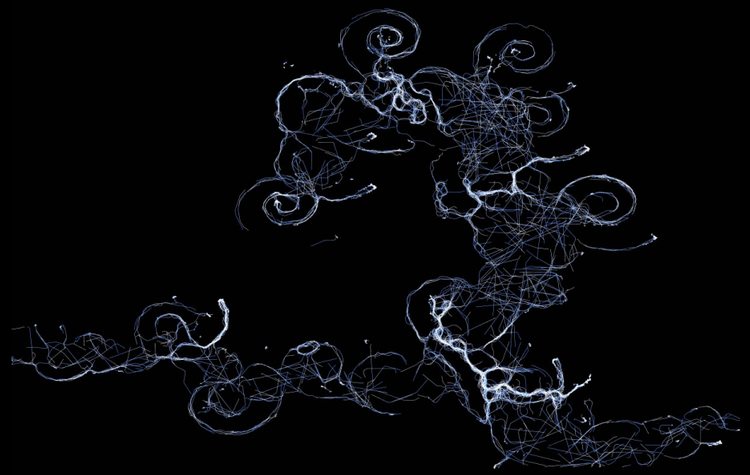
Creating networks to satisfy an autonomous tree planet with three tribes, two coexisting and two at war, required generating a preexisting pathway within the tree's natural environment; a "man"-made core network contrived from this base pathway; and two separate networks bifurcating from one or more original units. Several simulations ran with logged results to produce the most well defined simulations to suit the purposes of each specific network.

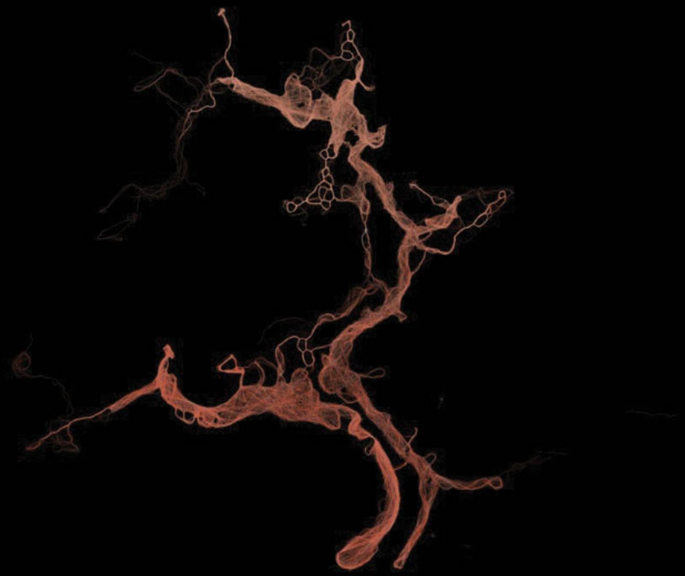
Further challenges included incorporating amalgamations. Both manual and computationally aggregated amalgamations applied to the completed networks. Ultimately one of the computational outcomes and one of the manual outcomes provided the right aesthetic and conceptual balance.

Other iterations further defined color and hue after each of the networks formed.

PROGRESS
Core & Main Networks Experiments







PROGRESS
Bifurcating Network Experiments

7

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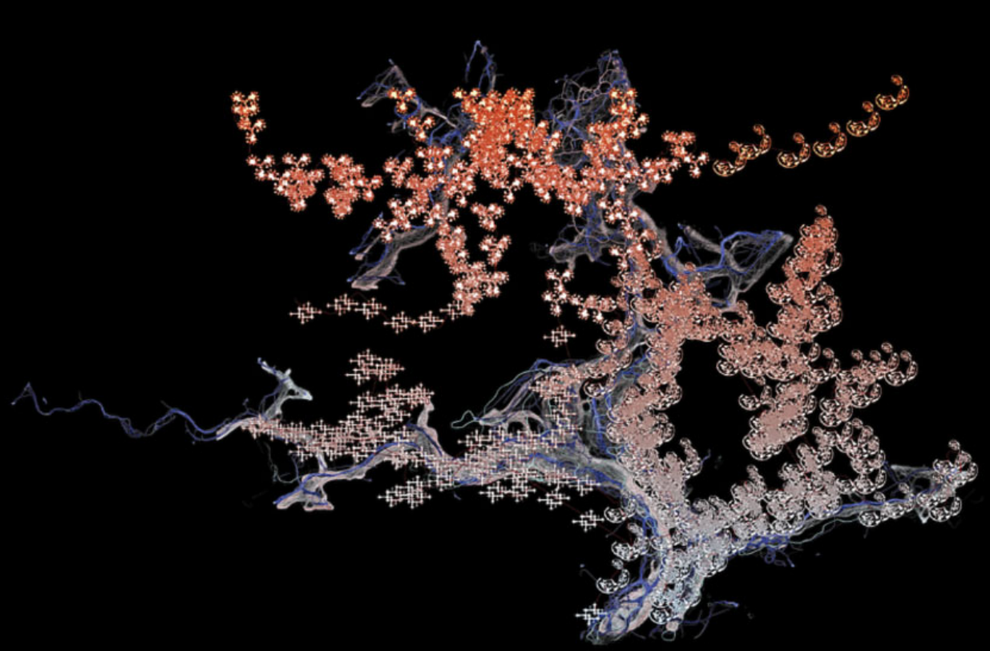
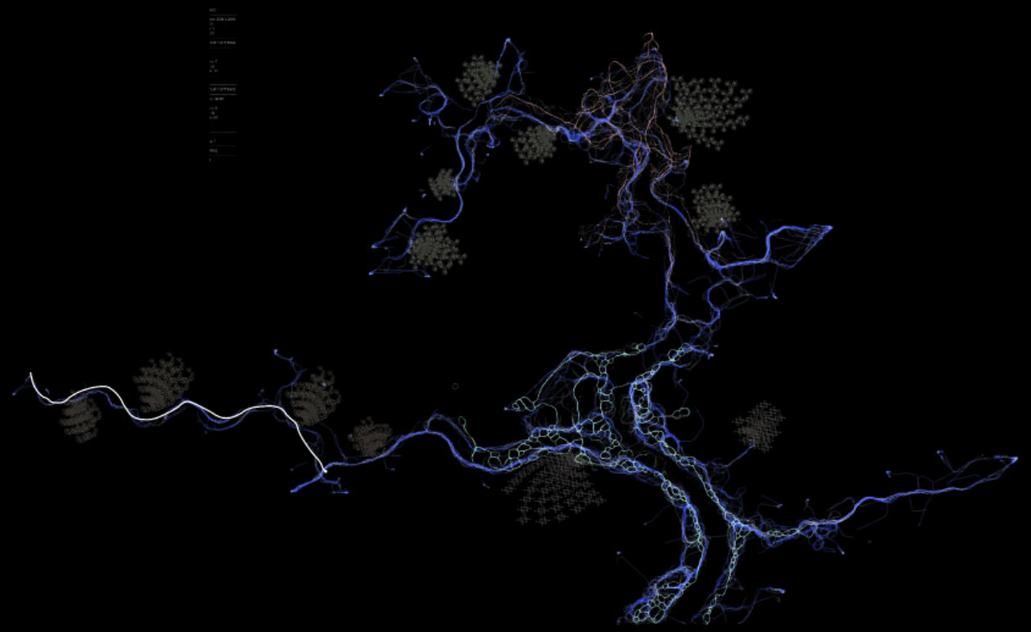
PROGRESS
Computational Amalgamations

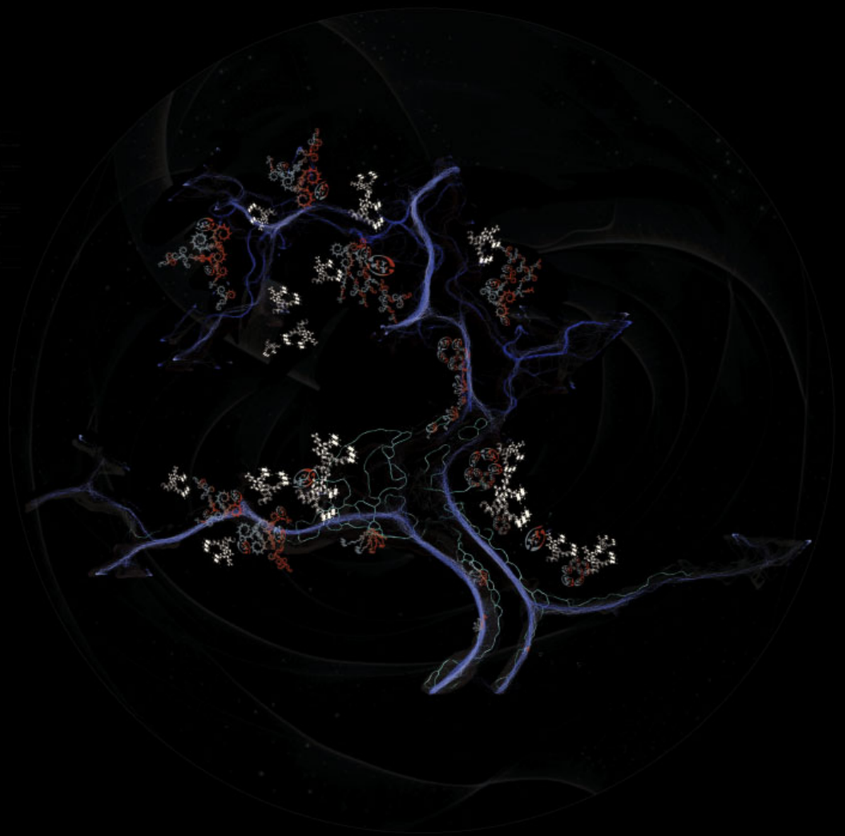


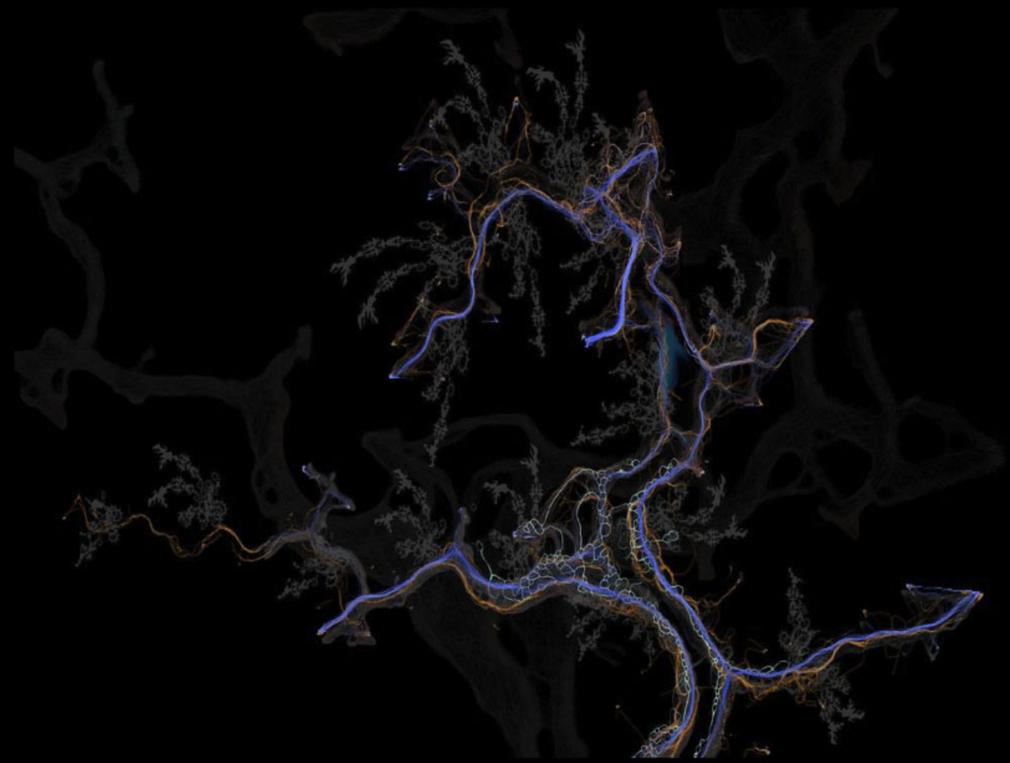
C# Script + Grasshopper



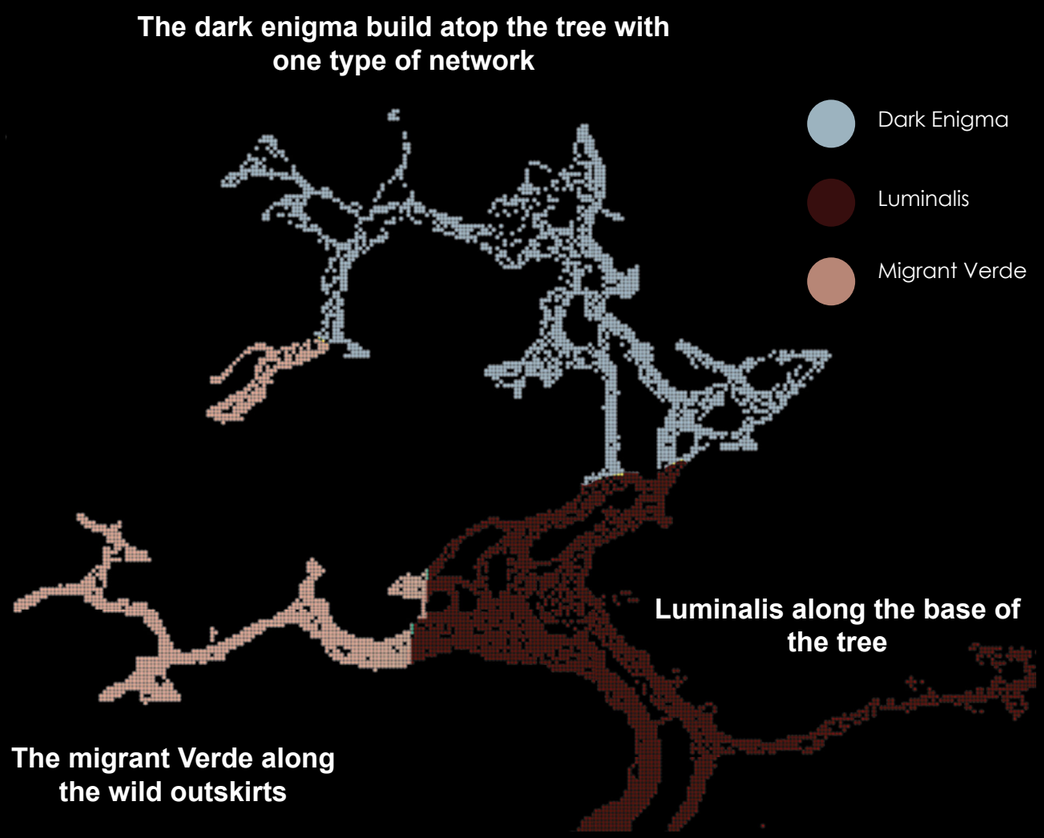
Grasshopper

PROGRESS
All Networks Configurations





REGIONAL MAP



C# & Grasshopper Generated Regional Map

C# and Grasshopper scripts helped to identify the three main regions of Luminalis. While this image was later omitted from the overall map due to style preferences and the large amount of existing activity, it was instrumental in determining the exact locations of the regions and ultimately deciding on how many tribes we would focus on for our project.

The process involved clustering by means of arraying a collection of points, clusters, and for-loops.

REGIONAL MAP
Code

```
// Grasshopper Script Instance
using System;
using System.Collections;
using System.Collections.Generic;
using System.Drawing;

using Rhino;
using Rhino.Geometry;

using Grasshopper;
using Grasshopper.Kernel;
using Grasshopper.Kernel.Data;
using Grasshopper.Kernel.Types;

public class Script_Instance : GH_ScriptInstance
{
  /*
    Members:
      RhinoDoc RhinoDocument
      GH_Document GrasshopperDocument
      IGH_Component Component
      int Iteration

    Methods (Virtual & overridable):
      Print(string text)
      Print(string format, params object[] args)
      Reflect(object obj)
      Reflect(object obj, string method_name)
  */

    private void RunScript(
     IList<Point3d> points,
     int clusterCount,
     double threshold,
     ref object clusteredPoints,
     ref object colours)
//G additions / explanations
   // double b = 0
   // double r = 1
   // double g = 2
// Grasshopper Script Instance
using System;
using System.Collections;
using System.Collections.Generic;
using System.Drawing;

using Rhino;
using Rhino.Geometry;

using Grasshopper;
using Grasshopper.Kernel;
using Grasshopper.Kernel.Data;
using Grasshopper.Kernel.Types;

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     double threshold,
     ref object clusteredPoints,
     ref object colours)
//G additions / explanations
   // double b = 0
   // double r = 1
   // double g = 2

   // RunScript takes in
   // Dimensions: (x, y and z)
   // IList<Point3d>: collection of those points.
E.g., {x=3,y=4,z=2}, {x=5,y=2,z=3},
{x=99,y=97,z=101}, {x=101,y=99,z=98},
{x=0,y=0,z=0} and blah blah blah]
//List contains points as established by number
slider dividing tree and format the x,y,z

   {
      List<Point3d> pts = new List<Point-
3d>(points);
      // clusters: Array/collection of lists of points;
starts at 0; e.g.,  "0: [{x=-,y=-,z=-}, {x=-,y=-,z=-},
{x=-,y=-,z=-}] <-- first cluster, 1: [{x=-,y=-,z=-},
{x=-,y=-,z=-}, {x=-,y=-,z=-}] <- second cluster
      List<Point3d>[] clusters = Clustering.
Cluster(pts, clusterCount, threshold, out int stop);
      // List<double> cumulative Distances
      clusteredPoints = ListArrayToDataTree(clus-
ters);
      colours = ProvideColors(clusterCount);
      Print(stop.ToString());
   }
// something = MyWhateverFunction(whatever i
need to calculate)
// static methods (below) do not require you to
create any objects and they can be called directly
from anywhere
   public static class Clustering
   {
      public static List<Point3d>[] Clus-
ter(List<Point3d> points, int k, double
thresholdDistance, out int whenStopped)
      // new array of lists of points (array of
clusters); total number of clusters is k, which is
clusterCount from above
      {
         List<Point3d>[] clusters = new
List<Point3d>[k];
         Point3d[] centroids = InitializeCen-
troids(points, k);
         // create an array of the centers of the
clusters

         bool converged = false;
         int counter = 0;
         // repeatedly do something, until this
becomes “converged”
         while (!converged)
         {
            for (int i = 0; i < k; i++)
               clusters[i] = new List<Point3d>();

            foreach (Point3d point in points)
            {
               int closestCluster = GetClosestClus-
ter(point, centroids);
               double distance = point.Distance-
To(centroids[closestCluster]);
               clusters[closestCluster].Add(point);
            }

            double cumulativeChange = 0;
            for (int i = 0; i < k; i++)
            {
               Point3d newCentroid = GetNewCen-
troid(clusters[i]);
               cumulativeChange += newCentroid.
DistanceTo(centroids[i]);
               centroids[i] = newCentroid;
            }

            if(cumulativeChange <= thresholdDis-
tance)
               converged = true;

            counter++;
         }

         whenStopped = counter;

         return clusters;
      }

      private static Point3d[] InitializeCen-
troids(List<Point3d> points, int k)
      {
         Point3d[] centroids = new Point3d[k];
         for (int i = 0; i < k; i++)
         {
            int index = i * points.Count / k;
            centroids[i] = points[index];
         }
         return centroids;
      }

      private static int GetClosestCluster(Point3d
point, Point3d[] centroids)
      {
         int closestCluster = 0;
         double closestDistance = double.
MaxValue;
         for (int i = 0; i < centroids.Length; i++)
         {
            double distance = point.Distance-
To(centroids[i]);
            if (distance < closestDistance)
            {
               closestDistance = distance;
               closestCluster = i;
            }
         }
         return closestCluster;
      }

      private static Point3d GetNewCen-
troid(List<Point3d> points)
      {
         Point3d centroid = new Point3d(0, 0, 0);


   // RunScript takes in
   // Dimensions: (x, y and z)
   // IList<Point3d>: collection of those points.
E.g., {x=3,y=4,z=2}, {x=5,y=2,z=3},
{x=99,y=97,z=101}, {x=101,y=99,z=98},
{x=0,y=0,z=0} and blah blah blah]
//List contains points as established by number
slider dividing tree and format the x,y,z

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{x=-,y=-,z=-}] <-- first cluster, 1: [{x=-,y=-,z=-},
{x=-,y=-,z=-}, {x=-,y=-,z=-}] <- second cluster
      List<Point3d>[] clusters = Clustering.
Cluster(pts, clusterCount, threshold, out int stop);
      // List<double> cumulative Distances
      clusteredPoints = ListArrayToDataTree(clus-
ters);
      colours = ProvideColors(clusterCount);
      Print(stop.ToString());
   }
// something = MyWhateverFunction(whatever i
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// static methods (below) do not require you to
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   public static class Clustering
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         Point3d[] centroids = InitializeCen-
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         // create an array of the centers of the
clusters

         bool converged = false;
         int counter = 0;
         // repeatedly do something, until this
becomes “converged”
         while (!converged)
         {
            for (int i = 0; i < k; i++)
               clusters[i] = new List<Point3d>();

            foreach (Point3d point in points)
            {
               int closestCluster = GetClosestClus-
ter(point, centroids);
               double distance = point.Distance-
To(centroids[closestCluster]);
               clusters[closestCluster].Add(point);
            }
```
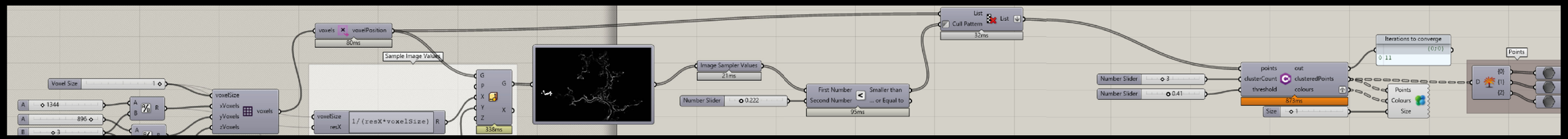
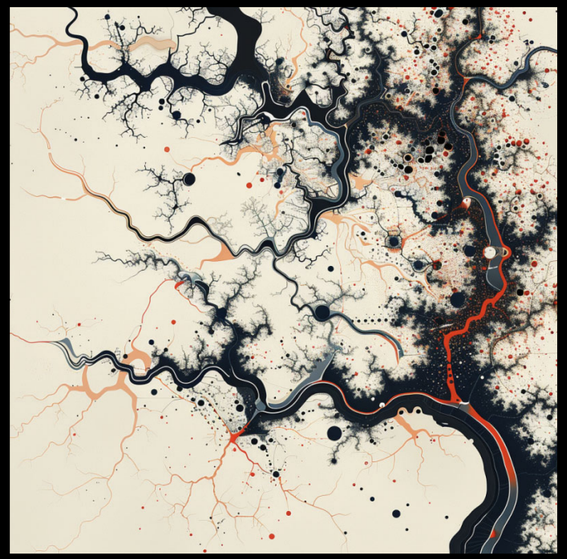



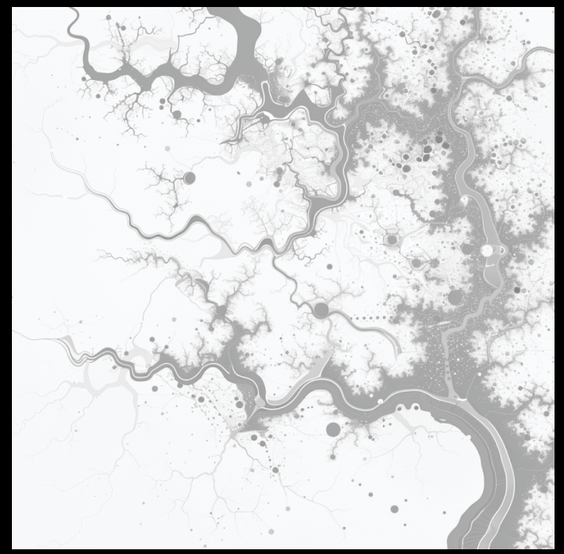
NUCLEI SIMULATIONS
Simulation Process: 1 & 2

1
Original MJ image



Contriving the shape of the Great Tree specified geometry suggestive of branching. Midjourney research included sketches and prompts including tree silhouettes, blends of trees and brass instruments, and termite networks blended with cityscapes.

2
Ambient Occlusion Map of Midjourney



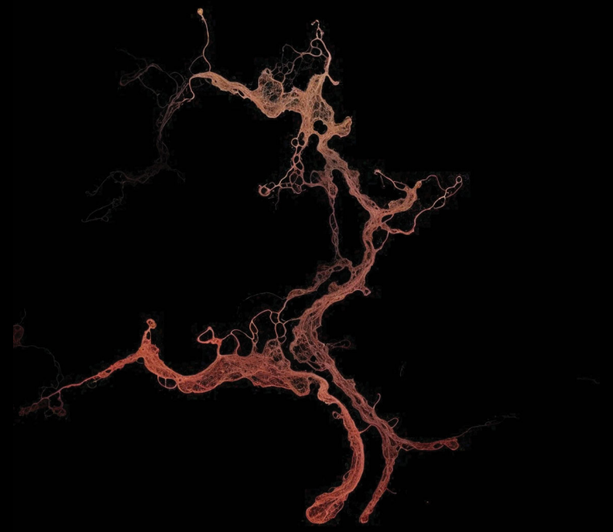
The ambient occlusion map of the Midjourney image provided a base image fed into Nuclei to simulate with geometry outlining the main shape.

NUCLEI SIMULATIONS
Simulation Process: 3 & 4

3
Block-out from Gradient Map Simulation

Simulating the ambient occlusion map with a thick outline provided a base form from which other, more creative geometry outlined for simulations to produce networks representing distinct regions.

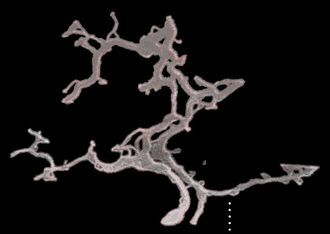
4
Two-Image Simulation Iteration



New networks resulting from simulations paired to form new simulations. A foundational network birthed diverse variations of new networks. Simulations aimed to create specific geometry and behaviors, which included a tighter core network with limited branching, and experimental networks resulting from actively simulating two opposing regions.

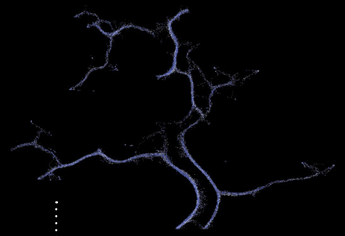
USING NUCLEI SIMULATIONS TO BUILD PATHWAYS

1
Transit Layer Network



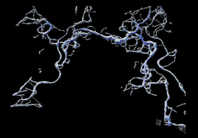
2
Core Network

Pathways of the Dark Enigma, foes of Luminalis



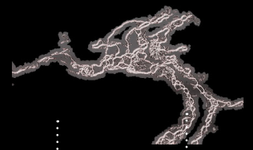
3
Lower Region Network

Pathways of the Dark Enigma, foes of Luminalis



4
Lower Region Network

Home to Luminalis and regions of the Migrant Verde, allies to Luminalis



5
Neighborhoods + Urban Development

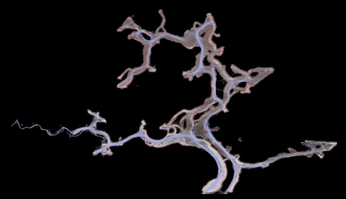
6
Outer Zone Ruins

Ruins in the outer low gravity ether of the Great Tree

\+

Networks 01 + 02
Transit + Core Networks

1
Stage



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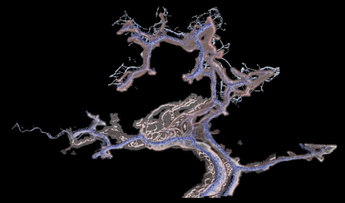
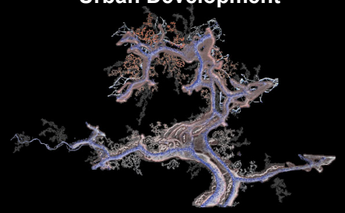
Networks 03 + 04
Regional Networks

2
Regional Networks



3
Residential + Urban Development



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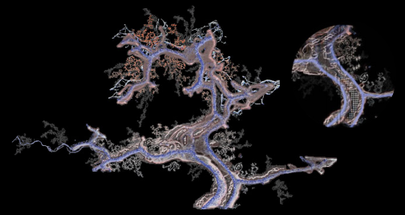
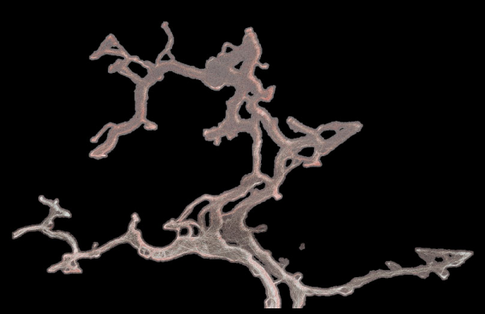
05 + 06
Neighborhoods
and Urban Establishments

4
Public Zones

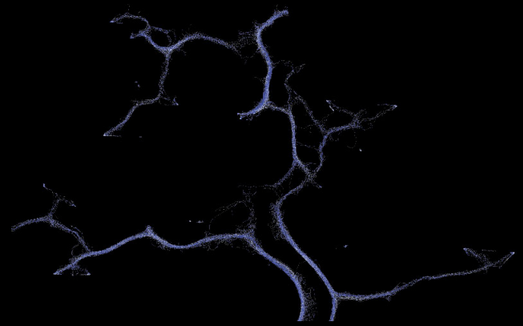


USING NUCLEI SIMULATIONS TO BUILD PATHWAYS

1 | Foundational Network
Natural Foundation for Tree Network

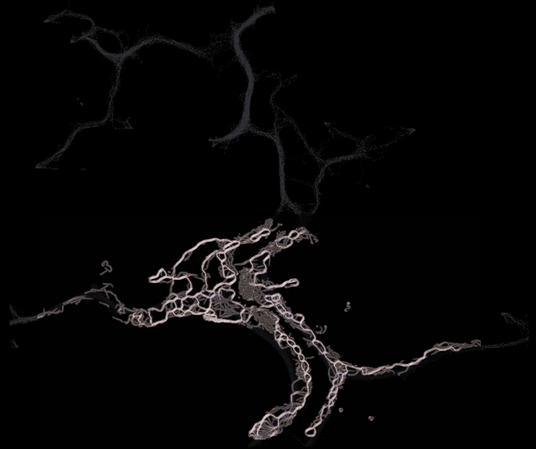


2 | Primary Network
Core Network of the Great Wise Ancestor Tree

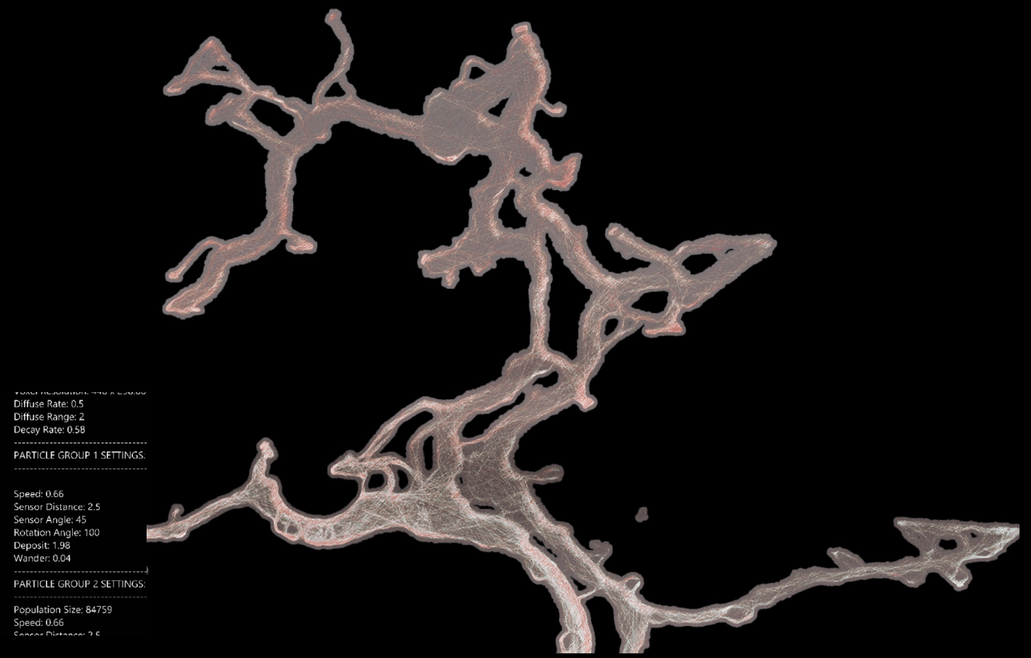


3 | Second Networks
Foe Region of the Dark Enigma

4 | Third Networks
Luminalis Region + Allied Regions



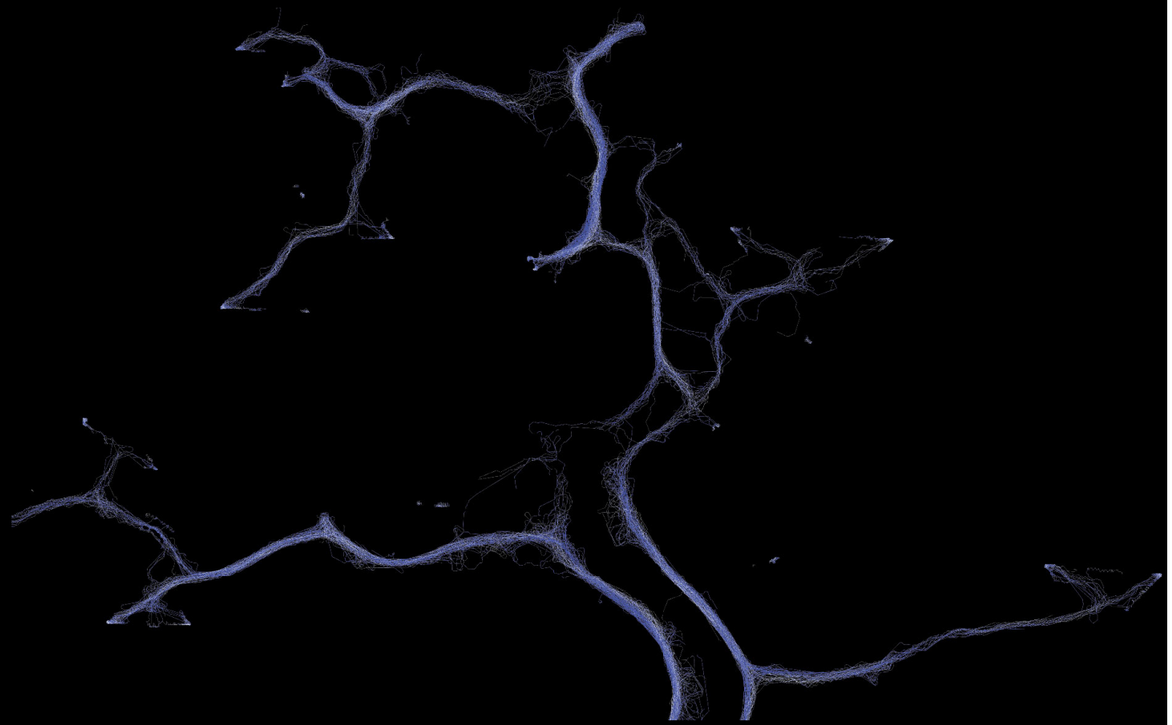
NUCLEI SIMULATIONS
Foundational Network



Simulation

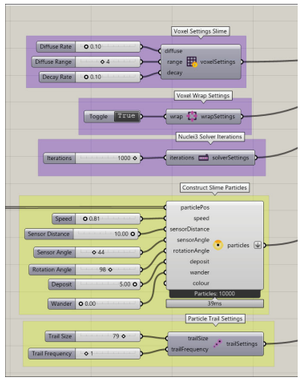
The four images on the right display simulation process of the first layer in order from top to bottom. Beginning with an ambient occlusion map of a Midjourney image, block-out shapes combined with a gradient map script were tested to simulate a new structure that would provide the foundation network from which all other networks would emerge.

NUCLEI SIMULATIONS
Core Network

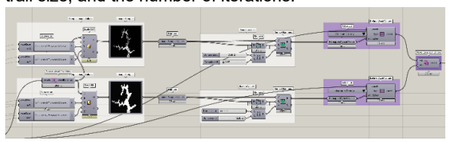


Core Network Simulation

In order to create a thick, solid core pathway to serve as the core, the key to generating the central core pathway lay in the relationship among voxel settings. A specific focus lay in the relationship between the sensor angle and the sensor rotation, keeping the sensor rotation closer to 100 and the sensor angle at approximately 45 degrees. Other methods that optimized the final result lay in increasing the trail size to give the appearance of longer and therefore tangent lines, while also increasing the number of iterations for a denser concentration of lines when set in the aforementioned parameters.

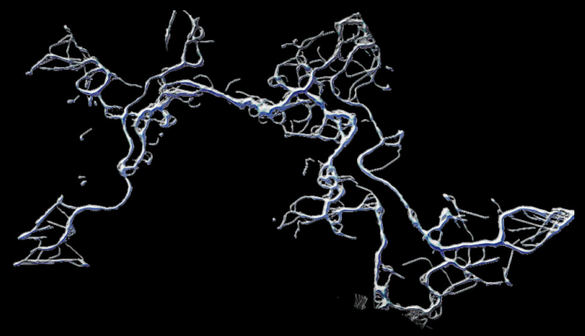


Among various components, simulations proved the best results by streamlining the sensor rotation, sensor angle, trail size, and the number of iterations.



NUCLEI SIMULATIONS
Top Network of the Dark Enigma

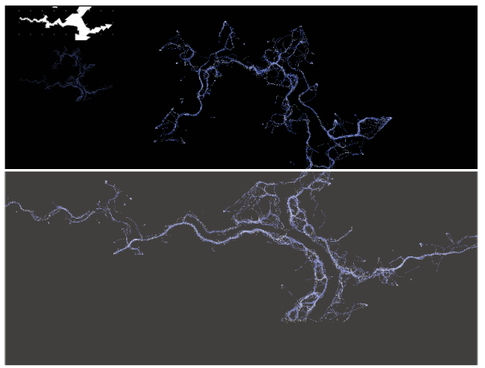
Dark Enigma

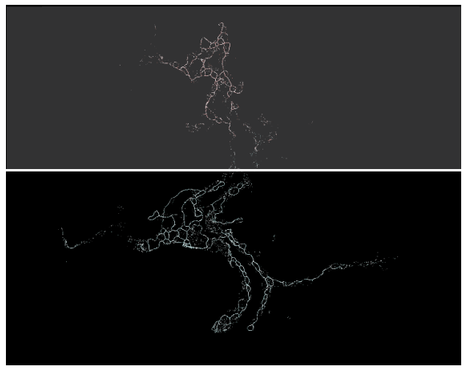


Luminalis & Allies

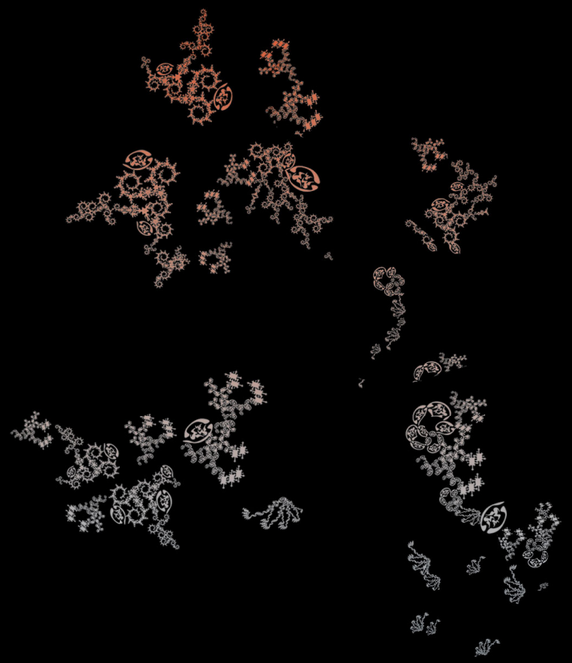
Bifurcating Simulations

Dividing the tree into two opposing sections between Luminalis and their foe, the Dark Enigma involved generating a series of city map bifurcation simulations. Out of nearly twenty results, two were selected, dissected by simulation part, and paired by top and bottom.





Regions



Clusters manually placed around tree represent various districts.

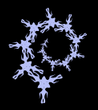
Ancient Remains from the Great Explosion

Computationally generated amalgamation placement produced a unique interpretation of the amalgamations. These conglomerates represent the ashen remains in the ether of the tree that resulted from the great explosion from the first quantum harp.

GREAT TREE REGIONS
Base Units

Working Class
Exo-cities

Building Block of
the Dark Enigma



Signature Architecture of
the Dark Enigma

Education &
Communication Centers

Agricultural
Hubs

Canyon City
with Towers

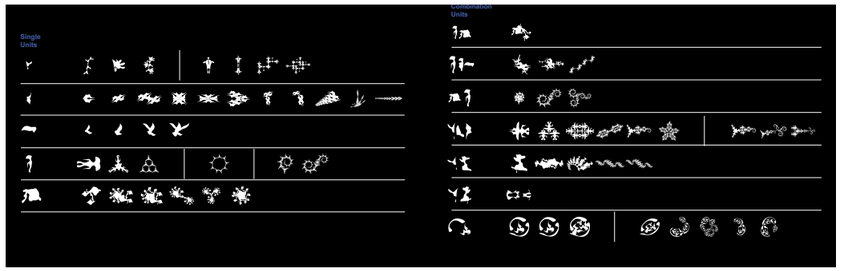
Base Units for the Regions of Luminalis

The base units employed to build the regions of the Great Tree derived from outlining shapes shown from the top view of Luminalis. Permutations of each of these base forms' transformations -- through scaling, multiplying, moving, rotating, and mirroring -- provided new possibilities for geometry that would represent the different regions within the Great Tree.

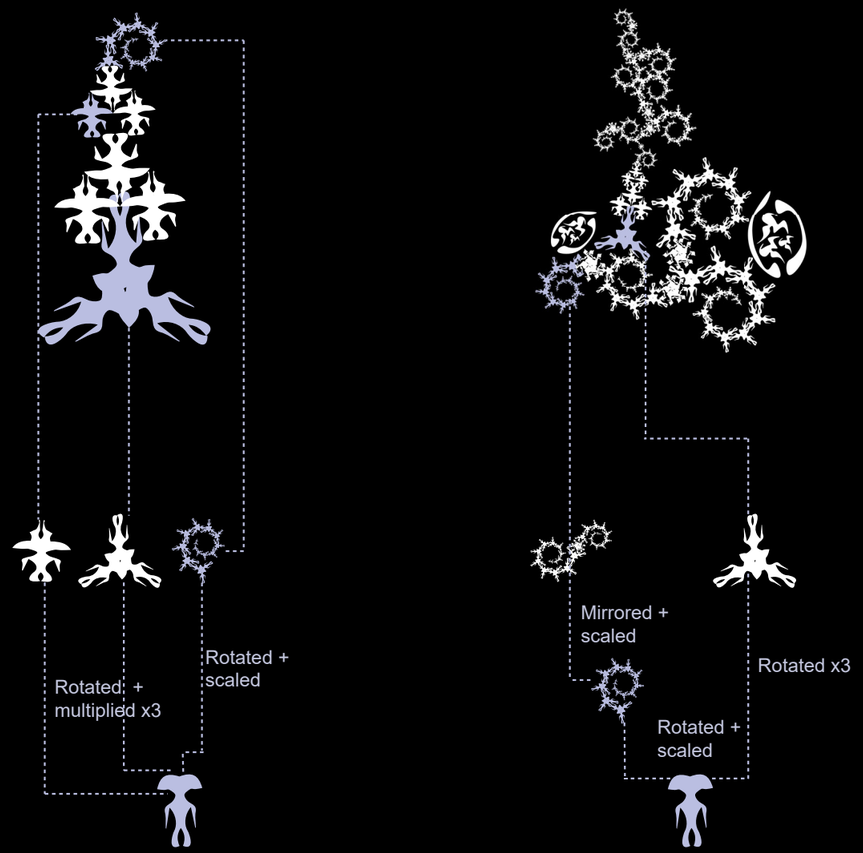
Images to the right display the main base shapes chosen to represent the basic building blocks. Each building block represents a different cultural or institutional component applied as an ingredient to the final resulting conglomerate representing a single region within each section of the map. For example, conglomerates representing ancient architecture consist of canyon cities and working class exo-cities. Permutations of these base units as they appear to the right construct each of these regions.

The main base units building each region include working class exo-cities, dark enigma, education and communication centers, agricultural hubs, and canyon cities. These units construct the main regions, which include quantum music academies; rural areas; ancient ruins; trading hubs; and early, classic architecture that survived the infamous event of mass destruction.

Base and conglomerate units modeled both manually and in Grasshopper.



REGIONS
Quantum Music Academies



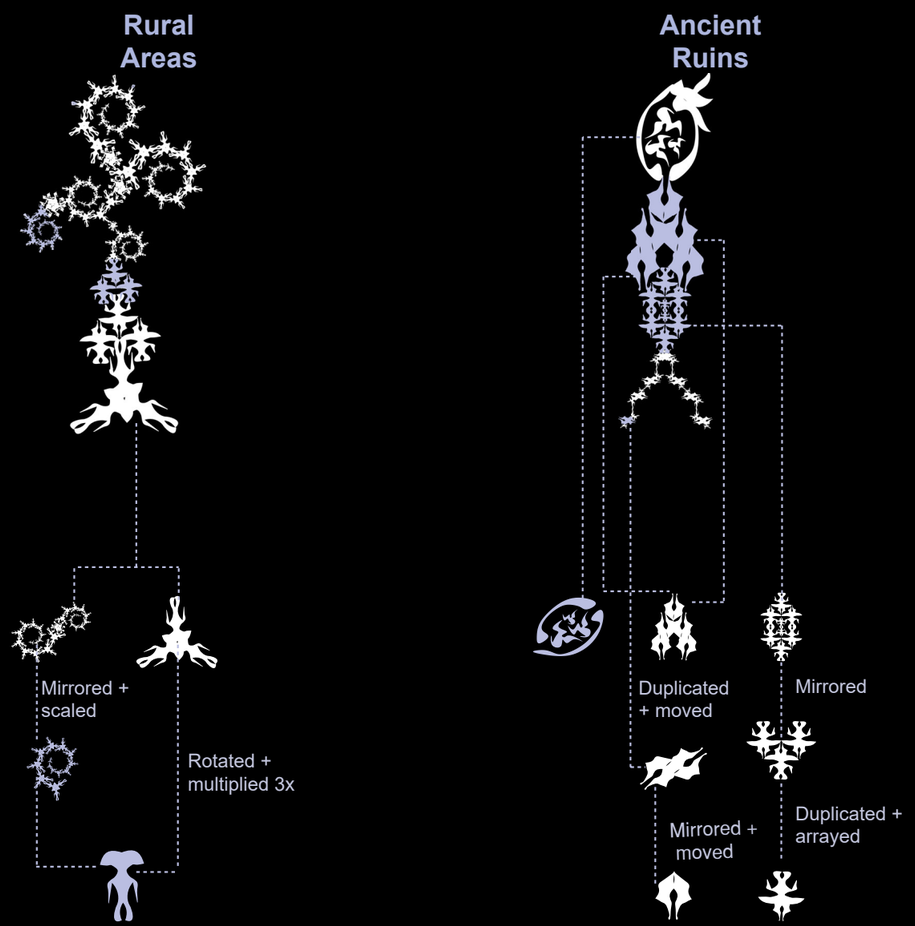
Quantum Music Academies of the Dark Enigma

Most of the Dark Enigma architecture consisted of a signature base unit transformed into a spiraling conglomerate constructed in a progressive series of rotations, scales and mirroring. For the architecture of the Dark Enigma's Musical Academies, the signature spiraling unit conjoined with other variations of the same base unit, formed by a process of rotating in multiples of three. Sitting atop the Great Ancestor Tree, their architecture tended to climb and circled around the canyons instead of inside of them, reflecting their musical drive for crescendo and the release of their more feverish and sultry tones, contrasting the cooler, melodic harmonies of Luminalis.

Each academy built by the Dark Enigma is populated by approximately 2.5 Million Verde.

Clusters created both manually and computationally in Rhino and Grasshopper.

REGIONS
Rural Areas & Ancient Architecture



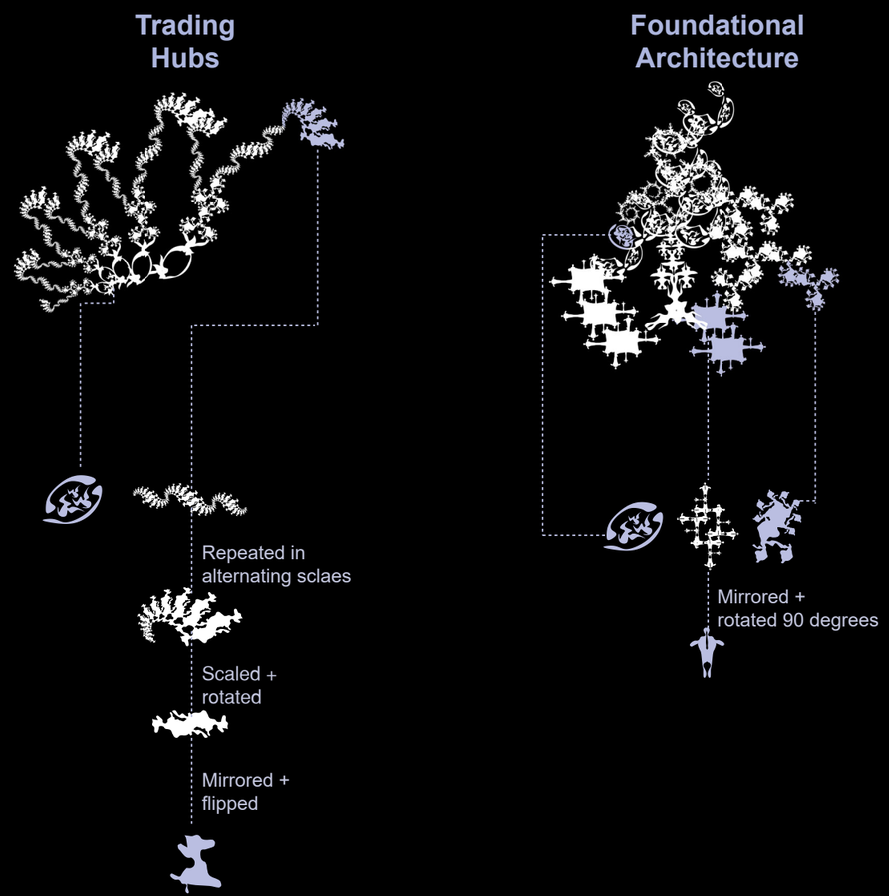
Rural Areas and Ancient Ruins

Rural, agricultural areas typically resided within the regions of the Dark Enigma where vegetation best received sunlight for cultivation. Thus, these regions comprised mainly of architectural staples of the Dark Enigma, including both the main building block and the signature spiral. The base unit rotated into a conglomerate unit of three, and then duplicated and arrayed into a second unit of three. Branches of the signature spiraling unit mirrored and scaled. The populations of these locations average at approximately 5,000 Verde.

The great devastation from the plucking of the first quantum harp demolished ancient architecture of the Verde. Orbiting the Great Tree, ghost-like remains floated in the ether. These ancient constructions consisted of canyon cities paired with archaic exo-cities. Permutations of the archaic exo-city units were conjoined into distinct configurations through methodical transformations. In one approach, the original unit was mirrored and moved, followed by duplicating the mirrored pair and repositioning these units to form a trio. In another approach, a conglomerate form was created by duplicating and arraying the base unit, which was then mirrored to complete the configuration. These regions are no longer populated, but visited during expeditions into the asteroid belt.

Clusters created both manually and computationally in Rhino and Grasshopper.

REGIONS
Trading Hubs & Foundational



Trading Hubs & Foundational Architecture

Trade Hubs primarily existed within canyons and consisted of the working class. Their geometry comprised mainly of docking stations as their base unit. The stations conjoined in a repeating series of mirroring, flipping, scaling and rotating. Trade Hubs vary in their population given their transience, but can be populated with up to 2.7 million Verde.

The foundational architecture predating the discovery of quantum music included the geometry of canyons and working class exo-cities. These units conjoined by mirroring and rotating 90 degrees.

Clusters created both manually and computationally in Rhino and Grasshopper.

Epilogue

As the tensions mounted, the combative ways of the Verde continued to threaten the survival of the Great Ancestor Tree. While hope seemed distant, rumors spread of a prophecy that a child would be born with the special power to harmonize quantum frequencies and to harmonize all tribes' music. As embers simmered in the barren grounds of Luminalis, hope loomed on the cusp of nonexistence. But then…

In the quiet of the night, as the first rays of dawn pierced through the darkness, the prophesied child, Seraphina, was born, her eyes ablaze with an otherworldly wisdom. A bright and vibrant child with a penchant for music, she possessed an inclination to discover the long-lost chords from the ancient lore that brought the Great Tree itself into existence. Could this unique melody unite the disparate groups?

Amidst this uncertainty, one truth prevails: the tale of Quantascape, with its verdant souls at the helm, is far from its conclusion. In the unfolding pages of destiny, the hearts and minds of the Verde inscribe their own saga, uncovering the essence of their being and the destiny that awaits them.

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WAR & MUSIC

THE PREQUEL TO THE TALE OF SERAPHINA

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