Grace Grothaus

PORTFOLIO

www.gracegrothaus.com

LIST OF CONTENTS

Grace Grothaus creates installations and performances that address the global climate crisis and work to foster empathy across species and ecosystems.

BIO

Grace Grothaus is a computational media artist grappling with the climate crisis. Her practice-based artistic research encompasses environmental sensing, physical computing, algorithmically generated imagery, and speculative futurity. Her projects take the form of interactive or responsive indoor and outdoor installations, and performances. Grothaus' artwork has been exhibited around the world, including the International Symposium of Electronic Art, Environmental Crisis: Art & Science in London, UK, Cité Internationale des Arts in Paris, and the World Creativity Biennale in Brazil. Grothaus has received awards for her work from organizations such as the National Foundation for Advancement in the Arts in the United States and was an Art 365 Fellow. She has been invited to speak about her work for the University of California San Diego's Design@Large series and Ecoartspace in Santa Fe, among others.

SUN EATERS

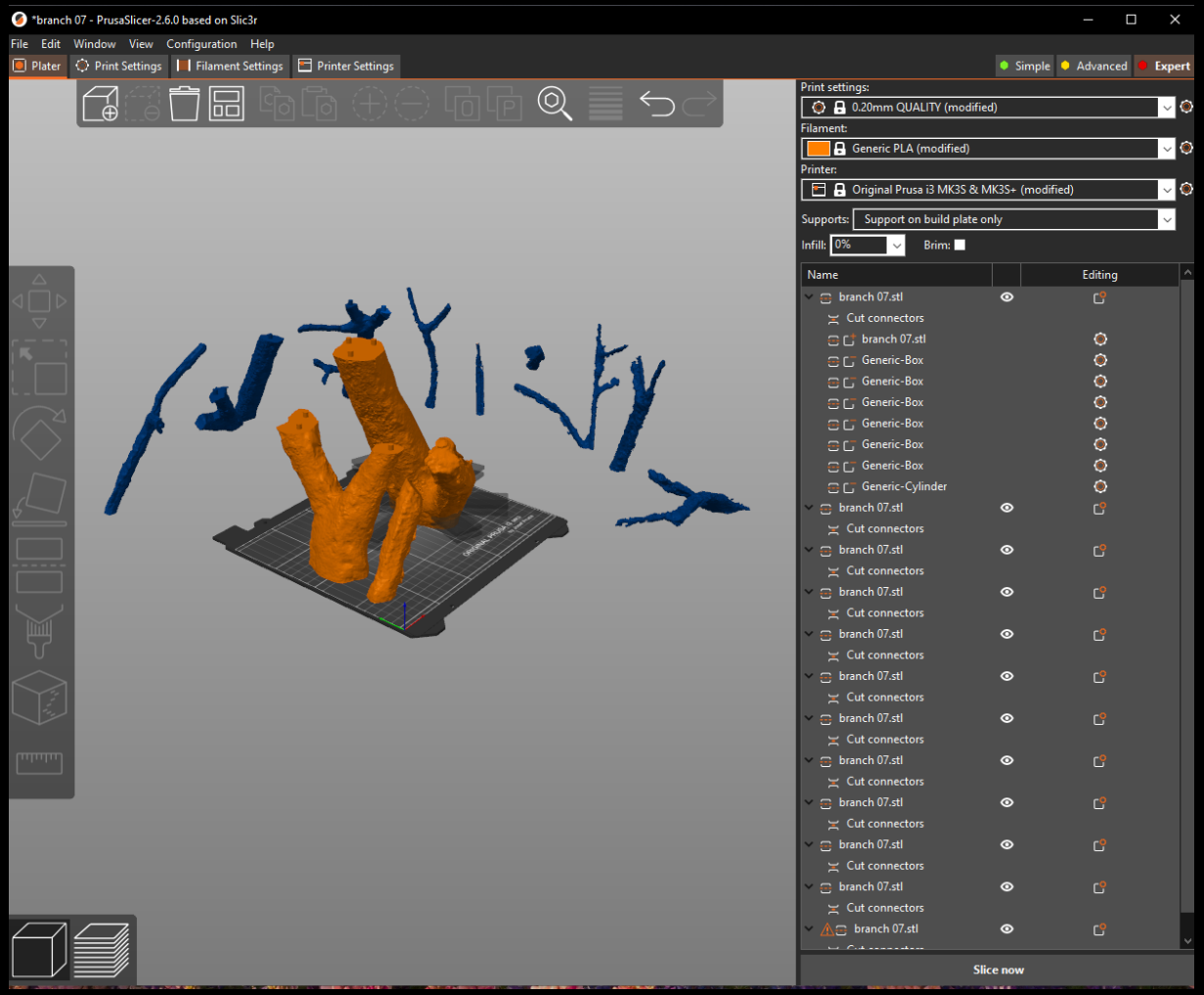
Sun Eaters uses custom electronics to visualize biodata as light. Here a grove of trees at the Toronto Botanical Garden are equipped with branches I created to enable people to both see and feel a tree's "heartbeat." The installation shows the electrical patterns unique to each tree, a constantly shifting combination of internal factors including a tree's overall health, daily metabolic processes, and state of hydration. Their pulsing rhythms are also influenced heavily by external environmental cues such as time of day, season, and the lunar cycle.

At several touch stations visitors can hold the branches, which contain sensors that pick up the bioelectric rhythms of each tree.

The spherical touch station flickers in tandem with the heartbeat of the person holding it, through a touch-activated sensor. Sun Eaters aims to create opportunities for wonder and empathy across species, in the hopes that we will recognize trees and plants as unique individuals, as we see ourselves and other people.

I created the Sun Eaters branches were created via photogrammetry scan. The resulting 3D model was sliced into printable sections and fitted together via a series of pegs and slots using Prusa software.

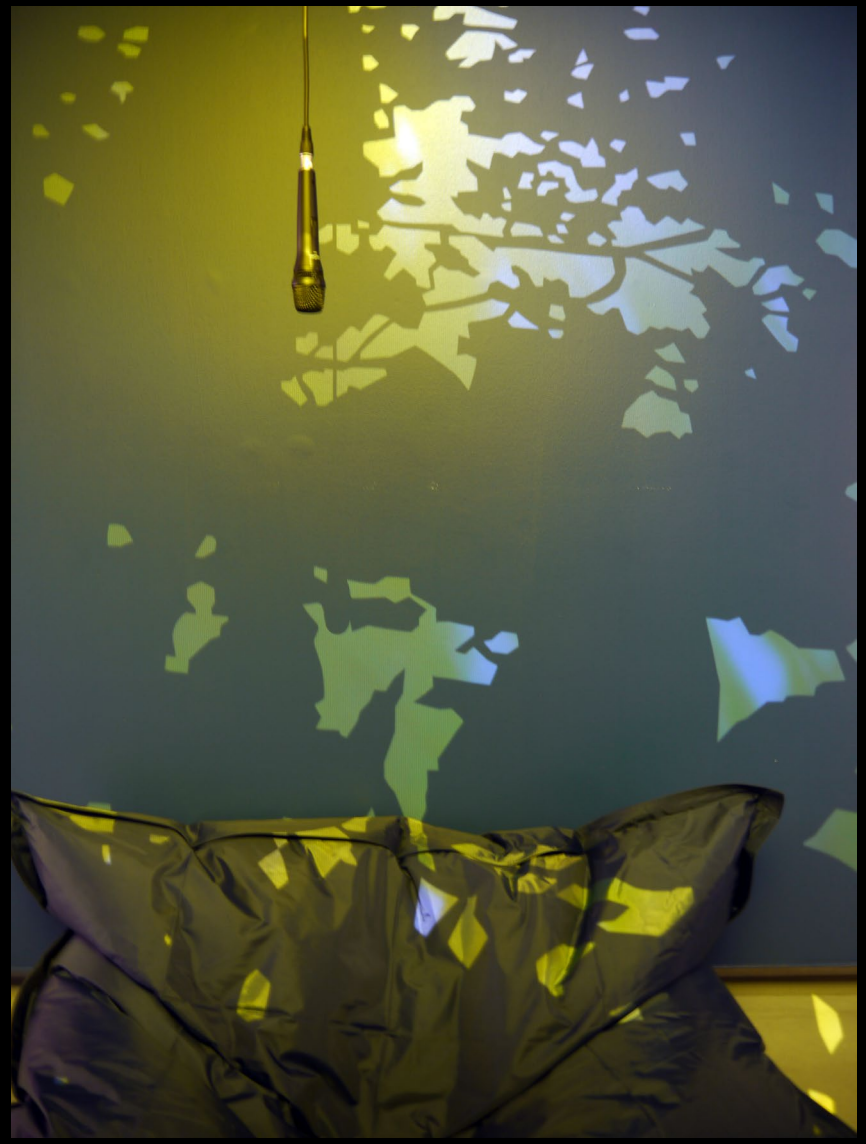
I designed the electronic circuit and programmed the data visualization using Arduino.



DAWNING

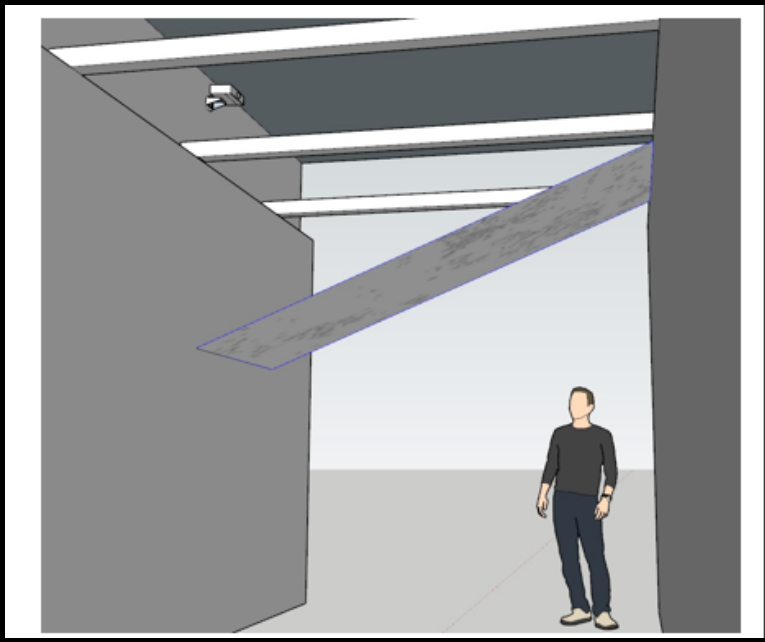
Dawning celebrates the daily rhythm of life on Earth as it responds to the sunrise. Footage from the Serra do Rola Moça mountains is projected onto a screen with tree canopy cut-outs, creating a forest-like dappled light effect on the floor. Both visual and audio aspects of the video are altered through software TouchDesigner by real-time environmental sensor data from the forest.

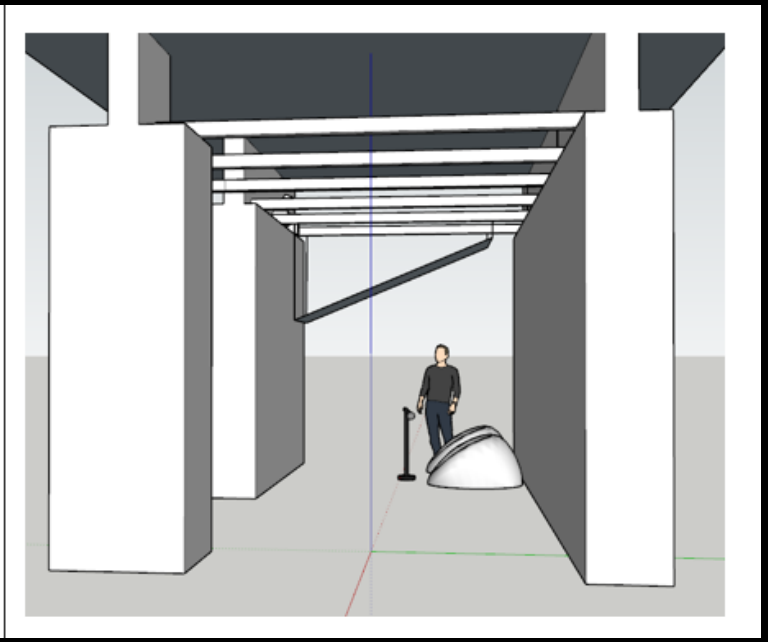
Dawning aims to bring a remote forest into urban space, connecting us with the intricate beauty of the life cycles of forest ecosystems.

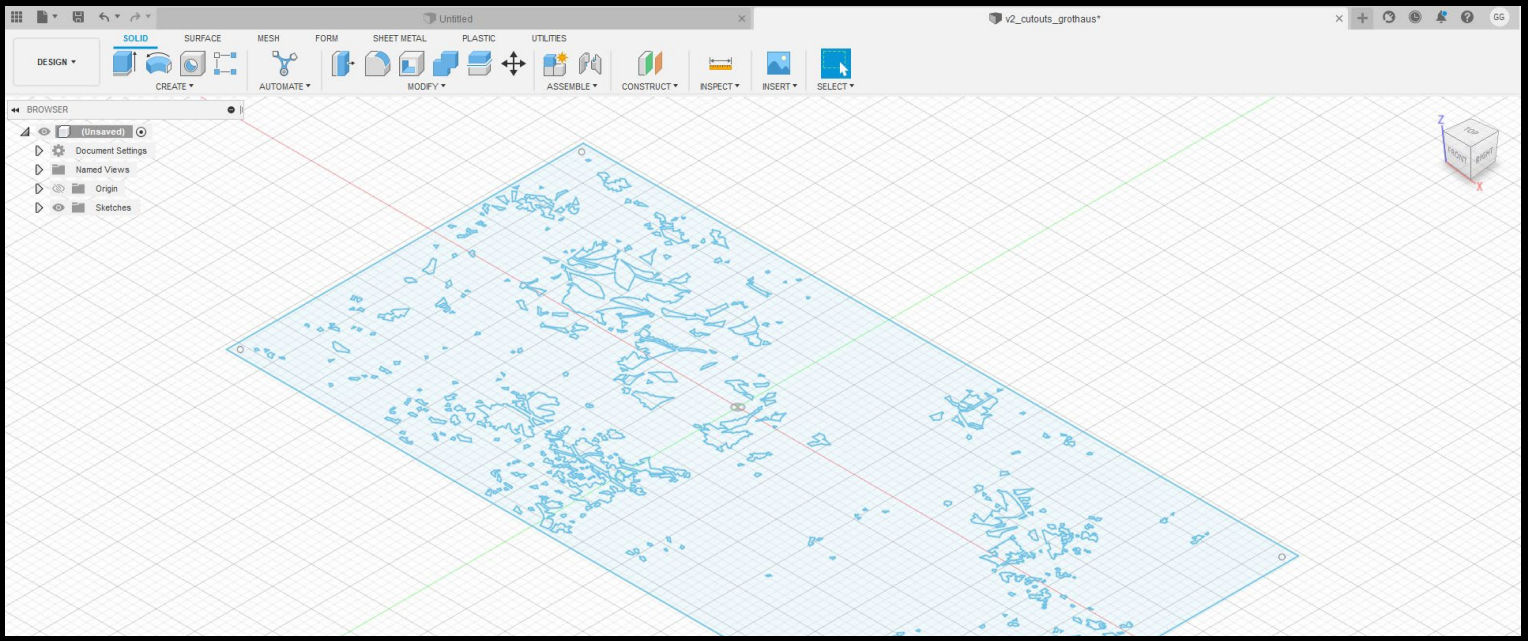


Visitors can lie under the screen to fully immerse themselves in the experience, and even add their voices to the dawn chorus using the provided microphone.

In Dawning, sensor data including CO2, humidity, light levels, temperature, Volatile Organic Compounds (VOC), wind speed, and airborne particulate matter is posted to IoT platform Shiftr.io. I subscribed to the data in TouchDesigner and used it to affect video playback.



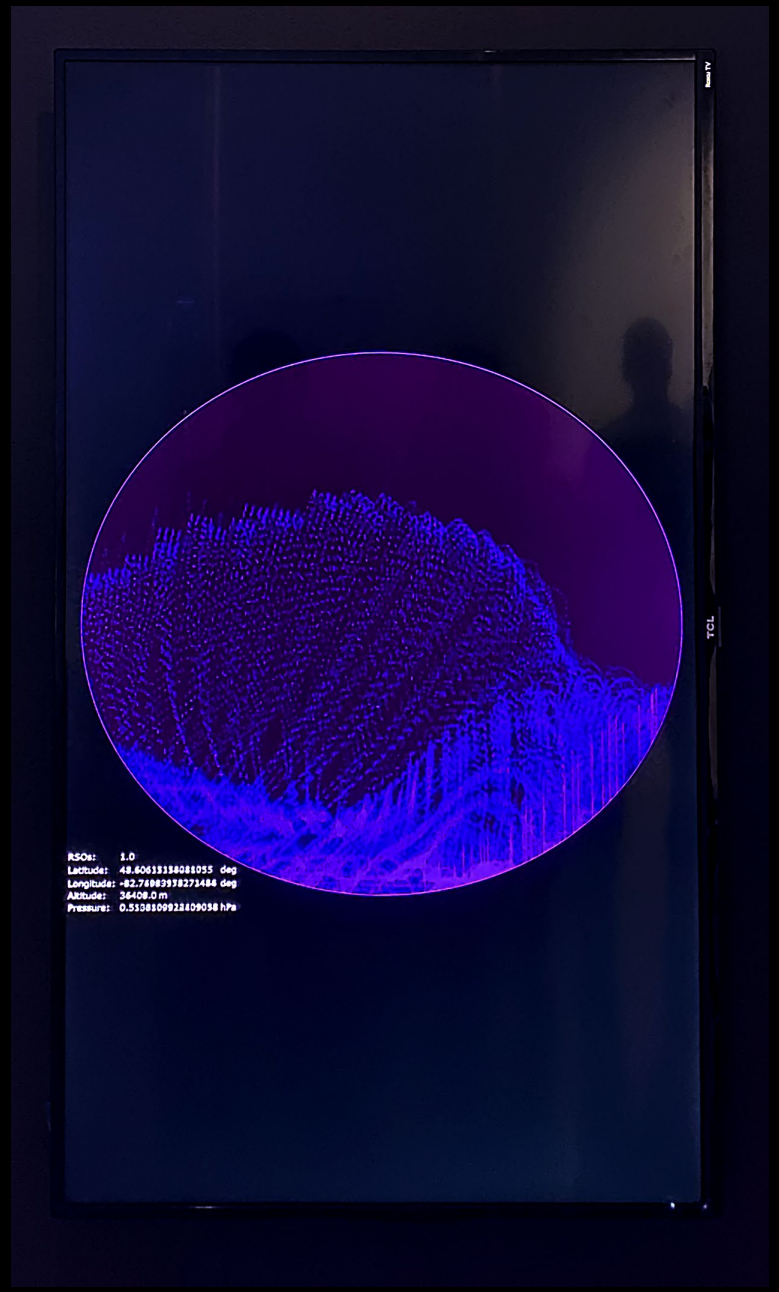


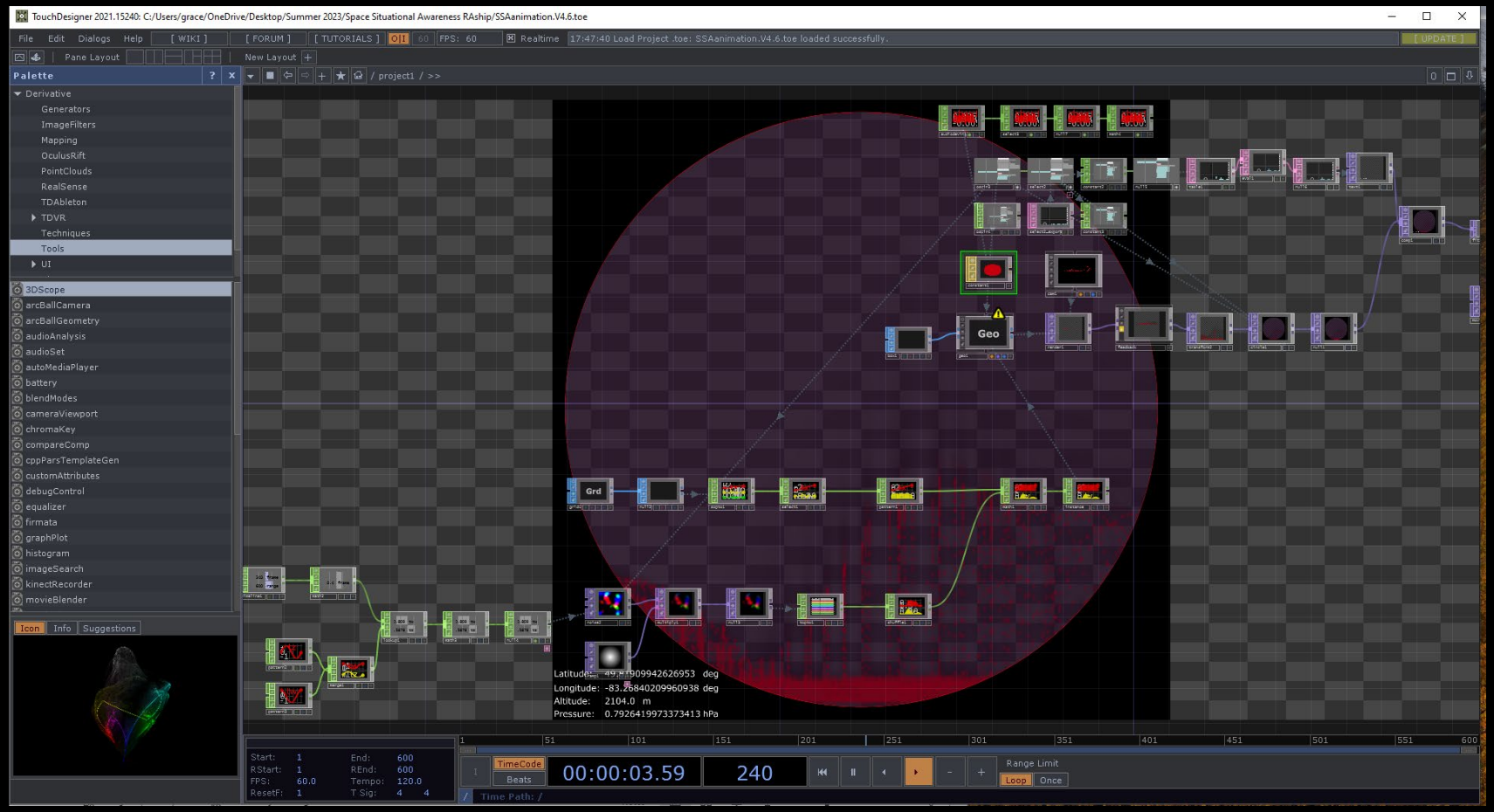


To design the installation of Dawning, I modeled the space in SketchUp from gallery floorplans. The overhead screen is made of projection film and the cutouts were designed in AutoCAD.

CELESTIAL OBJECTS AND AERIFORM MASSES

Animation Celestial Objects and Aeriform Masses is a generative animation, drawing from data about human-made space debris from a RSOnar nanosatellite. It is part of Space Situational Awareness and Us, a collaboration with Joel Ong, Regina Lee, and a team of cross disciplinary researchers from York University's Nanosatellite Lab. Created in TouchDesigner, it evolves through periodic rhythms: depicting atmospheric swirls and evolving colours in the form of a lunar scape.



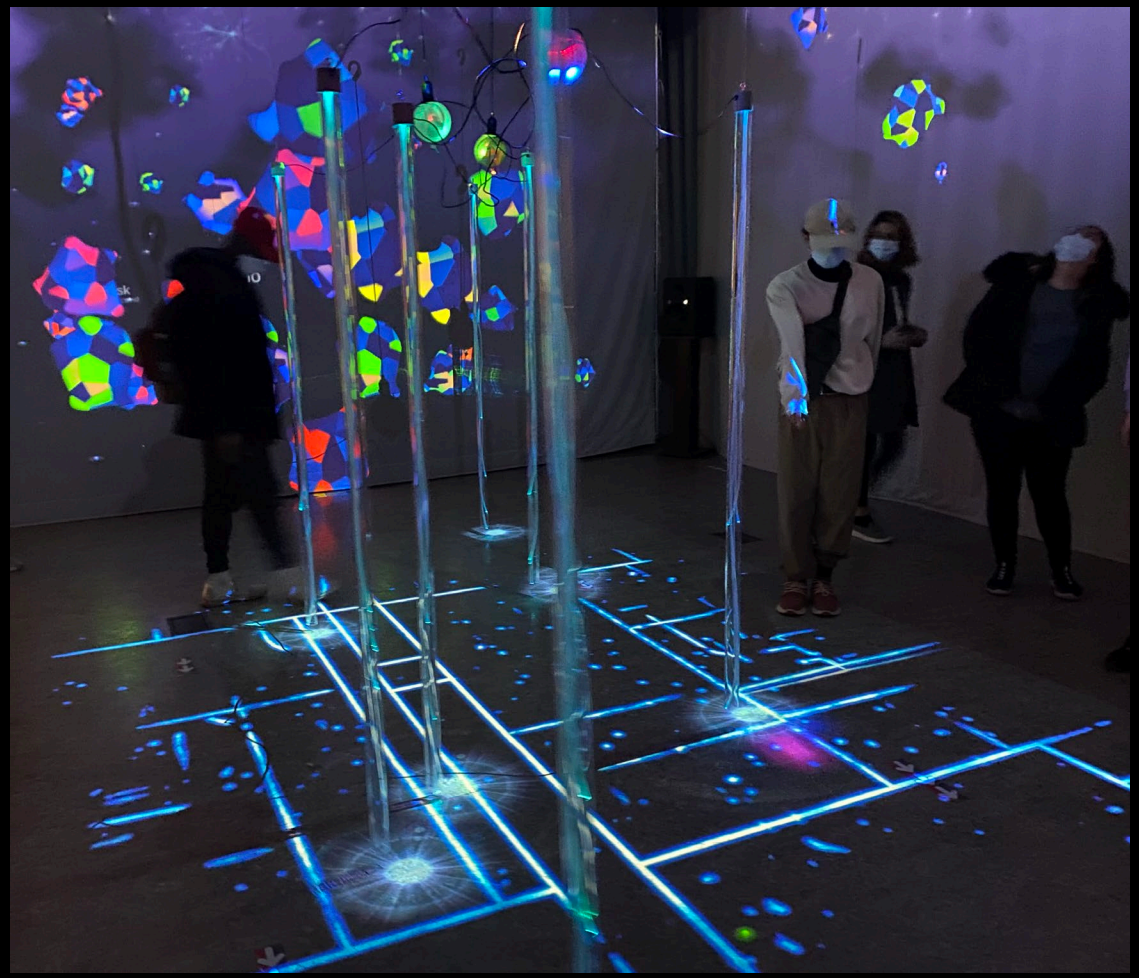


Celestial Objects and Aeriform Masses

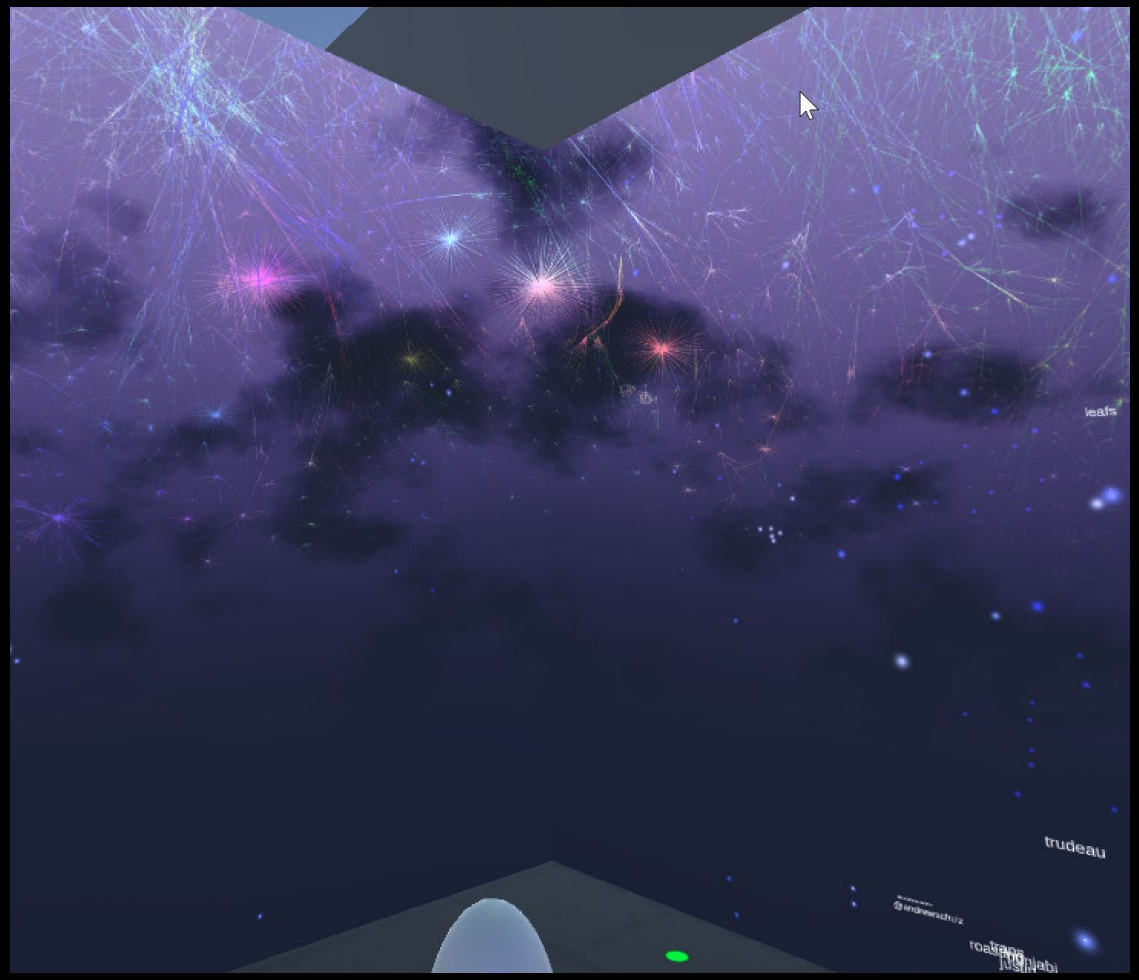
Visualizes a data set of latitude, longitude, altitude, pressure, and RSO count update a generative algorithm in software TouchDesigner.

DAILY CHORUS

Daily Chorus is an installation that visualizes and sonifies the daily ebb and flow of activity in our urban environment. Using 9 channel speakers, 4 channel projectors, and an interactive physical installation, Daily Chorus presents a time lapse of 48 hours of the city of Toronto. Environmental data from Toronto captures the dynamically changing light levels, humidity, wind speed, and air particulate measurements as they fluctuate over the course of a day. Tweet data involving the keyword Toronto is also represented in a 48-hour cycle and analyzed for sentiment on a range of positive, neutral, and negative. We are interested in the question of how tweet sentiment patterns shift with the atmospheric conditions of the city. This project explores potential connections between environment and emotion, based on a belief that everything is interconnected.

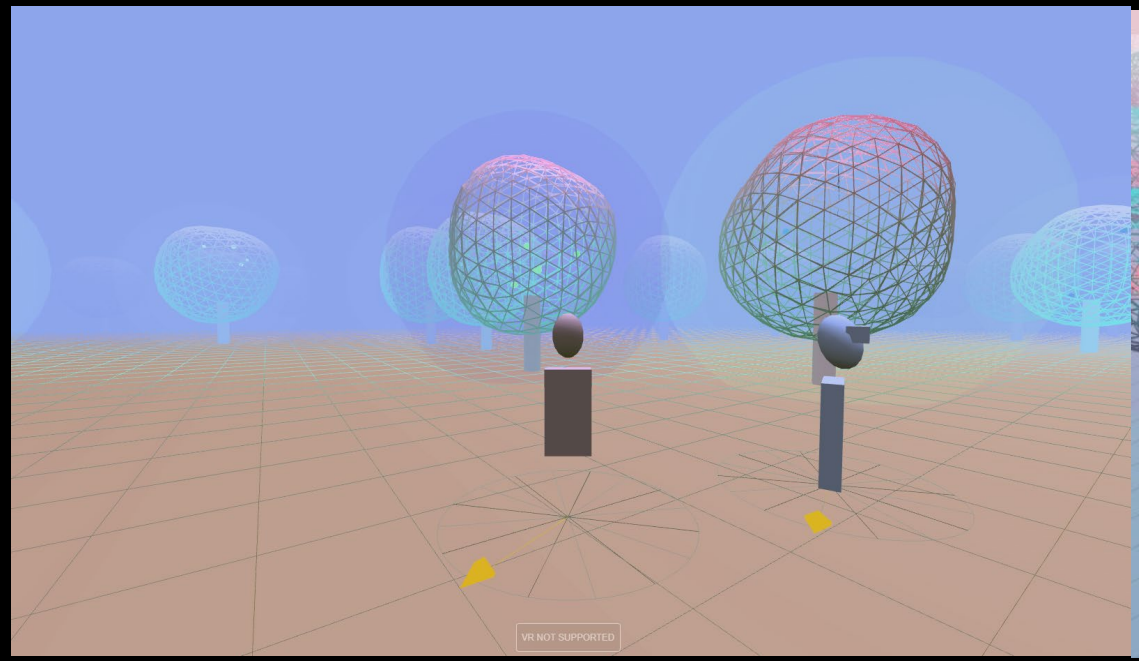


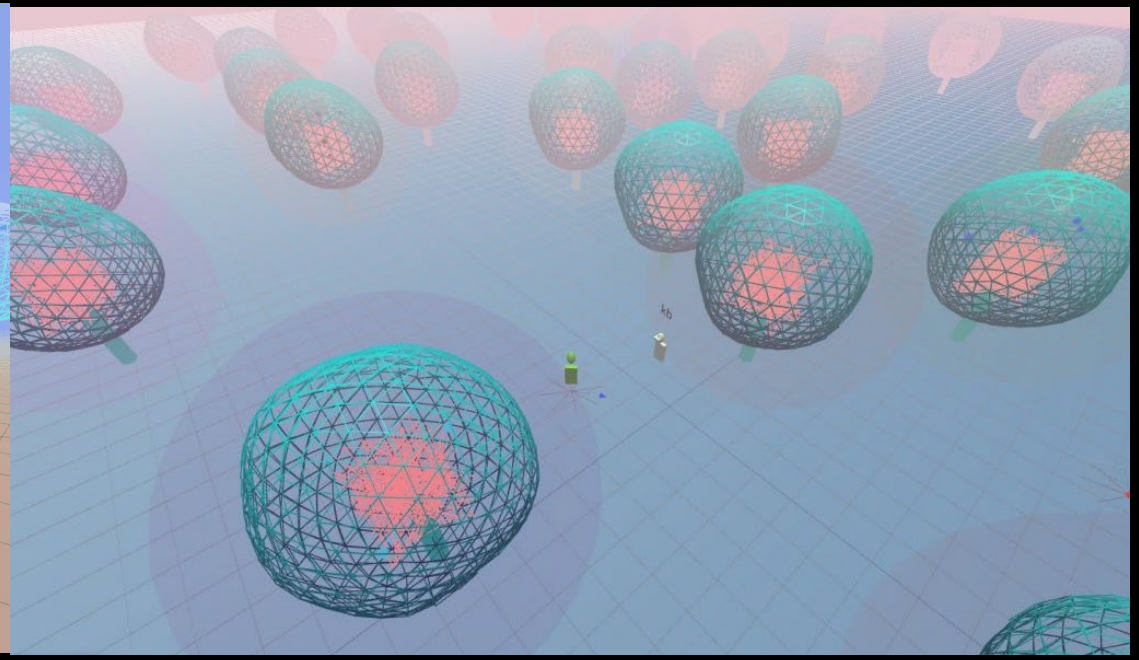
Daily Chorus was created by Horizontal Studio Lab (HSL), a non-hierarchical horizontally organized artist collective: Eyal Assaf, Kimberly Davis, Raghad El-Shebiny, Douglas Gregory, Kwame Kyei-Boateng, Xi Lu, Jorge de Oliveira, Janica Oplindo, and myself.



The Daily Chorus physical installation was comprised of acrylic tubes, fiber optic cables, and a network of LED lights controlled from MaxMSP. The digital display was programmed in Unity. Aesthetic decisions were made together as a team for both. During installation I worked on the physical computing.

HOLONIC CHORUS

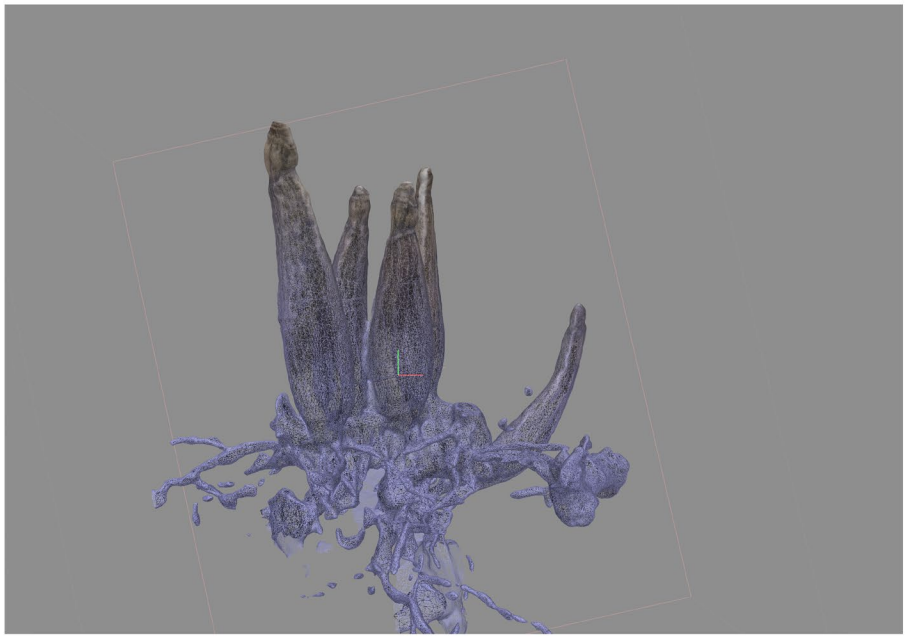


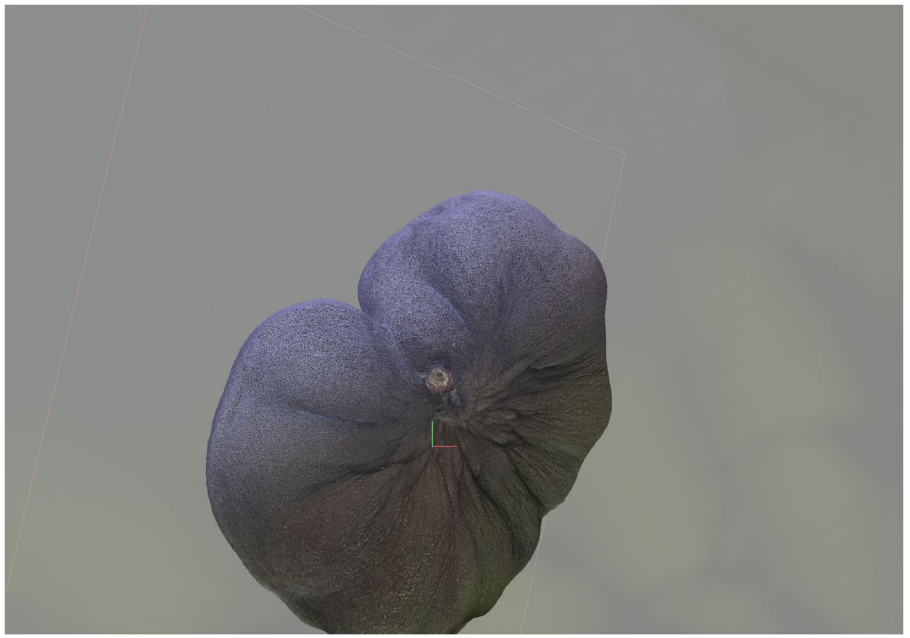


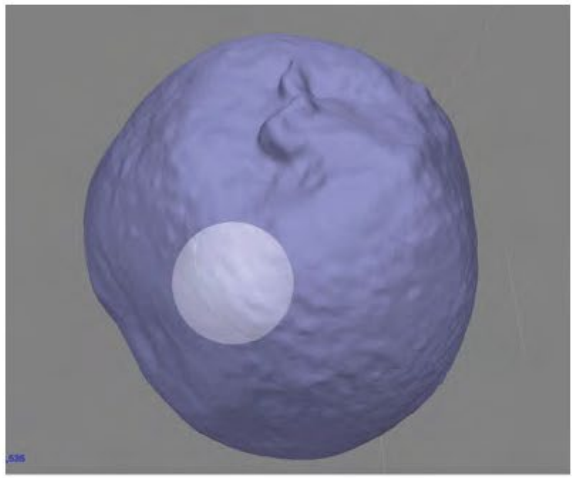
Holonic Chorus invites viewers into a shared WebXR world, a fluctuating forest generated from real biometeorological data. In this playful world, groups of participants are invited to interact with trees to generate musical tones. Each new interaction creates a different song. A holon, from the Greek holos ‘whole’ and -on ‘part’, is defined as being simultaneously both a whole in and of itself, as well as part of a larger whole. In our real worlds, which at the time were socially distanced due to the pandemic, we hoped to provide a sense of community and shared space. Holonic Chorus was created by Kwame Kyei-Boateng, Eyal Assaf, Ilze Briede, and myself. Aesthetic decisions were made as a group, and I created the back-end in Heroku.

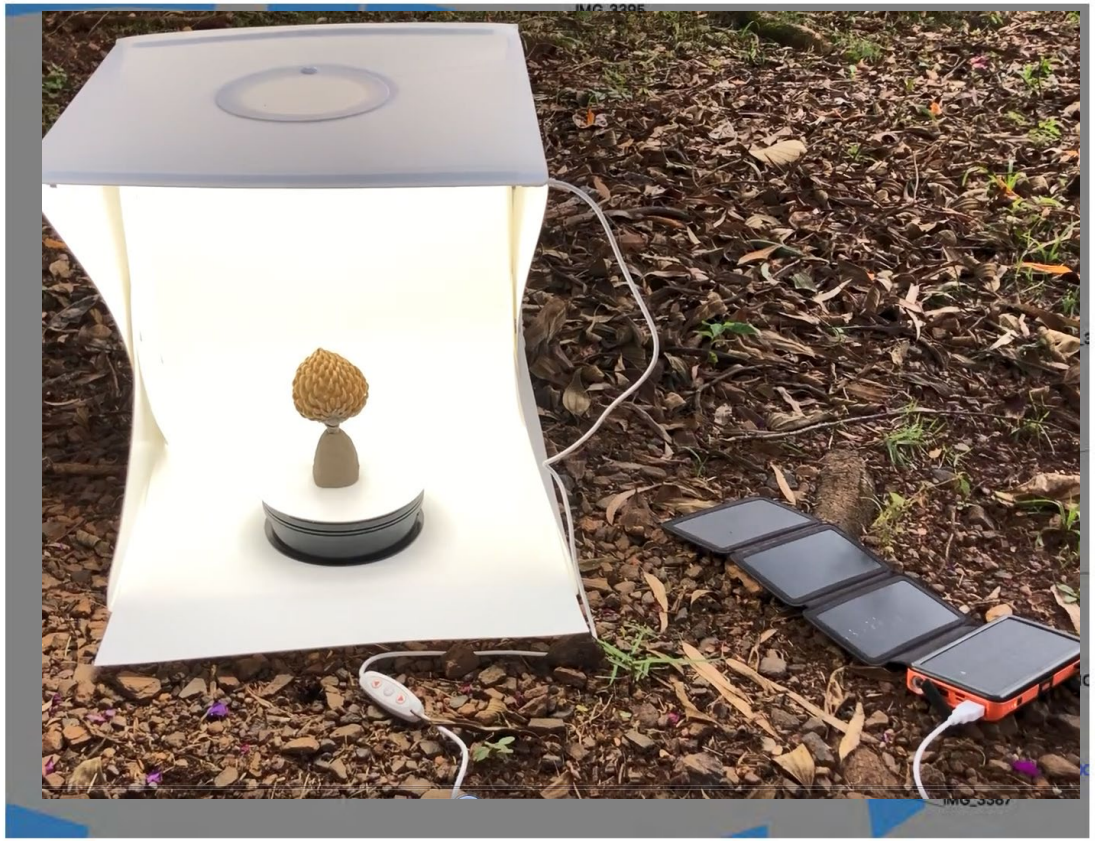
AGAINST OUR BETTER NATURE

Against our Better Nature is a series of prints created from 3D models of seeds I created in forests across three continents. The work explores themes of environmental loss and speculative futures as species are vanishing due to climate change. While it is well known that wild animal populations around the world have fallen dramatically, the situation is worse for plants. Scientists don't have the resources to effectively track plant loss. Some species which are now at risk of extinction have never been formally documented.

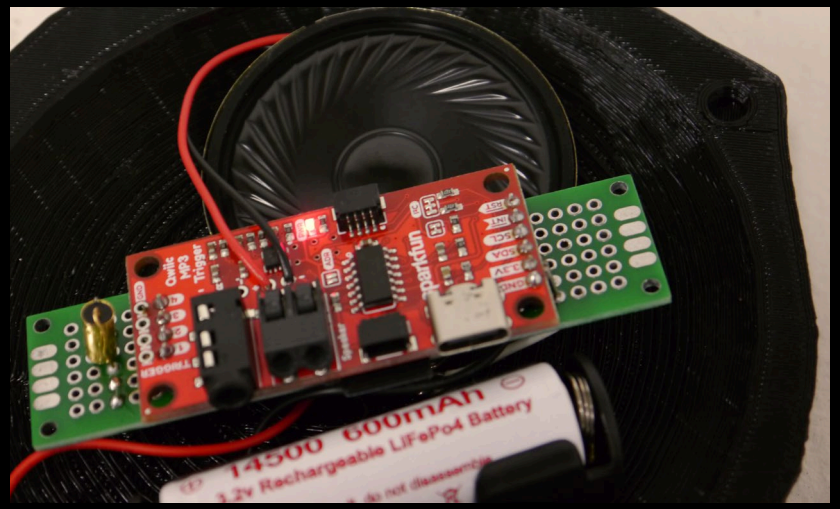








I created the 3D models for Against our Better Nature on site in the landscape where the seeds were found using a portable lightbox and the software Metashape by Agisoft.



3D printed sculptures were also part of the Against our Better Nature series. Each played a soundtrack composed of field recordings from the forest where the seed was found and music. These were motion activated via tilt sensor.

PROJECTED HORIZONS

Projected Horizons is landscape-sized video installation that transports viewers to the arctic circle to witness footage of glaciers in decline. It provides an immersive experience without the harmful effects of ecotourism.

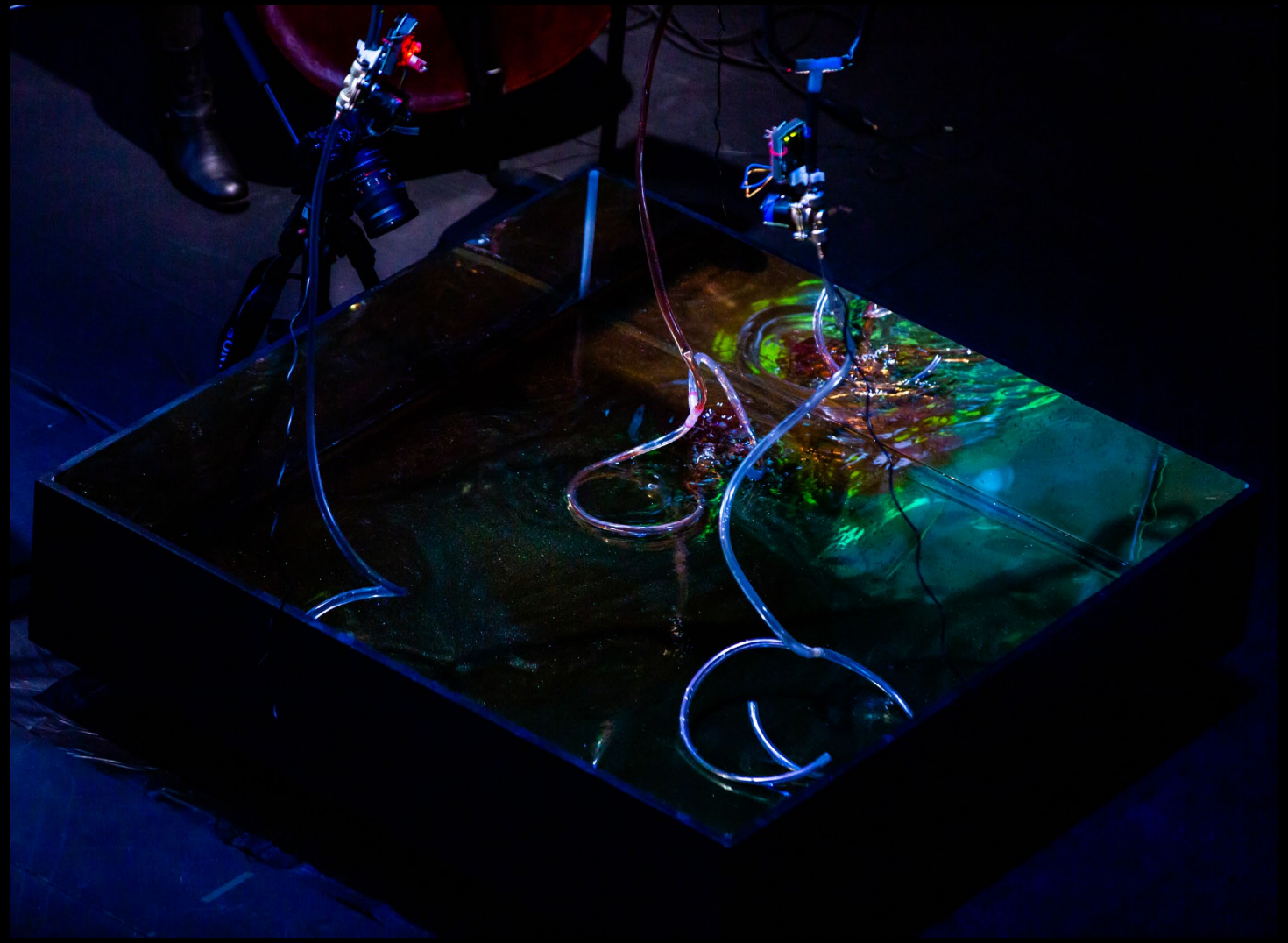
Projected Horizons is created from research footage donated by Dr. Joshua Jones of the Whale Acoustics Lab at the Scripps Institution of Oceanography. The soundtrack is a lament by composer Felipe Rossi from the Whale Acoustics Lab's arctic sea life recordings.

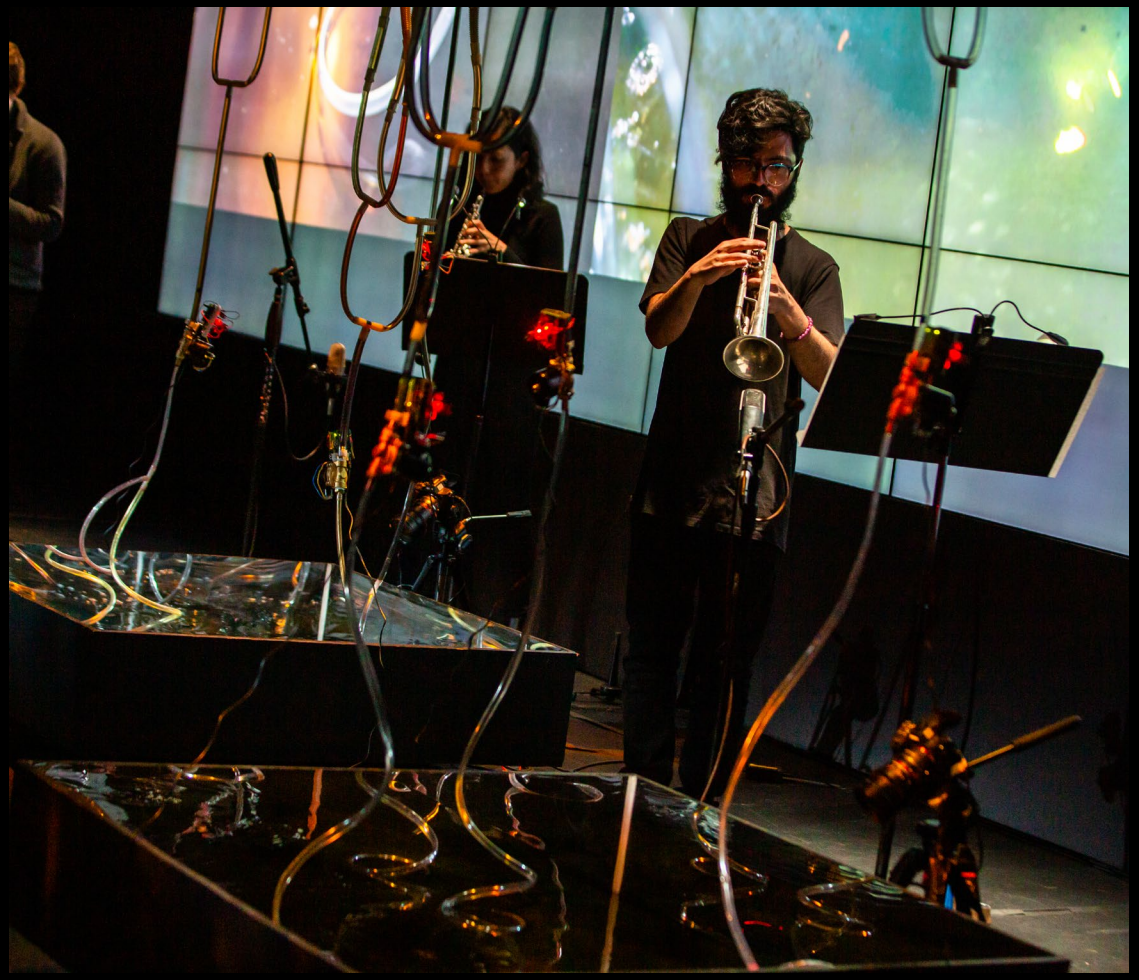
Projected Horizons' soundtrack is a data sonification, transforming projected rates of Arctic iceberg loss into music.

RISE

Rise is an audiovisual installation that explores the impact of climate change on our oceans, including rising sea levels, ocean warming, acidification, and loss of marine species. Created in collaboration with activist and composer Peter Sloan, it combines art and music to reflect on environmental changes and the concept of solastalgia, a form of distress caused by environmental loss. The installation features underwater recordings from the Arctic Ocean and oil drilling sounds from the Gulf of Mexico, played in surround sound. This multi-layered artwork includes a 55-foot video wall as a backdrop to three sculptural pools. Speakers under the pools vibrate with live music, making waves. The performance, lasting about 45 minutes, tells a story that starts with the celebration of oceanic biodiversity and ends in a quiet, mournful tribute to loss.

Over the course of the performance, rising water levels in the three pools became more polluted. Gas can sculptures dispersed colored water into the pools through valves that opened and closed in a pattern matching a dataset of global temperatures in the last century. I achieved this through programming Arduino microcontrollers and solenoids.



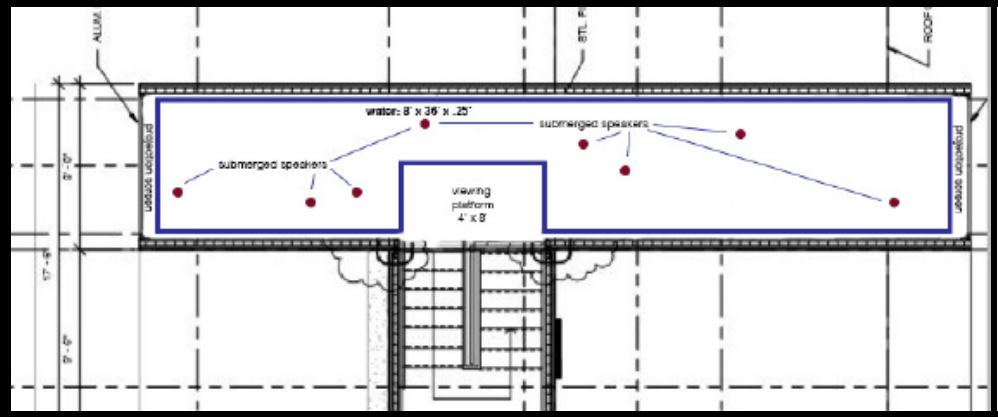


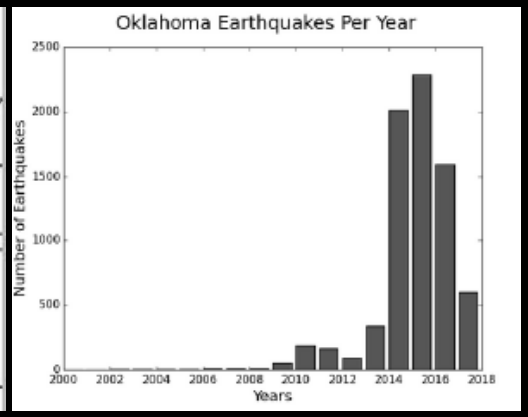
The musicians are mimicking the recorded sounds of sea life and marine traffic as instructed by the score. The featured performers are Ilana Waniuk (violin), Juliana Gaona-Villamizar (oboe), David Aguila (trumpet), Paul Roth (alto sax), and Kathryn Schulmeister (bass). Sea life sound recording archive access was provided by Professor Dr. John A. Hildebrand's Whale Acoustics Lab.

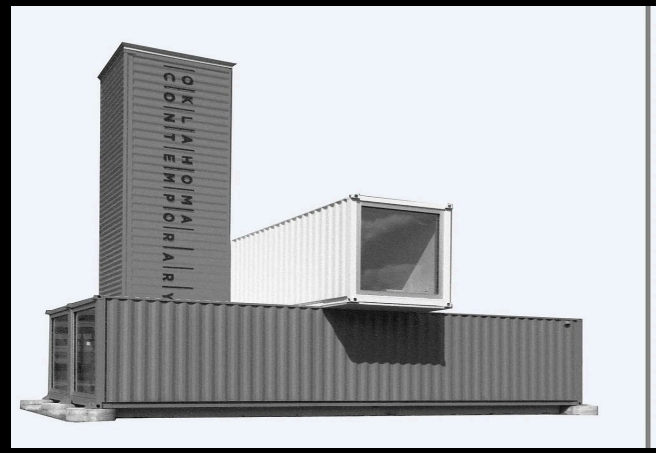
WAKE

Wake is a pool of oil-black water is disturbed by sound from submerged speakers. For this artwork, audio recordings of industrial water usage, including fracking, were gathered across Oklahoma. and composed into a data sonification of a decade of the state's seismic activity.

The graph on the right shows a dramatic increase in the frequency and intensity of earthquakes in Oklahoma that aligned with an increase in oil fracking. When legislation was enacted to regulate the activity, earthquake rates began to fall. Wake was a call to recognize human impacts on the planet.

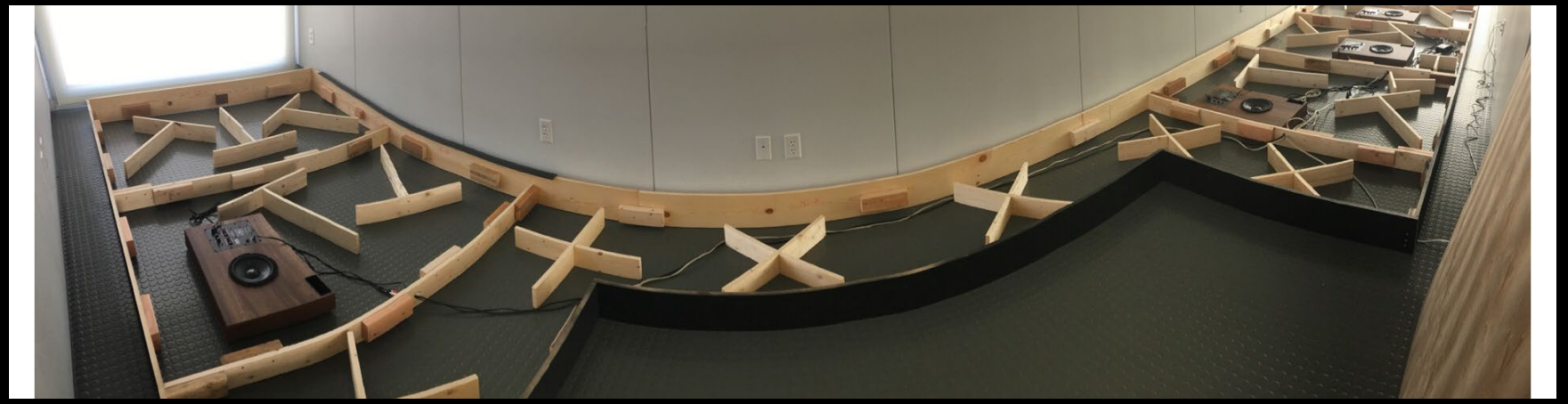


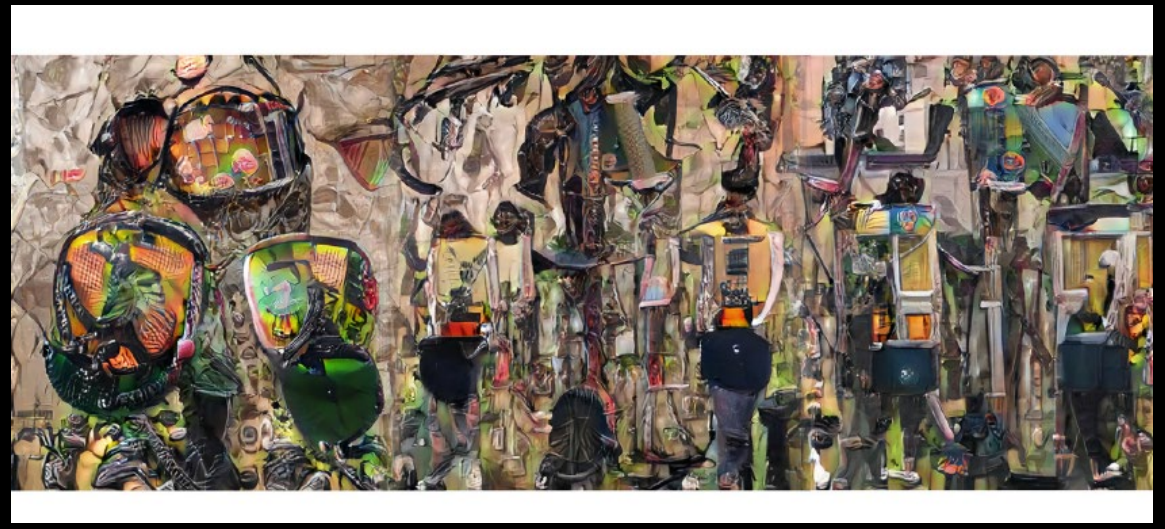




The pool was built from rubber liner underpinned by wooden framing. The water movements were the result of subwoofer movement beneath the liner.

Wake is a site-specific installation created in collaboratoration with Rena Detrixhe.

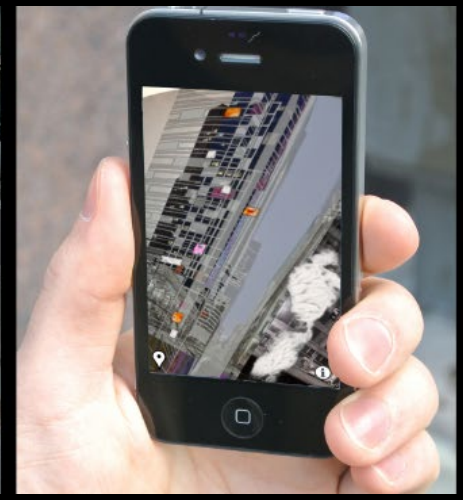




SYMBIOCITIES

Symbiocities was a creative exploration of VR experience I created through AI. It depicts imagined "living" cities inspired by the field of experimental architecture. The field involves creating responsive buildings that adapt to harsh environmental challenges by employing tactics found in nature.

RE(VIEW) IN SITU

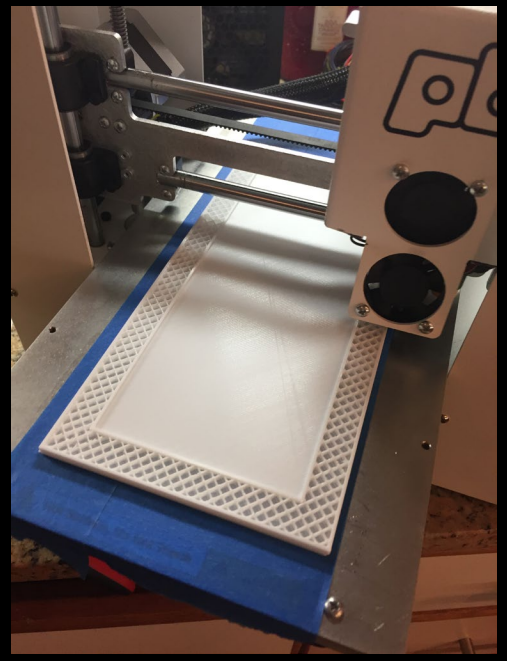


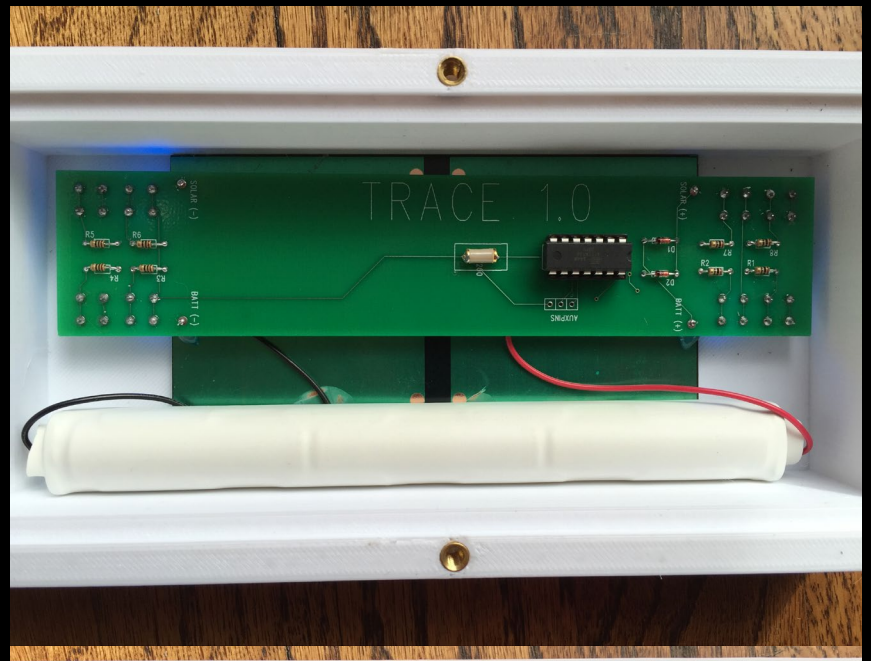
Re(View) in Situ was an early augmented reality project from 2012. It reimagined different city sites through a system of QR codes and a custom-built app for iPhone. Through the project I explored the perception that smartphones and the internet provide a means of eroding boundaries between the local, physical world and global, virtual worlds. It was commissioned by CRIO,the World Creativity Biennale, by curator Liana Brazil.

TRACE

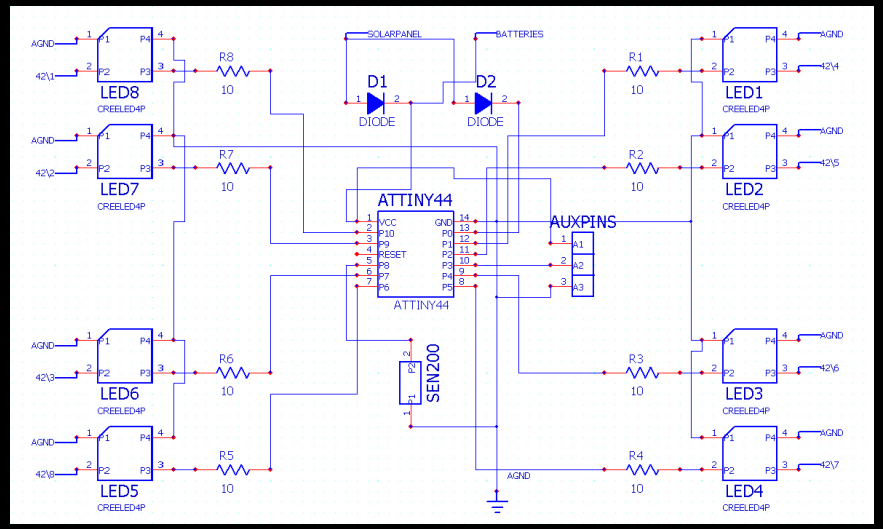
Trace was created in collaboration with Geoffrey Hicks. We created 300 solar-powered LED pavers individually cast in resin. Each paver responds to footsteps by shifting color from white to blue immediately and again a minute later, creating "traces" of pedestrian paths through the city. The pavers are powered by internal solar panels. 1/6th of the bricks contain additional circuitry sending time stamps of each footfall via an onsite wifi hub to an online database, providing an anonymous data record of visitor traffic

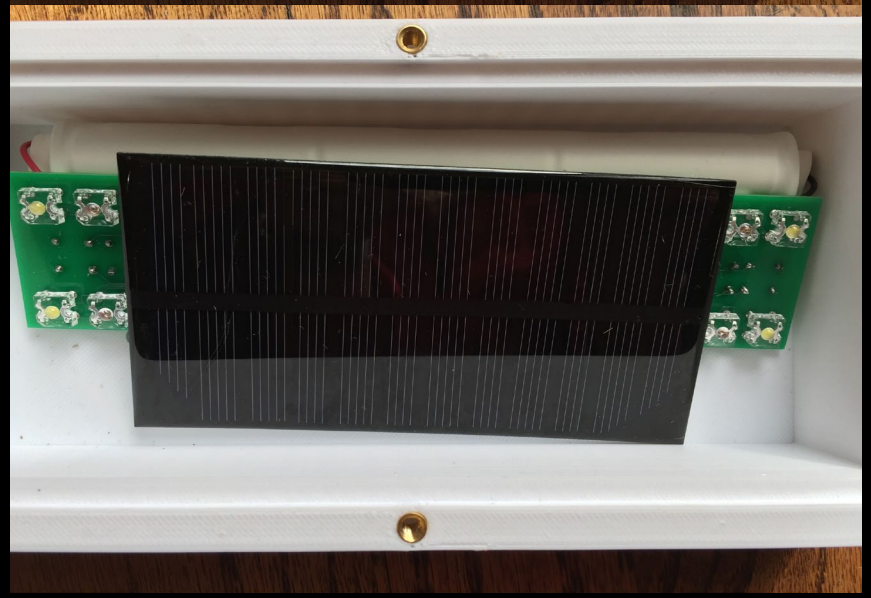
Trace was commissioned for the city of Tulsa by Urban Core Art Project, UCAP.





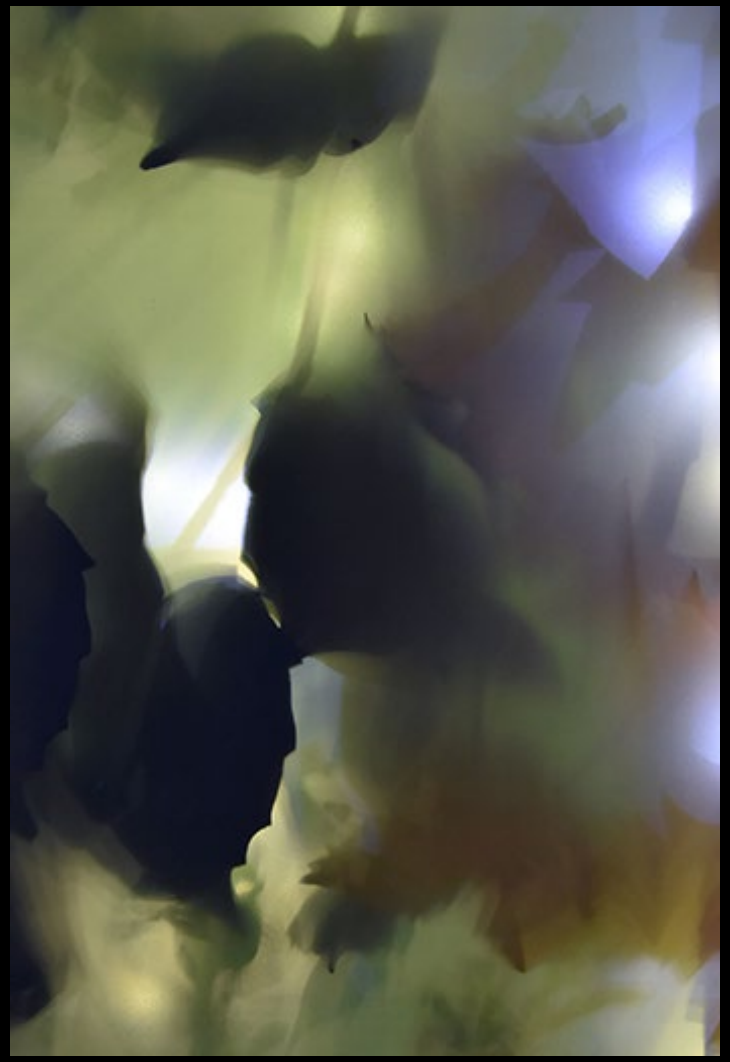
Trace was extensively tested before installation. Protype bricks were 3D printed and the final versions were cast in resin. Custom boards were produced by Sunstone. All design and production was carried out by myself and Geoffrey Hicks.





SUNLIT

"Sunlit" is a collection of light box paintings that imagine a future where city residents no longer experience green spaces through their windows. Instead, they see only backlit screens, pale imitations of the once common natural views. The installation screens mimic the appearance of digital screens but in fact I made them made of scrims, sculptures, and electronics. LEDs and motors were programmed in Arduino.



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