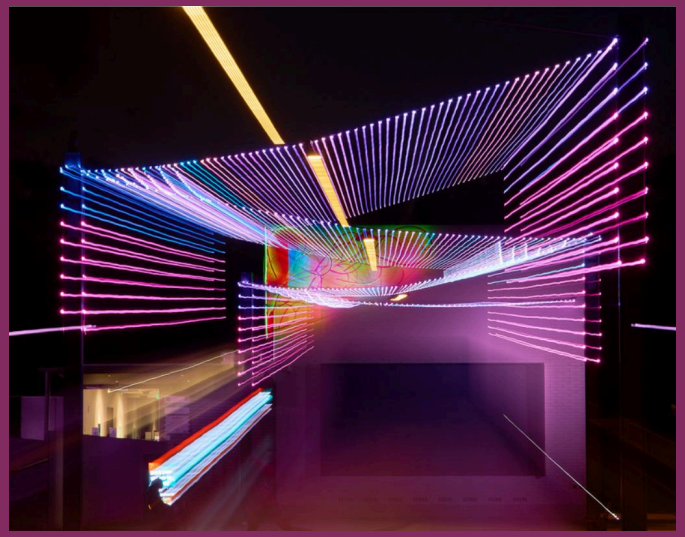
Experience Design Visual Report

IDEA 9202 A3



Videos for Cube and Catenary Concept

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Introduction

The Lake Macquarie area, located in New South Wales, Australia, is heavily covered in bush fire prone land, with around 60% of the city consisting of bushland areas (Lake Macquarie City, 2024). Bushfires are a natural part of the Australian environment, but can pose serious threats when they burn out of control near populated areas.

Historically, cultural or cool burns were employed by ancient Indigenous peoples to nurse the land back to health. This ancient tradition was done primarily to preserve wildlife, reduce bushfire risks, and to prevent food insecurity. In recent years, the NSW Government has employed a similar version of this in the form of Hazard Reduction Controlled Burns. The primary purpose of this is to reduce the risk of loss of properties and lives (Western Sydney University, n.d.).

These preventative fires help improve biodiversity, reduce wildfire risk, and allow native bushland to regenerate over the long term. The fires can open seed banks and release new vegetation. The ash from fires provides nutrient-rich fertilizer to the soil. This allows degraded areas of coastal scrub to be transformed into thriving ecosystems with healthy native plants.



(Lake Macquarie City Council, n.d.)

Climate in Lake Macquarie

In recent years, Lake Macquarie has experienced glaring changes in temperature and humidity due to climate change. During our research, we found that there is a trend of increasing temperatures, with more frequent and intense heatwaves. This is also a global phenomenon that is resulted from the melting icebergs in the Artic Region (Hancock, n.d.).
Humidity levels have also shown variability, contributing to changes in weather patterns and the overall climate of the region. These shifts have implications for local ecosystems and human activities, highlighting the need for adaptive measures to address the impacts of a changing climate.



(Deckee, n.d.)

Lake Macquarie Nature Environment Study

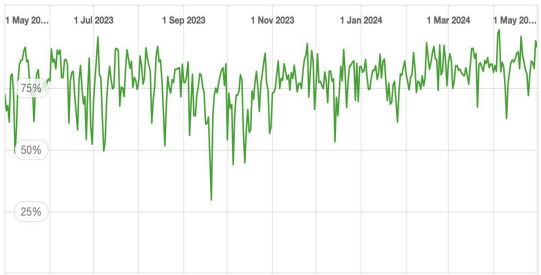
Despite our findings on the changes to the climate of the area, Lake Macquarie has a pleasant climate suitable for family engagements and outdoor activity. The beautiful surrounds create a relatively peaceful environment. However, there are still pollution problems;

Climate security

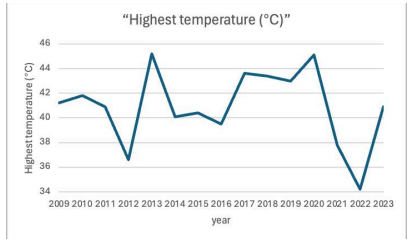
- Climate security refers to the impacts of the climate crisis on peace and security, particularly in fragile and conflict-affected settings.
- Climate change impacts can trigger competition over natural resources, insecure livelihoods, and mass displacement, increasing the risk of social tensions and instability.
- Investing in climate action can be an opportunity to strengthen cooperation, rebuild trust, and mend the social fabric in fragile and conflict-affected settings.

(What Is Climate Security and Why Is It Important?, n.d.)

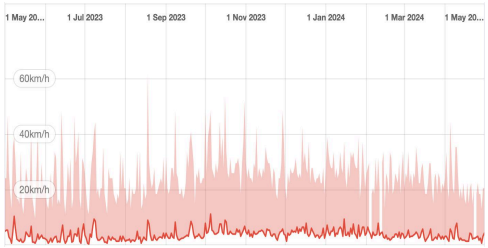
Climate data of Lake Macquarie



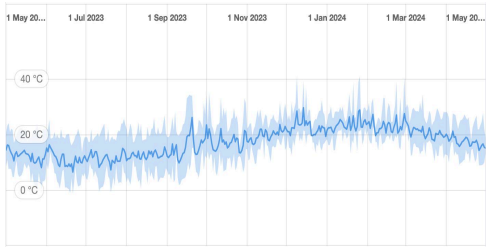
Humidity from 2023 May to 2024 May



Highest temperature from 2009 to 2023



Wind speed from 2023 May to 2024 May



Temperature from 2023 May to 2024 May

(Lake Macquarie (Cooranbong) Climate Statistics, n.d.)

Ideal humidity for human living environment is 40% to 60%

Too much or too little humidity can lead to disease

Average wind speeds in Lake Macquarie are estimated to be 6 metres per second

Uptake of wind energy is currently being driven by the Federal Government's Renewable Energy Target

Human emissions of carbon dioxide and other greenhouse gases are the primary drivers of the rise in temperatures

Lake Macquarie's emissions are projected to increase by approximately 39% between 2007 and 2030, and assuming similar growth patterns, approximately 55% by 2050

Fire

We examined the diverse spectrums of fire, recognizing it as a tool with both positive and negative impacts. Fire is utilized universally and for numerous purposes. It can give life, but in extreme cases, such as the Australian bushfires and other global tragedies, it can also bring death.

> fire is [...] essentially contradictory, [...] since it is both the sweetness and torture that lies at the heart and origin of our civilization'
>
> Klein, 1961

Schmidt(2019)

Artistic Fire Representation

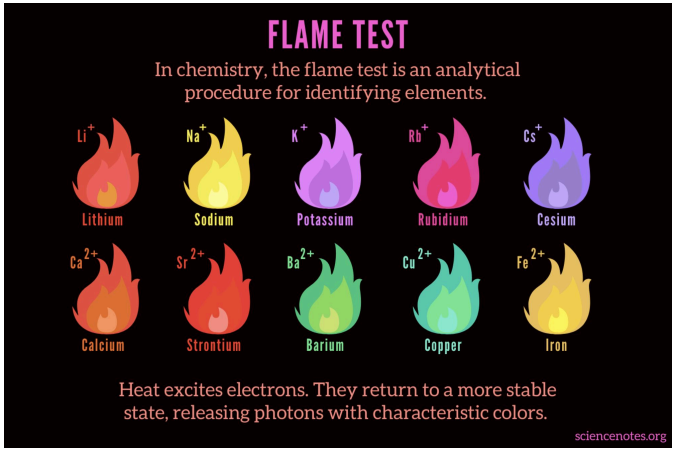
There are essentially two ways nature-inspired concepts can be utilized in art:

1. Illustrative: This approach emulates and enhances realism to convey a specific message.
2. Affective: This method brings spectators closer, evoking emotions tied to the chosen inspiration.

We chose to incorporate both approaches, using audio-visual elements to convey our intended message. Additionally, we explored various artistic and technological methods to capture the essence of fire.

Fire Science

The color of flames varies depending on the materials being burned and their temperature. Metals such as sodium, lithium, potassium, calcium, strontium, barium, and copper produce distinctive colors when burned due to their emission spectra. Understanding these properties is essential for authentically representing fire visuals.



(Helmenstine, 2024)

Symbolically represent fire's role in regeneration with visuals of dispersing "ash" transforming into butterflies or new growth.

Use heat lamps or simulated warmth to provide the sensory experience of fire's radiant heat

Utilize animation, spotlights, and projection mapping to recreate fire's fluid shapes and color variations.

Integrate dry ice to mimic smoke in an environmentally-friendly manner.

Incorporate audio elements such as crackling, roaring, and wind sounds.

Explored visual concepts and natural phenomena that loosely or tightly relate to fire

Design rationale of the Cube

Fire as a tool to show destruction and re-creation.

Goal

Our goal was to explore the different colours and forms fire presents itself as and use this to create a transformative and immersive Audio-Visual experience

Chosen themes to explore

- Gradual Dissipation
- Tyndall Effect
- Rebirth
- Circle of Life
- Creation and Destruction
- Hope

Design Decisions



Using “Fire Clouds” , we chose to simulate an ethereal and contemplative atmosphere. The audio is also symbolic of this giving viewers a hint into what the inspiration behind the visual is.

First Iteration

Interaction

Starting off with our conceptual Fire Clouds, when motion is detected moving towards the Cube walls (via the DoF sensors), ash is generated. As a viewer comes closer, their motion becomes a figurative wind that is spread and then green shoots begin to appear symbolizing new life.

Goal

Engage the audience to join the artwork and become part of the cycle of destruction and re-creation

Second Iteration

Interaction

Instead of ashes, we replicate the silhouette of the person on the cube walls. This will only be done based on proximity to the cube (~ 1m away from sensors). The silhouette gradually dissipates upward joining the art work as the other fire clouds make space.

Goal

Engage the audience with a representation of themselves living on as something else equally beautiful. Exploring themes of rebirth.

Upon further thought, we chose to use butterflies to replace the initial smoke and ash of out first iterations.
Butterflies are generally more positive as they symbolise new life and hope.

Design rationale of the Catenary

Visualising Climate change to raise awareness about environmental protection

Goal

Our goal was to create an engaging light experience that used technology as a tool for facilitating and creating meaningful conversations on global impact.

Chosen themes to explore

Gradual Dissipation | Tyndall Effect | Digital Placemaking | Co-Creation | Environmental Responsibility | Expressions of Nature

Design Decision

We chose to use environmental data to inform the light showcase of the Catenary. To do this, we wanted to use temperature, humidity and wind sensors. This would effectively create a solid intention behind the concept of the catenary and give it a thematic relationship with the local environment and globally.

Some Considerations

Visitors will not understand the inspiration behind the light movements

Resolution

Create a Landing page explaining the concept. Place a QR code leading to the URL of the landing page on the ground in strategic locations along the pathway (Refer to Appendix Page 1).

First Iteration

Interaction

A colour will be assigned to people using a worn sensor. That colour travels based on the speed at which the person moves and clashes into the current colour of the catenary to create a mix of both colours.

Goal

Actively engage visitors with the installation by using luminance feedback through colors. This interaction with the catenary structure could potentially enhance the representation of the concept.

Second Iteration (After User Evaluation)

Interaction

Using force-sensitive floor panels we create a more engaging interaction. These panels are strategically placed along the path to the Cube, invite engagement and interaction. When a visitor stands under the LEDs, the panels detect their presence, causing the lights above to shine brighter.

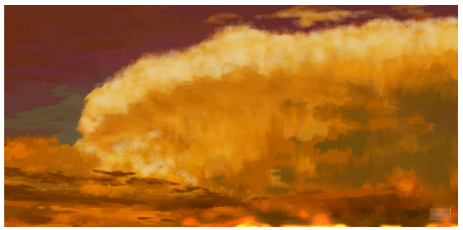
Goal

The Goal was the same as our initial iteration however this approach seemed more straightforward and less obtrusive. Wearable sensors raise questions on hygiene and disinterest from visitors.

Inspiration and Design Vision

Aesthetic inspiration for the Cube

We explored various artworks that use fire as a conceptual tool for creation. To achieve this, we developed a mood board showcasing different patterns, art styles, and emotive elements we wanted to incorporate into our effects. Drawing inspiration from these artworks and our background research, we created our visuals.



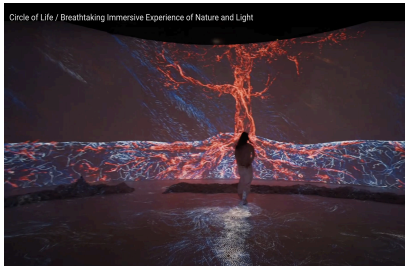
(Tarragón, n.d.)



(TeamLab, 2022)



(Ramsay, 2013)



(Limelight Art, 2021)



(Shuttershock, n.d.)

Aesthetic inspiration for the catenary

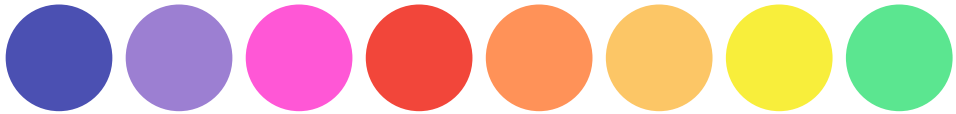
The glass trestle bridge in the valley inspired us to create a force sensitive path with to have the effect of gathering visitors to encourage participation. We also chose an array of different colours that hint at different weather conditions based on the Environmental sensor data received.



glass trestle bridge 1 (Amazing Suspension Bridges Around the World., 2018)



glass trestle bridge 2 (A Glass Panel on a Bridge Shattered in Indonesia, Killing a Tourist., 2023)



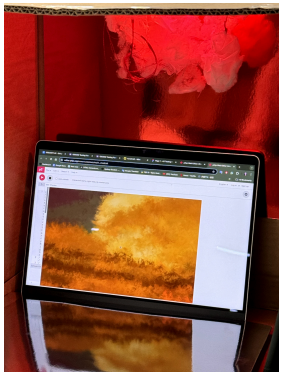
Target Audience

Based all our findings and our background research, we selected our target audience and worked on our prototype for the User Evaluation Phase.

- People that care about the environment
- People that are not aware of their environmental impact
- People that are unfamiliar with technology

User Evaluation and Prototyping

Cube and Catenary Prototypes





Images from User Testing Session



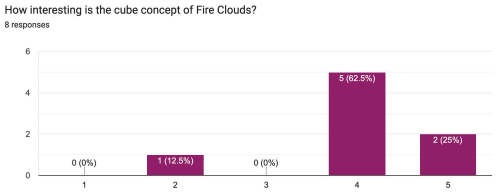


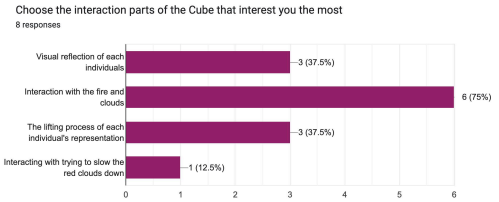


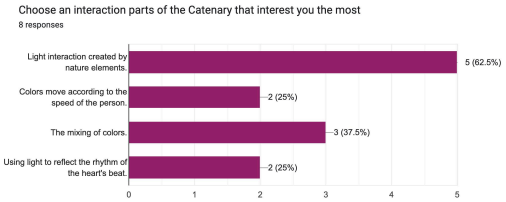
Tools and Methods Used

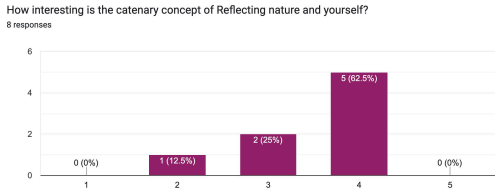
- Wizard of Oz Prototyping
- Hybrid Prototyping
- p5js
- Google Forms
- Art Tools

Questionnaire Results









Insights from User Test

- Meaning behind the cube and catenary concept is lacking.
- How can the catenary concept be more linked to Lake Macquarie?
- The interaction with the catenary is not explicit.
- How do we let people know the elements behind colour in the catenary passive mode?
- How will people know how interaction within the cube is done?

How did we implement some of the feedback received?

Meaning behind the cube concept is lacking.

Themes:
Nature Lifecycle and Rebirth: Using fire as the central reflective tool.
Levels of Interaction:

1. Silhouette Representation: Instead of showing the outline of the body, use vibrative elements to represent the silhouette.
2. Visual Transformation: After visitors stay for approximately 10-15 seconds, the visual representation disperses into butterflies with colors and varying depths similar to the artwork, becoming part of the installation.

The interaction with the catenary is not explicit.

Creating a pathway in the middle of the catenary walkway. Once presence is sensed on the walkway, the lights above the audience will be brighter where they are.

Visual cue for people to know how interaction within the cube is done. Clarity in the interaction within the cube.

Guidelines to let people know how interaction is done. Create a brochure to introduce the whole process and distributed to viewers before they enter the cube.

How to let people know the elements behind colour in the catenary passive mode?

Creating a landing page with more information on what the catenary concept is about and put the QR code on the ground.

How can the catenary concept be more linked to Lake Macquarie?

Theme: showing the nature environment of Lake Macquarie, people's affects to Lake Macquarie and people's social connection.
Levels of interaction:
1. Using Lake Macquarie's real-time temperature, humidity, wind speed data to control light flow speed and colors.
2.When audience enter the force-sensitive path, the the lights overhead gradually increase in brightness and lights will follow their movement.

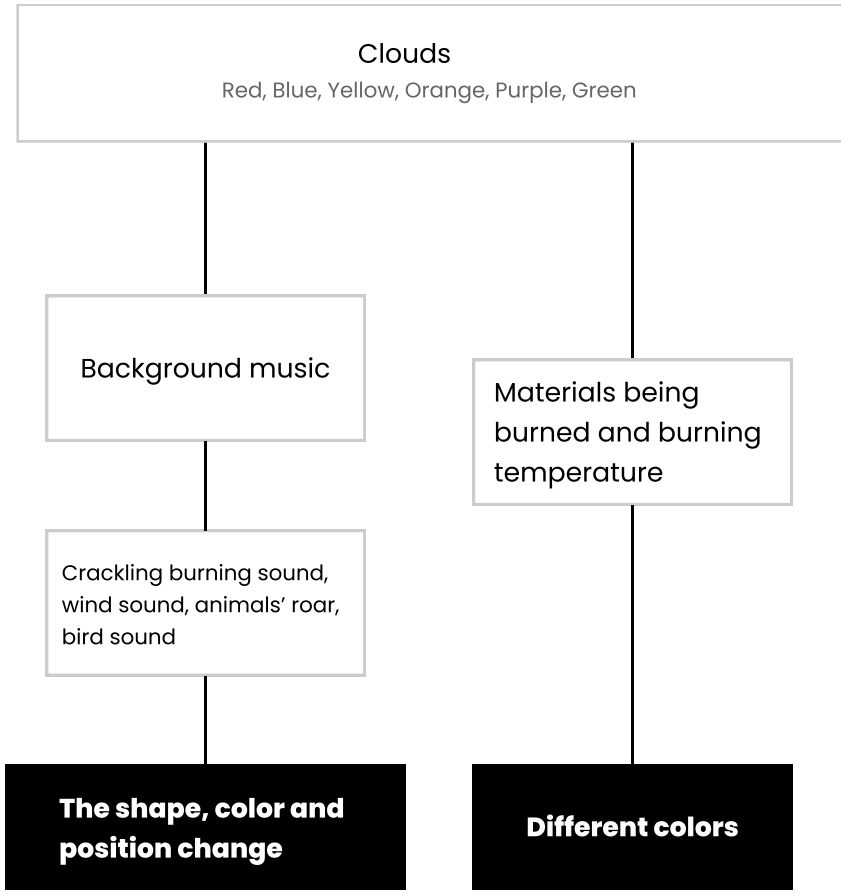
Fireborn Metamorphosis

Embrace the Transformative Power of Fire – The Journey of Rebirth

Themes & Materials

Indoor | Artistic Representation | Light | Nature | Environmental Awareness | Projection | Reincarnation

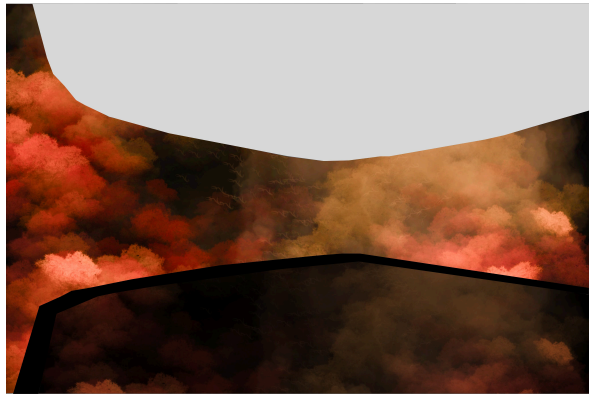
Step into the transformative power of fire with "Fireborn Metamorphosis" - an immersive audio-visual experience that takes you through fire's cycle of destruction and re-creation. Envelop yourself in swirling flames rendered in light, smoke and sound. As you close to the sensors, your own silhouette emerges in the screen, then dissipates into a flurry of digital butterflies - a symbolic rebirth unleashed by fire's force. You will become part of the art itself, your presence catalyzing the regenerative cycle.
A multi-sensory experience capturing fire's brilliant colors, charming shapes, and the renewal it sparks in the natural world.



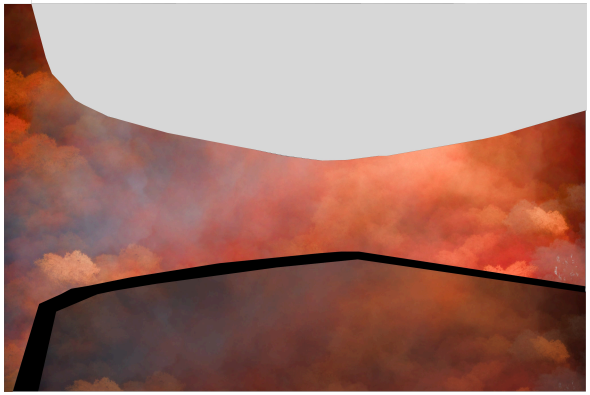
Fire is not just destruction, but rebirth.

Passive mode

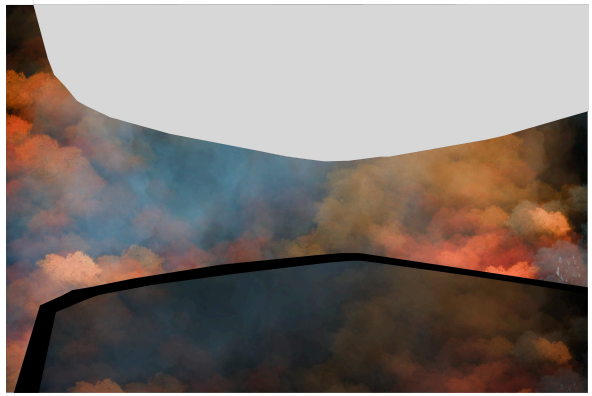
- Clouds and smokes are changing all the time according to the background music.
- Fire has different colors, shapes and size: red, yellow, orange, blue, green, white (depending on different temperature, chemical elements…)



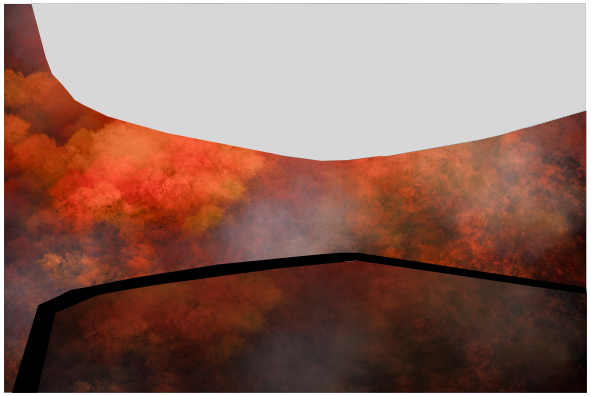
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❷



❸



❹

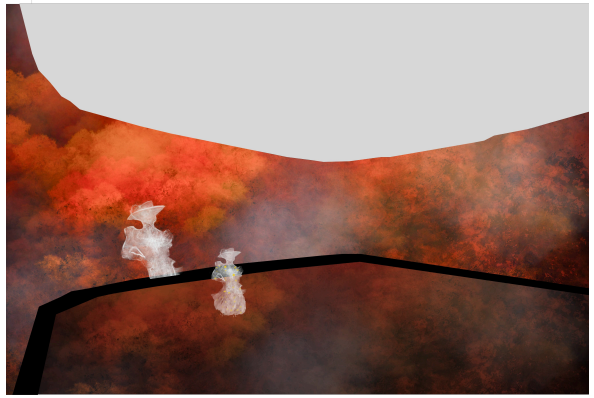
Background music change

Background music elements:
peaceful music, crackling burning sound, wind sound, animals' roar

Wind sound comes from all directions
The volume of the burning crackling sound will increase as the wind blows

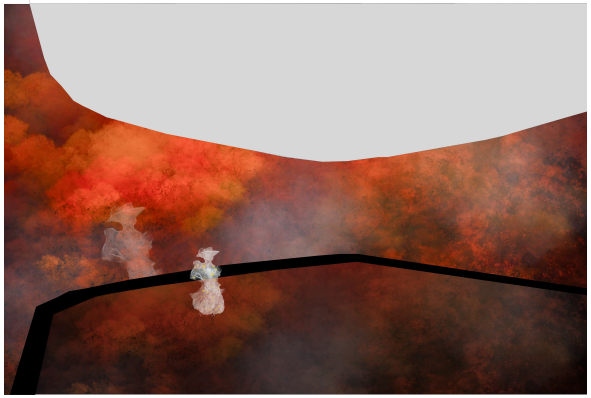
One-person mode

- on the floor is real person
- on the screen is silhouette



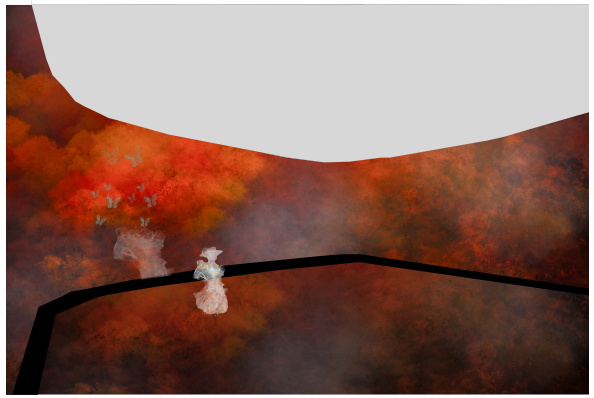
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- When one person closes to the sensor, their body silhouette will be present in the screen.
- The color will be related to the screen.



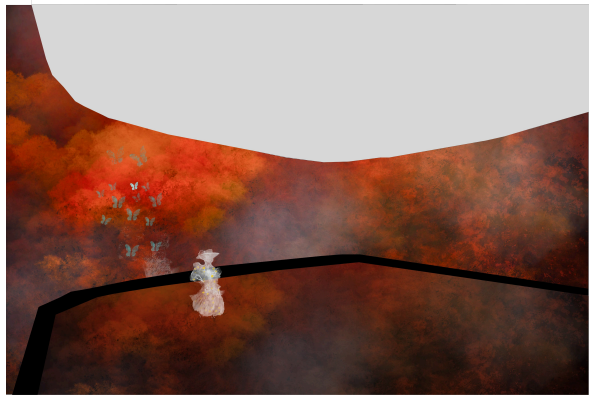
❷

- After seconds, the outline will become faint.
- The background music will also have the sound of wind blowing.



❸

- After seconds, the shape will disappear gradually and become butterflies.
- Butterflies will have different size and color.



❹

- Close to the end, all human silhouette will will turn into butterflies.
- In the end, butterflies will disappear in the clouds and smokes eventually.

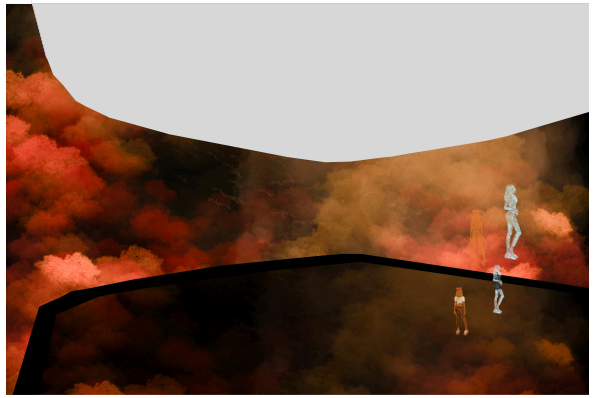
Background music change

Background music elements in scene 1, 2:
peaceful music, crackling burning sound, wind sound, animals' roar

Background music elements in scene 3, 4:
peaceful music, bird sound

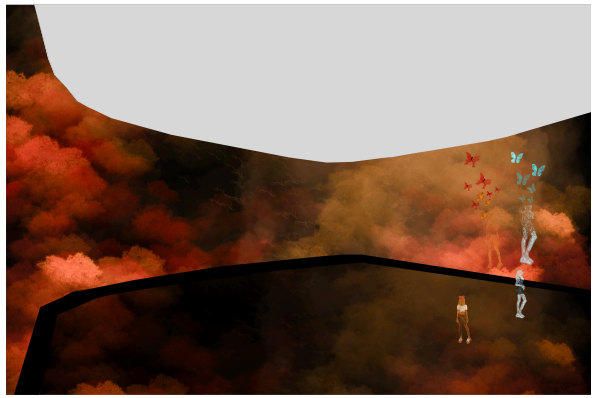
Multi-person mode

- on the floor are real person
- on the screen are silhouette



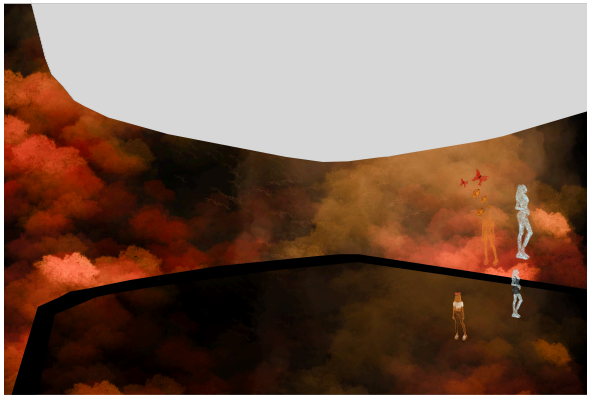
❶

- The color of everyone's outline is different but will be related to the screen.
- The shape sizes are different, depending on their position (distance from the screen)



❸

- The time it takes for the silhouette to turn into butterflies also varies, depending on when the viewer reaches the sensor.



❷

- All the shapes will disappear gradually and become butterflies which mean rebirth and new life.
- Colors of butterflies are related to the silhouette's color and screen's color.

Background music change

Background music elements in scene 1, 2:
peaceful music, crackling burning sound, wind sound, animals' roar

Background music elements in scene 3, 4:
peaceful music, bird sound

Significance for the Client

Symbolic Rebirth:
Fire has lots of negative meaning, bring devastating effect on people's life. But it also can be a powerful symbol of renewal and regeneration across cultures. By visually representing the transformative cycle of flames giving way to new life in the form of butterflies, this project allows audiences to intuitively experience fire's metaphorical role as a catalyst for rebirth.

Interactivity & Personal Connection:
As audiences directly influence the generative fire visuals through their movements and physical presence, they are no longer passive viewers, but become co-creators to make the experience's symbolic rebirth. This degree of interaction facilitates a deeper personal connection by allowing each individual's participation to shape the artwork's transformative journey. The audience is not just watching rebirth but literally embodying it through their involvement, more easily lending profound resonance.

Multisensory Engagement:
The project's multi-sensory approach combining responsive visualizations, surround sound design, simulated smoke completely immerses participants within a breathtaking representation of fire's elemental force. This full-body sensory experience allows the symbolic concepts to transcend mere intellectual appreciation to evoke guided instinctual and emotional resonance with fire's primal essentiality across human history as both a destructive and vitalizing natural power.

Elemental Symphony

Nature's Rhythms, Amplified Through Interaction

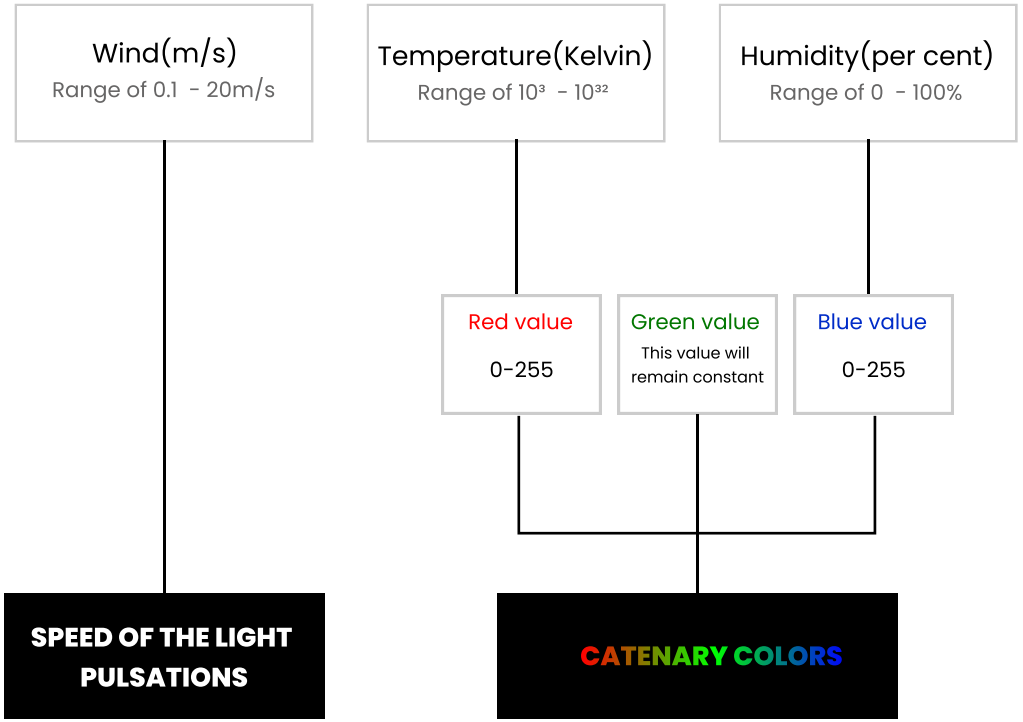
With the immense foot traffic in the surroundings of MAP mima, we set out to create an experience that would complement this and still create a sense of awe and appreciation for the visual aesthetics of the catenary.
Elemental Symphony is an immersive light experience that mirrors changes in the environment by gathering ambient data. These visual colour changes are then altered by single and multi-viewer interactions. The goal is to reflect elemental relationships in a visual and exciting way.

The concept is inspired by the inspired by the subtle but significant impacts of climate change on Lake Macquarie. Climate change is often misconstrued as a sudden and catastrophic event when, in reality it is an accumulation of subtle changes in environmental factors such as temperature, humidity, wind speed.
We have three fundamental interaction phases each of which visualize social relationships between nature and humans in different contexts.

> Climate is a living, breathing entity that responds incrementally and immediately to our good and bad decisions.

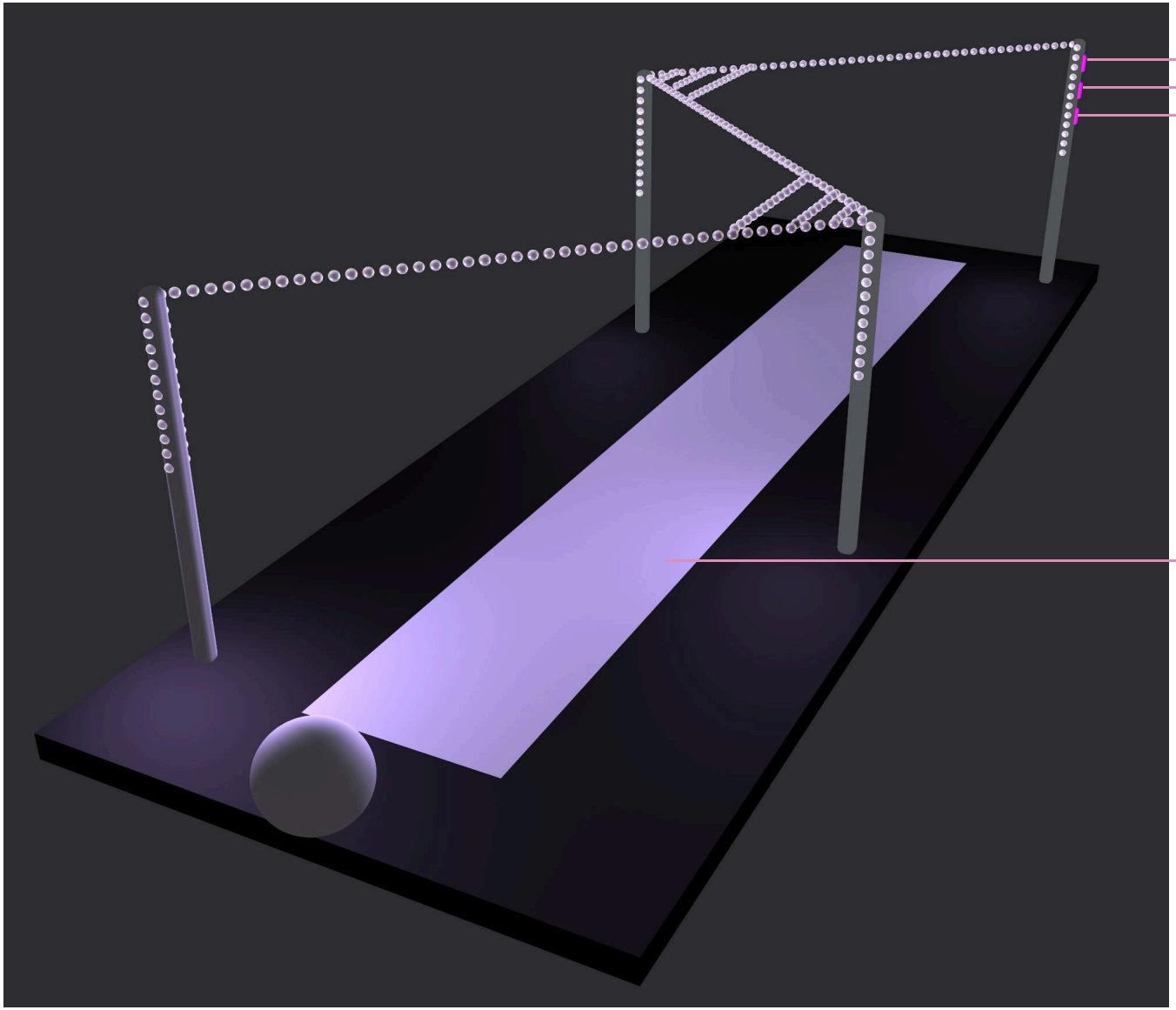
Themes & Materials

Outdoor | Artistic Representation | Light | Nature | Environmental Awareness | LED Lights | Sensors and Actuators



Visual description of the elements of the passive mode. The green value remains constant in order to reduce the variability of colours returned.

Environmental Data referenced from openweather.org
Catenary Fig 1.1

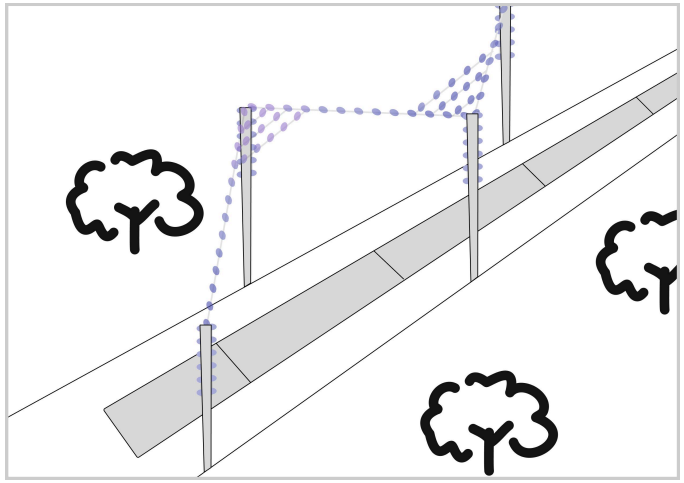


Catenary Fig 1.2

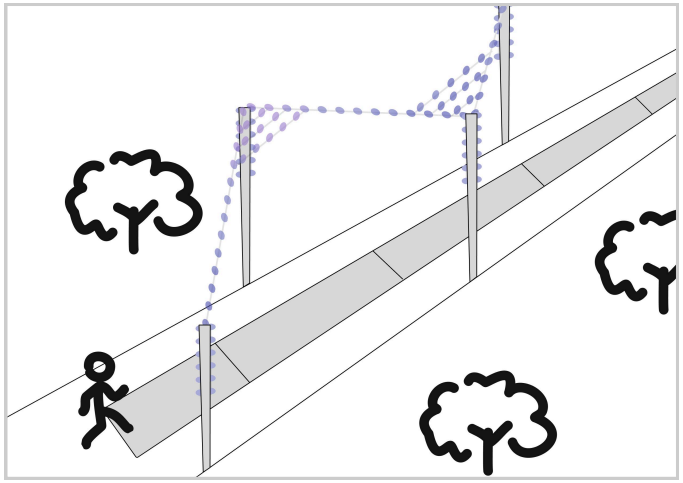
The image above shows the suggested location for the sensors. The Catenary poles have partitions that house the necessary wired connections needed to power the catenary

Why Sensors and not an API data point?

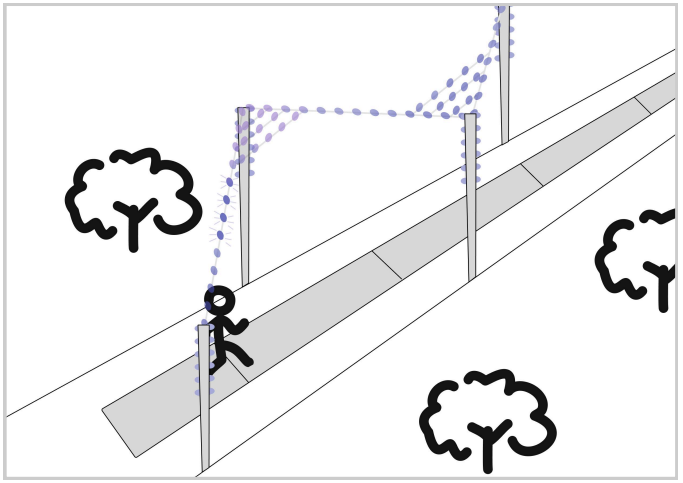
Using sensors present a unique opportunity to ensure that the ambient environment data is received is more fine tuned based on preference and the intended use.
Additionally, APIs tend to have downtime and using third-party sources introduce security concerns.



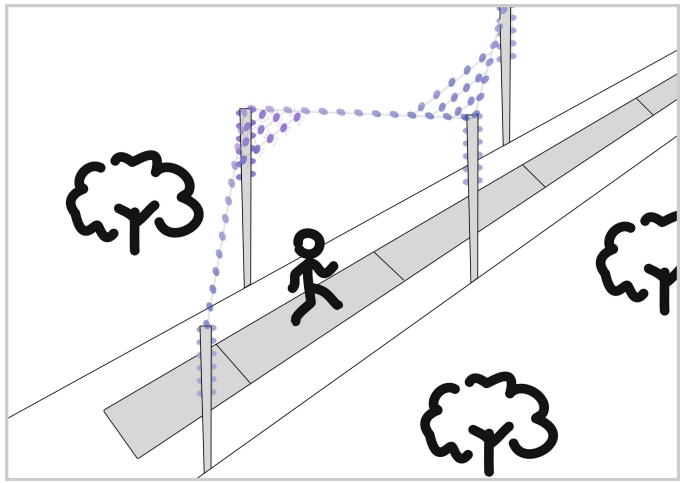
Passive Mode involves interaction between 3 fundamental sensor sources as shown in Catenary Fig 1.2.
The scene above is a depiction of a cold and slightly humid day.



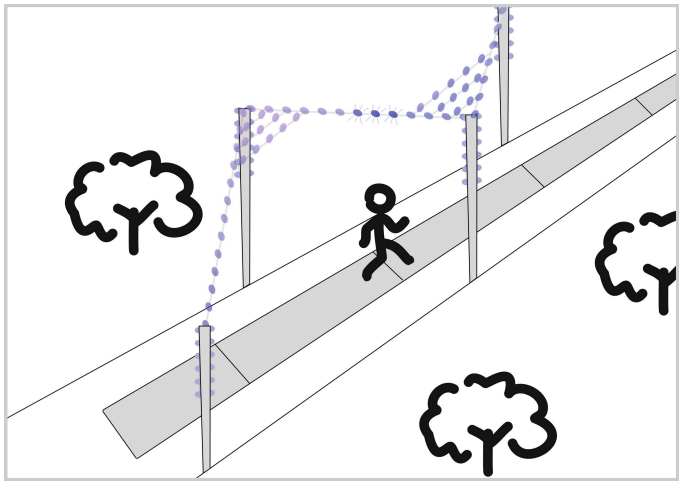
Darren sees the path to the cube and chooses to walk on it. This path uses force-receptive flooring to sense Darren's position and creates a corresponding effect on the catenary as shown in the following scenes.



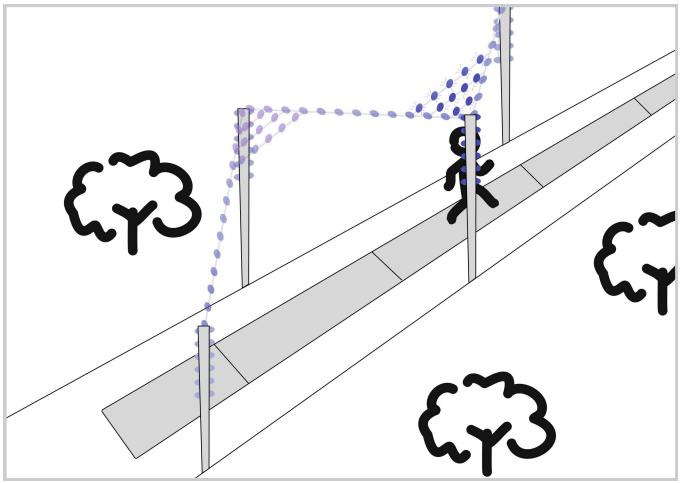
When Darren reaches a point between the specified range of 10-20% of the force-sensitive path, the lights overhead (i.e. only 10% of the center of the light module) gradually increase in brightness.



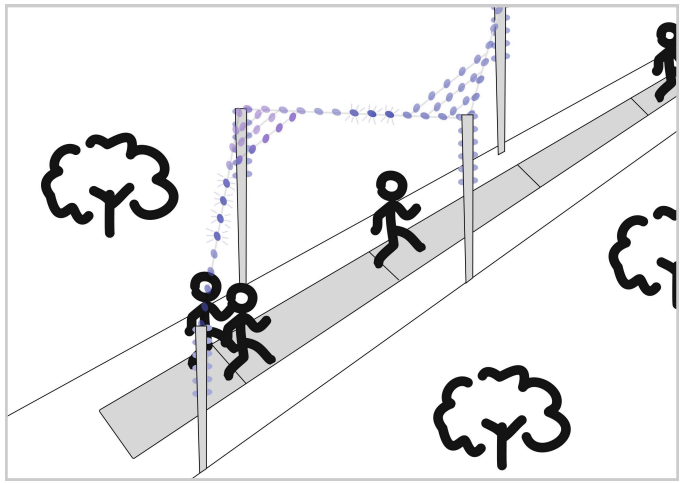
At a point between the specified range of 30-40% of the force-sensitive path, the lights overhead gradually increase in brightness.



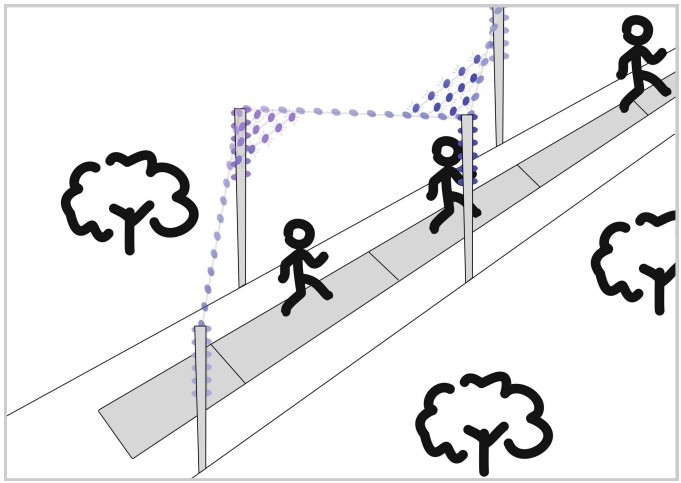
At a point between the specified range of 50-60% of the force-sensitive path,the lights overhead (i.e. only 10% of the center of the light module) gradually increase in brightness.



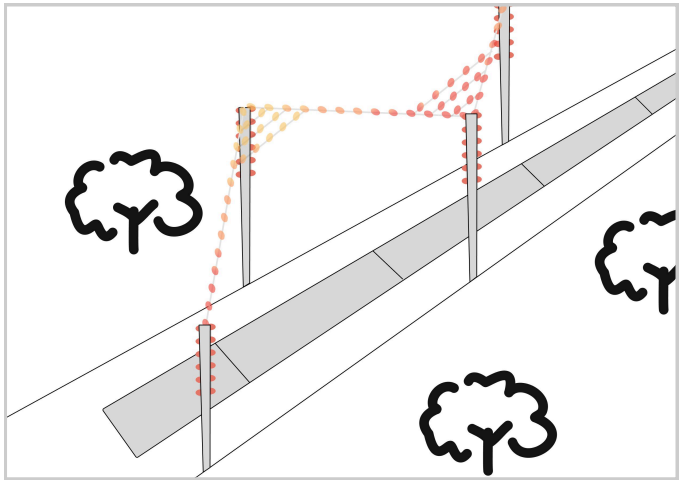
At a point between the specified range of 70-80% of the force-sensitive path, the angled lights to the right gradually increases in brightness.



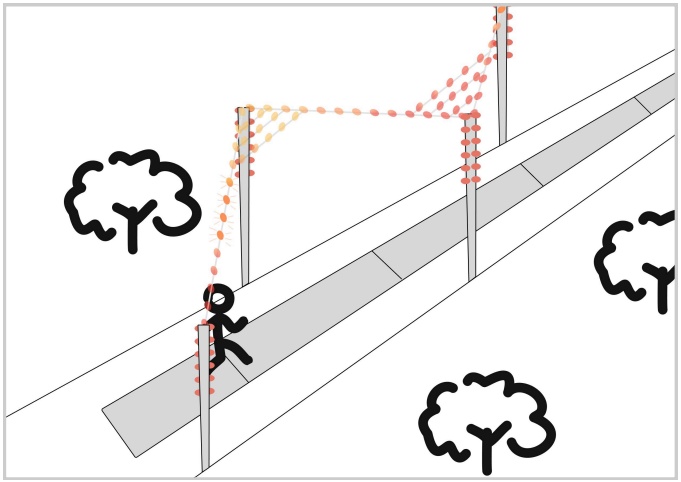
When there are multiple viewers on the pathway, the individual effects are amplified, creating a complex and evolving visual experience.



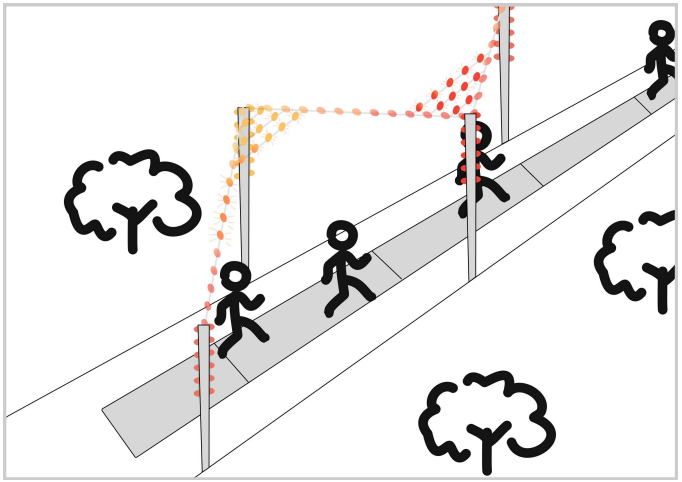
The lights become brighter relative to the position and amount of people on the pathway.



Similar to Scene 1, this is a representation of another weather use case. This is a depiction of a hot and mildly dry day.



Single viewer interaction mode



Multi viewer interaction mode

Significance for the Client

Elemental Symphony is a transformative concept that perfectly aligns with MAP mima's mission to foster community engagement and spark critical dialogues about environmental issues on both local and global scales. Integrating this innovative installation can enhance MAP mima's role as a cultural hub, highlighting the gradual yet significant impacts of climate change in an engaging and educational manner.

Highlighting Accumulative Climate Change

Inspired by the subtle yet impactful effects of climate change observed in Lake Macquarie, Elemental Symphony addresses a common misconception: that climate change is sudden and catastrophic. Instead, it often manifests gradually through incremental changes in environmental factors. This installation visualizes elements such as temperature, humidity, and wind speed, making the invisible impacts of climate change visible. By illuminating these transformations, Elemental Symphony educates visitors on the continuous and accumulative nature of climate change, emphasizing the importance of sustained, collective action.

Enhancing MAP mima's Cultural Role

Implementing Elemental Symphony will attract a diverse audience and enhance MAP mima's reputation as a forward-thinking cultural hub. Bridging art, science, and community engagement, this installation reinforces MAP mima's commitment to fostering meaningful dialogue and action on critical environmental issues, solidifying its position as a leader in cultural and ecological education.

Raising Awareness and Inspiring Action

By visualizing the gradual impacts of climate change, Elemental Symphony raises awareness about a critical global issue. It encourages visitors to reflect on their environmental impact and participate in sustainable actions, aligning perfectly with MAP mima's goal of sparking important conversations.

Limitless Possibilities for Engagement

Elemental Symphony offers boundless opportunities for creating engaging, multifaceted experiences. Designed to raise awareness about humanity's impact on the environment, it also provides endless possibilities for games and extended interactions suitable for both children and adults. This adaptability ensures the installation remains engaging and relevant to a diverse audience, making learning about environmental issues both fun and impactful.

Interactive and Engaging Experience

The use of force-sensitive floor panels transforms passive observation into active participation. Visitors become integral to the exhibit as their presence and movements influence the visual display. This interaction fosters a sense of co-creation, highlighting the power of collective action and underscoring our shared responsibility in addressing environmental challenges.

Team Contributions

Group Work	Mowanuola (Mowa) Akin-Jimoh	Zhaopeiwen Xiang	Yuer Yuan	Tingyu Tang
Choose technique for user evaluation	Sketches for catenary	Sketches for Cube	Video Script for Cube	Moodboards
Decide on visual design of the cube	Storyboard creation for the catenary	Sound design for the cube	Animation for the cube	Landing page for catenary
Cube Prototype	Animation and 3D design for catenary	Storyboard creation for the cube	Record Video for Cube	
Catenary Prototype	Video Script for Catenary			
User Testing Prototypes	Record Video for Catenary			
Visual Report				
Background research in Lake Macquarie				

Appendix

Catenary Landing page

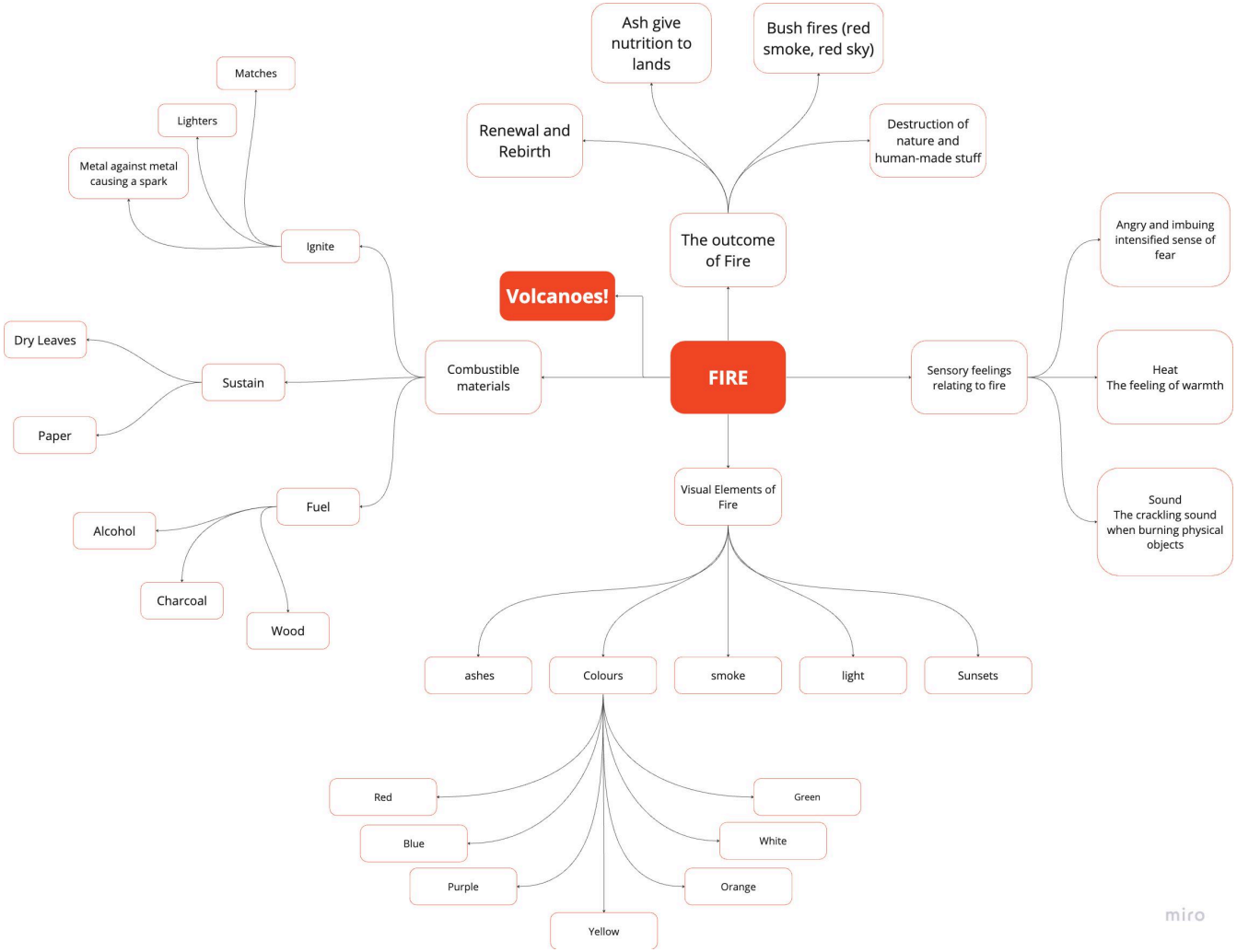
View Interactive Prototype

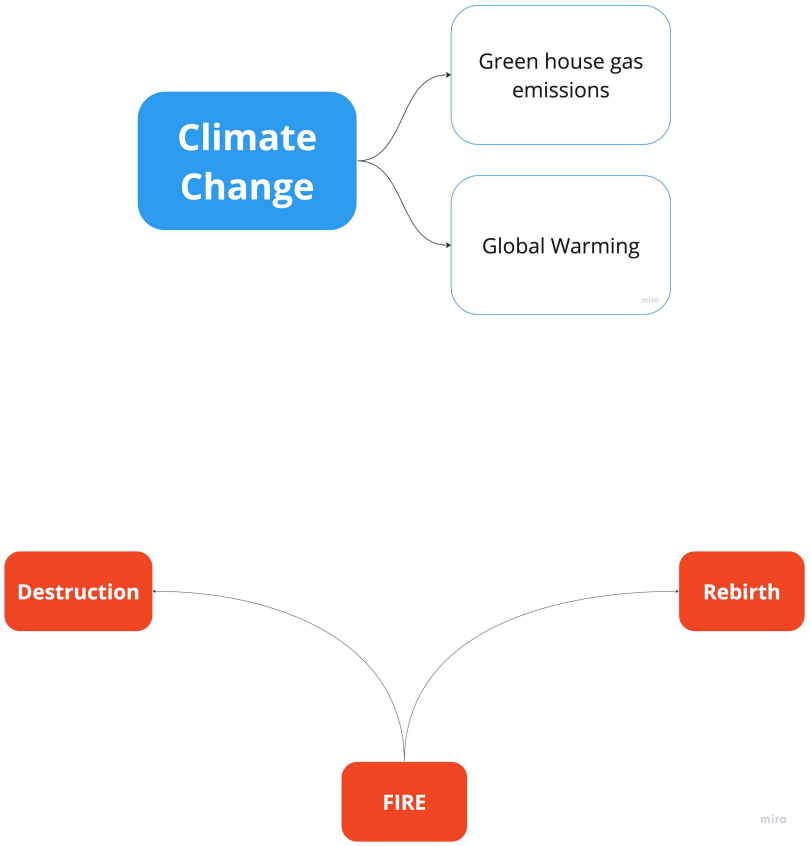
Miro Board

Link to Miro Board

Thematic Exploration

Mind Map on Fire and Climate Change





Thematic Exploration

Moodboards

Moodboard for the Cube

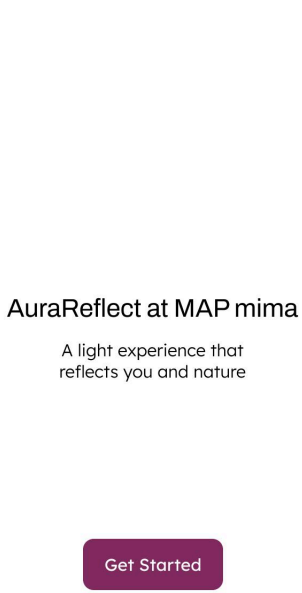


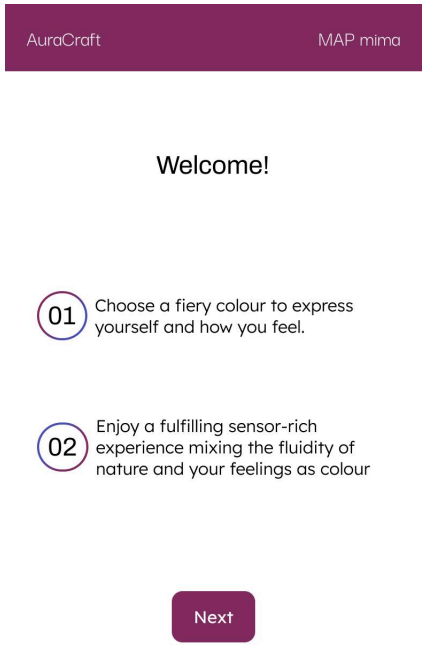
Moodboard for the Catenary

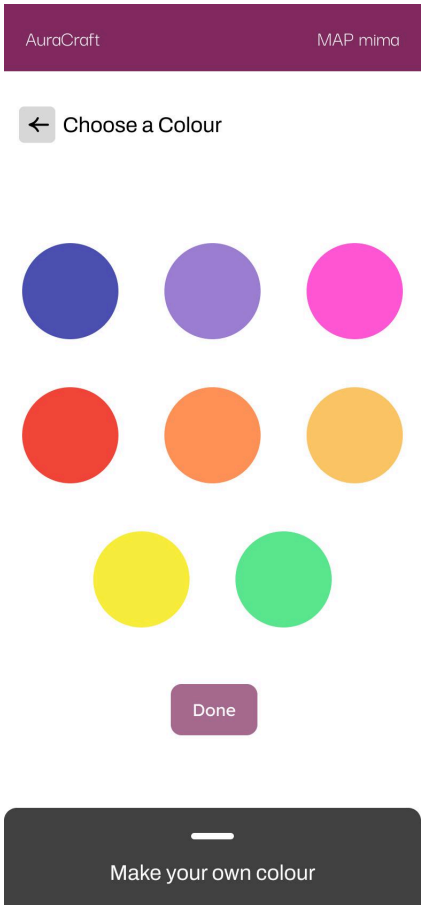


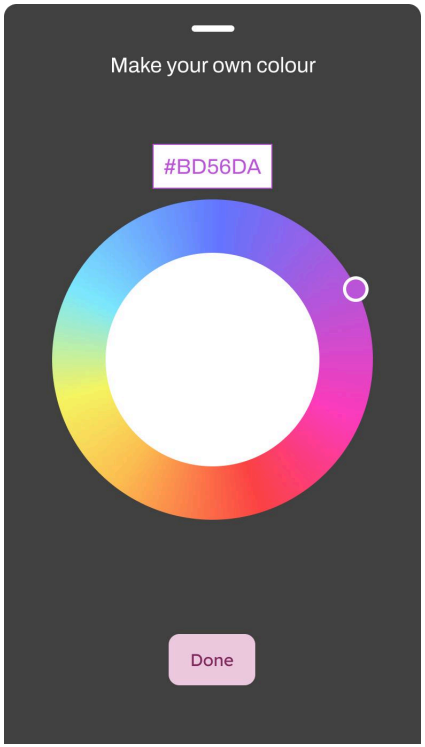
Assets for User Evaluation Session

Initial Digital Prototype for User Evaluation









Slides for Videos

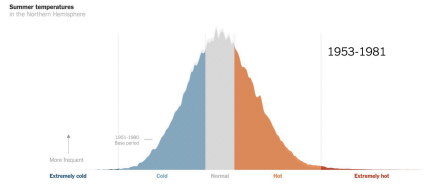
Catenary

Elemental Symphony

Nature's Rhythms, Amplified Through Interaction

Themes & Materials

Outdoor | Artistic Representation | Light | Nature | Environmental Awareness | LED Lights | Sensors



Climate change is often perceived as sudden and catastrophic.
In reality, it accumulates gradually through incremental changes in environmental factors.

AuraCroft

Elemental Symphony

Nature's Rhythms, Amplified Through Interaction

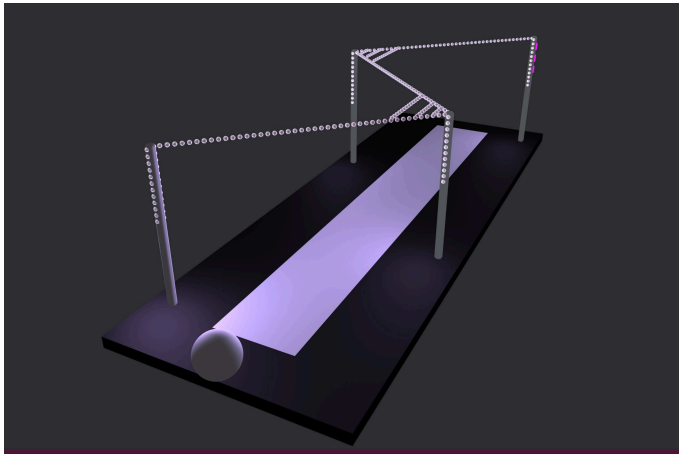
Wind(m/s)

Temperature(Kelvin)

Humidity(per cent)

Small changes in temperature, humidity, and wind speed can have profound ecological effects over time.
These changes may go unnoticed but contribute significantly to the overall impact on the environment.

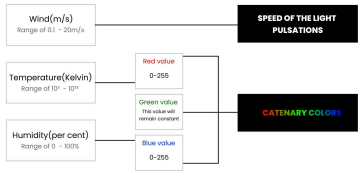
AuraCroft



AuraCroft

Passive Mode

Nature interacting with Nature



AuraCroft

Elemental Symphony

Interaction Phases

Initiate meaningful dialogue on Environmental Awareness

Inspire playfulness and educate in a fun and engaging way

Foster Community Engagement

AuraCroft

Slides for Videos

Cube

Fire Metamorphosis

Embrace the Transformative Power of Fire -
The Journey of Rebirth

Themes & Materials

Indoor | Artistic Representation | Projection | Life Cycling | Audio-visual Experience | Reincarnation



North of Walhalla (24 September 2007)



Same location 13 months later (October 2008)

Fires create and destroy crucial elements for wildlife and are especially integral to the life cycle of many species.

AuraCraft

Fire Metamorphosis

Embrace the Transformative Power of Fire -
The Journey of Rebirth

Themes & Materials

Indoor | Artistic Representation | Projection | Life Cycling | Audio-visual Experience | Reincarnation

3D depth motion sensors

Detect and calculate each visitors distances and movements

Reflective floor

Enhance the immersive experience

Smoke machine

Increase dynamics within the Cube

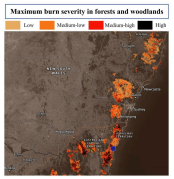
AuraCraft

Fire Metamorphosis

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Fires create and destroy crucial elements for wildlife and are especially integral to the life cycle of many species.

AuraCraft

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Wombat burrow and footprints
– Wilsons Promontory 7 March 2009



Swamp Wallaby with burnt feet
– Wilsons Promontory 7 March 2009

Fires create and destroy crucial elements for wildlife and are especially integral to the life cycle of many species.

AuraCraft

Fire Metamorphosis

Embrace the Transformative Power of Fire -
The Journey of Rebirth

Themes & Materials

Indoor | Artistic Representation | Projection | Life Cycling | Audio-visual Experience | Reincarnation



Fungus – a food source that appears
soon after fire



Airey's Inlet after Ash Wednesday
1983. Inset – butterfly
attracted to Grass Tree
(Xanthorrhoea) flowers, Kinglake
2009

Fires create and destroy crucial elements for wildlife and are especially integral to the life cycle of many species.

AuraCraft

Slides for Videos

Cube and Catenary

Passive Mode

Nature interacting with Nature

AuraCraft

Individual Interaction

A person interacting with Nature

AuraCraft

Multi-Viewer Interaction

People interacting with each other and Nature

AuraCraft

AuraCraft MAP mima

A cultural hub that fosters community engagement and initiates important conversations, both locally and internationally.

Significance of Elemental Symphony to MAP mima



- Encourage Environmental Stewardship
- Foster Community Engagement

AuraCraft

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