PORTFOLIO

2026

UX/UI AND GRAPHIC DESIGN
INTERACTION DESIGN
DIGITAL PRODUCT
MORE

WORK HIGHLIGHTS

Hayden (Haotian) Wang is a multidisciplinary designer with focus in UX/UI and engineering interaction design. He combines creative exploration with a rigorous, technology-informed approach, focusing on intuitive user experiences, well-crafted interfaces, and cohesive digital and physical products.

He is currently pursuing the Master in Design Engineering (MDE) at Harvard University, exploring the intersection of design, technology, and systems, with an expected graduation in May 2027.

HAYDEN WANG

SkiBoundless

INTRODUCTION

Rehabilitation exercises can slow the progression of ALS, and our goal is to **create engaging and safe activities** that help patients **maintain muscle function**. Given that ALS symptoms involve the gradual loss of muscle movement, we designed a skiing product targeting these specific needs, with a strong focus on safety. The product includes **supportive outer snowboards** and wearable inner snowboards, complemented by a **mouth-controlled braking system** for the outer snowboards. With guidance from ski coaches, patients **select equipment suited to their condition**, ensuring a personalized and secure skiing experience.

Group project: Baiyao Wu, Haotian Wang, Du Yiran

Time: 08/2024 - 10/2024

BACKGROUND

Exercise plays an important role for ALS patients. We are conducting research to identify opportunities within various rehabilitation exercises to help patients alleviate both physical and psychological sufferings.

ALS Introduction

Amyotrophic lateral sclerosis (ALS) is a condition where nerve cells that control movement gradually break down. This leads to muscle weakness and shrinkage. Over time, it makes it harder to speak, swallow, and breathe.

Positive Effects of Exercise

- Passive Range of Motion Exercises
- Gentle Stretching
- Low-Impact Aerobic Exercise
- Breathing exercises
- Postural and Balance exercises

Prevent joint contractures

Activities help maintain the range of motion at the joints.

Reduce muscle stiffness

Engaging in movement helps relax muscles and relieve stiffness caused by inactivity.

Promote blood circulation

Moving the limbs improves local blood circulation and reduces the risk of complications, such as pressure sores.

Improve comfort

Activities help patients feel more comfortable and reduce the discomfort caused by prolonged immobility.

1 Impact on life

As functional status declines and disease worsens, patients gradually lose independence and become reliant on family caregivers.

This causes physical suffering and heightened mental strain.

Therefore, we should provide support to patients.

2 Treatment

- Supportive care: Dialysis/Respiratory support
- Rehabilitation: Physical therapy/ Speech therapists
- Nutrition

PATIENT JOURNEY MAP

ALS has three onset areas: bulbar, upper limb, and lower limb. Over 50% of patients first show symptoms in the upper limb, which then spread to the opposite limb. The disease later affects the lower limbs and, finally, the medulla oblongata. Due to its complex progression, we focused on patients with upper limb onset and created this map based on their disease course. This stage is based on the ALS London staging and survival period.

Stage	Stage 1 : One functional area affected	Stage 2 : Second area affected	Stage 3 : Third area affected	Stage 4 : Requires gastroenterostomy and non-invasive breathing assistance	Stage 5 : Death or machine-assisted breathing
Lesion site					
Symptom	• Difficulty with fine finger movements • Muscle atrophy and weakness • Muscle spasms and fasciculations • Gradually affect forearm, upper arm and shoulder muscles	• Spread to legs • Foot drop • Movement deficits • Unsteady gait • Loss of sensation	• Spread to the neck, tongue, pharynx and laryngeal muscles • Difficulty swallowing • Progressive muscle weakness and atrophy	• Complete loss of ability to move independently • Inability to swallow • Difficulty breathing	• Inability to breathe on one's own
Opportunity	• Do more rehabilitation exercises to help delay progression of disease	• Exercise oral muscles to prevent premature inability to chew and speak	• Communicate more with the outside world	• Reduce caregiver stress and provide more assistive devices	

Given the clinical symptoms and the importance of exercise for ALS patients, we designed an exercise device for patients in stages 1 and 2. During these stages, patients have some mobility despite partial limitations. From stage 3 and beyond, patients mostly require passive movement, leading to a significant decline in their quality of life.

PERSONAS

Since ALS often affects younger individuals, we conducted interviews with two patients and a therapist to explore their challenges and opportunities. The focus was on how the disease impacts patients' participation in sports and physical activities.

Patient 1

Name : Chen Shanhe
Gender : Male
Age : 47
Stage : 2

"My legs gradually became out of my control. I am afraid that I would never be able to walk and had to stay away from social activities and people."

Previous hobbies

Swimming, Running, Table tennis

Frustrations

- Without proper sports equipment, gradually moving away from the outside world

Needs

- Participate in social activities
- Interact with people more

Patient 2

Name : Wu Qianyu
Gender : Female
Age : 36
Stage : 1

"I'm often told I can't do the sports I used to, but I want to live a life without limits and do all I can to delay muscle stiffness and weakness."

Previous hobbies

Skiing, Skateboarding, Badminton

Frustrations

- Gradually lose ability to move smoothly
- Sports you used to like are also restricted
- No suitable auxiliary sports equipment

Needs

- While you can still move, do what you like.
- Enjoy life
- Interesting exercises to delay muscle weakness and stiffness

Therapist

Name : Yu Li
Age : 32
Professional : Motion Therapist

"We encourage patients in early stages to engage in active exercise. As long as it is proper, it can be helpful in delaying their disease progression."

Nature of active motion

Frustrations

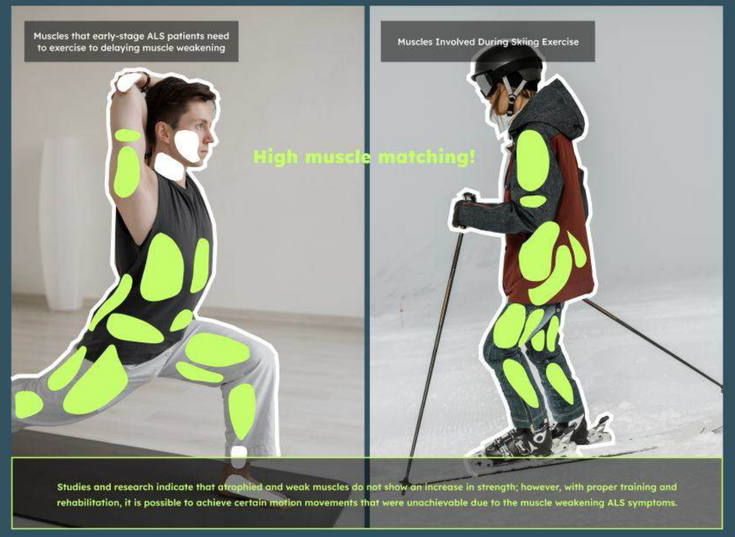
- Patients often refuse to do physical exercise, fearing secondary injuries
- Few devices suitable for active movement

Needs

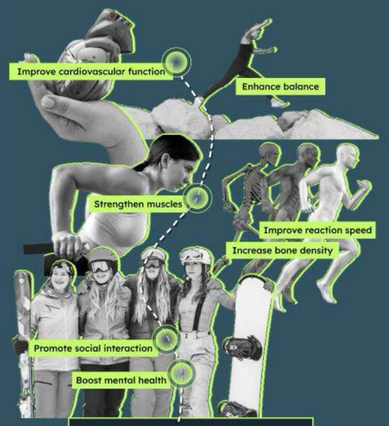
- Increase the patient's interest in performing active movement
- Ensure the patient's safety

ACTIVITY ANALYSIS

Supported by Studies, by comparing the muscle groups involved in skiing with those that ALS patients need to exercise, we found that skiing can help early-stage ALS patients engage in active movements to alleviate muscle stiffness and delaying muscle weakening. It can also bring patients enjoyment and enrich their life experiences after being diagnosed with the disease, because mentally staying optimistic is also a key to the treatment process.



Benefits



- Meet the needs of **PERSONAS**
- Need to pay attention to the gentle slope sliding

MARKET RESEARCH

Currently, the market offers skiing assistive devices aimed at a broad group of individuals with mobility troubles, but these products primarily focus on enhancing arm or leg strength and are less targeted to people with specific disease. They do not adequately address the progressive nature of ALS, which lays the foundation for our product concept.

Ripple Cyrusher

Target User : Individuals with relatively poor balance and weak control

- Obstacle avoidance
- Emergency stopping
- Plan the optimal route
- Slalom

- Expensive
- Lacks center of gravity control
- Easy to fall

Dynamique Bi Ski

Target User : Individuals with high-level paraplegia and lost strength in lower limbs

- Low center of gravity
- Not easy to fall

- Requires strong upper limb strength
- Limited leg strength involvement

Alpine Downhill Slide

Target audience : Individuals with weak grip ability and leg strength

- accompany to ensure safety
- Stabled center of gravity
- Enhance direction control

- Unable to build muscle
- Lack of spontaneous movement

Titanium Outriggers

Target User : Individuals with weak leg strength who are unable to control speed

- Affordable
- Simple and flexible
- Enhances grip strength

- Unstable
- Lacks center of gravity control
- Prone to falling

FIELD RESEARCH

In order to better understand the detailed sliding posture, force points and difficulties during skiing, we experienced both single-board and double-board methods and made comparisons.

Snowboarding

- No snow poles
- Mainly controlled by the center of gravity and legs
- The key is to press the toes down and the calf back to press the foot to form an opposing force, drive the knee to bend and straighten, and then form a side cut at a certain angle.

Skiing

- Snow poles : assist balance, control rhythm, accelerate and support to avoid falling
- Wrist and thumb force
- Stabilize the center of gravity
- Legs exert force

Interview

Q - Which one should I choose if the hand strength and leg strength are relatively weak? A: Both are the same

Since skiing with snow poles have stronger support and stability, we chose the skiing method.

SAFETY How Might We ?

How to transfer the force that the fingers need to exert to other parts

How to use equipment to help them strengthen their leg strength

How to help adjust the center of gravity

IDEATION

Through further principle learning, we identified the basic skiing movements for ALS patients and brainstormed the related functions for their safety.

Proper actions

Standing

- Bend your knees slightly
- Lean forward slightly
- Keep your back straight
- Eyes looking forward

Accelerate skiing

- Lean forward
- Utilize camber of snowboard
- Lower the center of gravity

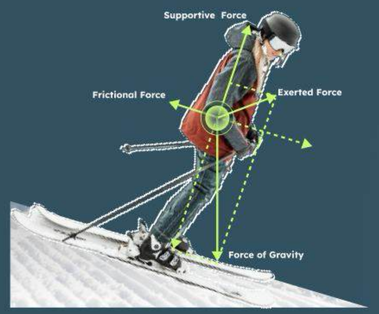
Braking or slowing down

- Dig your poles into the snow
- Adjust the angle of your skis
- Press the inside edge of skis inward to create a "V" or "snow plow" position

Turning

- Placing weight on opposite foot
- Pushing body and board toward
- Using your poles to guide you
- Keep your body balanced

Action principle



Brainstorming

INTERACTIVE MODE AND INNOVATIONS

Safety first. The mouth-controlled SupportBoards let ALS patients control their skiing by biting on a pressure-sensitive mouthguard. Biting is an instinctive action—people bite down when focused and set ease when relaxed, and ALS patients at our targeted stages typically retain this ability, making it an effective and ideal controller. The biting motion trigger two key functions:

- Braking: Brake spikes deploy for controlled deceleration.
- Posture control: Electromagnets adjust the snowboards for optimal posture.

This design enhances safety, improves hand coordination, and provides beneficial exercise for the jaw and mouth muscles.

Overall Snow-Facing Structure

Supportboards
- Provides Assisted Braking
- Provides Posture Correction opn Snowbaords

Snowboards
- Shortened design for better mobility
- Work with Supportboards to adjust posture

The Mouth Controller

The Mouth Controller, like a sports mouthguard with a pressure sensor, protects teeth and lets users send brake commands by biting with varying pressures.

Mouthguard Front View

Arduino Pressure Sensor

Sensor Position as shown

Arduino Testing

The Arduino pressure sensor demonstrates feasibility by detecting 5 pressure levels, with the top 3 labeled "SMOOTH," "DECELERATING," and "BRAKING." The setup includes a mouthguard for demo, Arduino UNO, thin film pressure sensor, jump wires, breadboard, and resistor.

Arduino Connection Mockup

Testing Documentation

Pressure sensor placed at rear teeth biting position

Arduino Code and Serial Port monitoring inputs

Sending Commands

Biting down with different pressure levels sends signals to the support boards, controlling how much braking is needed.

Brake Mode: No Brake → No Biting

Brake Mode: Some Brake → Less Biting

Brake Mode: Max Brake → Hard Biting

Sending Commands

Different bite pressure levels send signals to the support board, adjusting the spikes to apply the right braking force.

No Braking

When no braking command is given, the spikes remain hidden, keeping the board's underside smooth.

Standard Braking

Protruding spikes help increase the surface friction under the board, giving grip to help slow down the user.

Max Braking

Protruding spikes are now fully extended, giving max grip to help slow down the user.

Supportboards · Snow · Brake Spikes

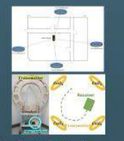
Posture Correction Feature Activated

For patients with weakened leg muscles, the Posture Correction function activates, positioning the inner ski boards into one of three postures based on the current motion state.

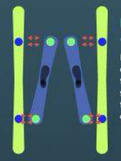
Using electromagnetic interactions and voltage controls, the built-in magnets can be adjusted to change the position and distance between the snowboard and support boards. This dynamic adjustment allows for real-time posture correction based on the user's movements.

No Magnetic Force Applied

There is no assisted posture correction needed at this moment.



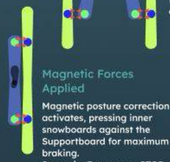
Physics behind design theory



Magnetic Forces Applied

Magnetic posture correction activates to hold inner snowboards in place for controlled deceleration.

Same posture as skiing



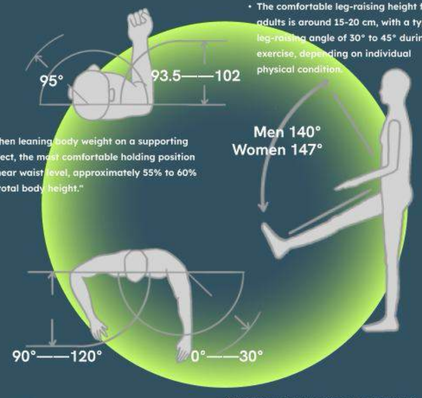
Magnetic Forces Applied

Magnetic posture correction activates, pressing inner snowboards against the Supportboard for maximum braking.
Scenario: Emergency STOP

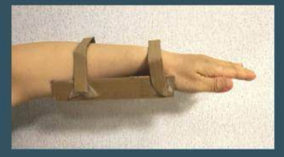
- Snowboard Magnets
- Supportboard Magnets
- Magnetic Attration
- Magnetic Repulsion
- Supportboards
- Snowboards
- Patient's standing point

DEVELOPMENT

Considering the interaction method and the progressive muscle weakening in the hands and feet of ALS patients, we designed this product configuration to prioritize both safety and ease of use for patients.



- "When leaning body weight on a supporting object, the most comfortable holding position is near waist level, approximately 55% to 60% of total body height."
- The comfortable leg-raising height for adults is around 15-20 cm, with a typical leg-raising angle of 30° to 45° during exercise, depending on individual physical condition.
- With arms naturally extending forward at an angle of approximately 0° to 30° in front of the body, they remain in a comfortable position without overextension.
- A comfortable angle of 90° to 120° between the upper and lower arms is usually comfortable.



Product Model Testing

Our product is designed to enable skiing for individuals in the early stages of ALS, with the recommendation to discontinue as the condition progresses. We demonstrated the product using 3D printing and a human model generated through advanced artificial technology. For accuracy, we used ski boards with friction coefficients similar to real slopes. Although we couldn't produce a full-scale prototype for live testing, the mannequin's simulated muscular limitations closely reflect ALS conditions, ensuring reliable safety testing.

1 Slope test to ensure stability

0° slope

12° slope

24° slope

Suitable ski slopes for ALS patients range from 3 degrees to 14 degrees, which are safe and suitable for beginners, but for our tests we chose higher range to ensure adequate safety.

2 Varying center of gravity to determine safety

Forward leaning of centre of gravity

Backward leaning of centre of gravity

Lack of foot control with sidedway's centre of gravity

Full centre of gravity shifting

3 Ability to adapt to ALS muscle-weakening progression

Finger weakness

Forearm weakness

Upper arm weakness

Lower limbs weakness begins

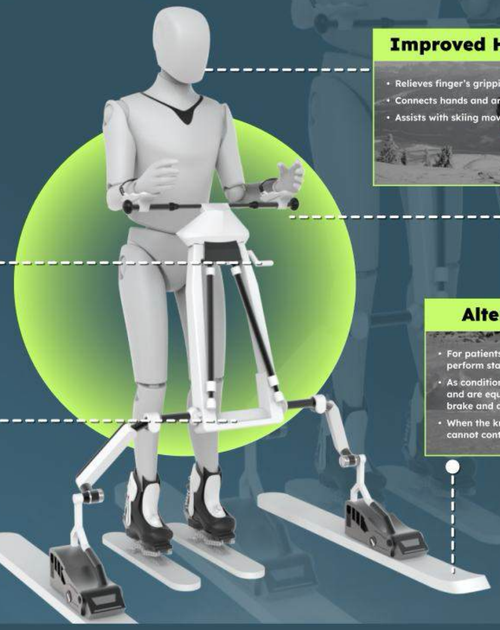
- With above tests conducted and studied, there are **no unsafe events. Zero fall rate** to ensure patient safety.
- In the future, we plan to explore controlling snowboard magnets via a mouth-operated controller, as this concept is in its early stages. Once developed, it will be a valuable tool to enhance the skiing experience of patients with hand and foot weakness.

FUNCTION AND REALIZATION

This section explains the components and functions of the entire skiing product in details including: mouth brake controller, support-boards with braking spikes, inner ski boards, and arm sleeves.

Adjust for Body Height

- Turn and roll the handle to adjust the slider
- Combined with ergonomics
- Adjust the handle height to fit patient's body height



Improved Hand Control

- Relieves finger's gripping pressure
- Connects hands and arms to work together
- Assists with skiing movements to stabilize

Mouth Muscles Exercise

- Facial muscles will not be affected by the disease in short term
- Exercising oral muscles in a timely manner
- Prevent premature inability to swallow and chew
- Increasing auxiliary braking control

Alternative Braking

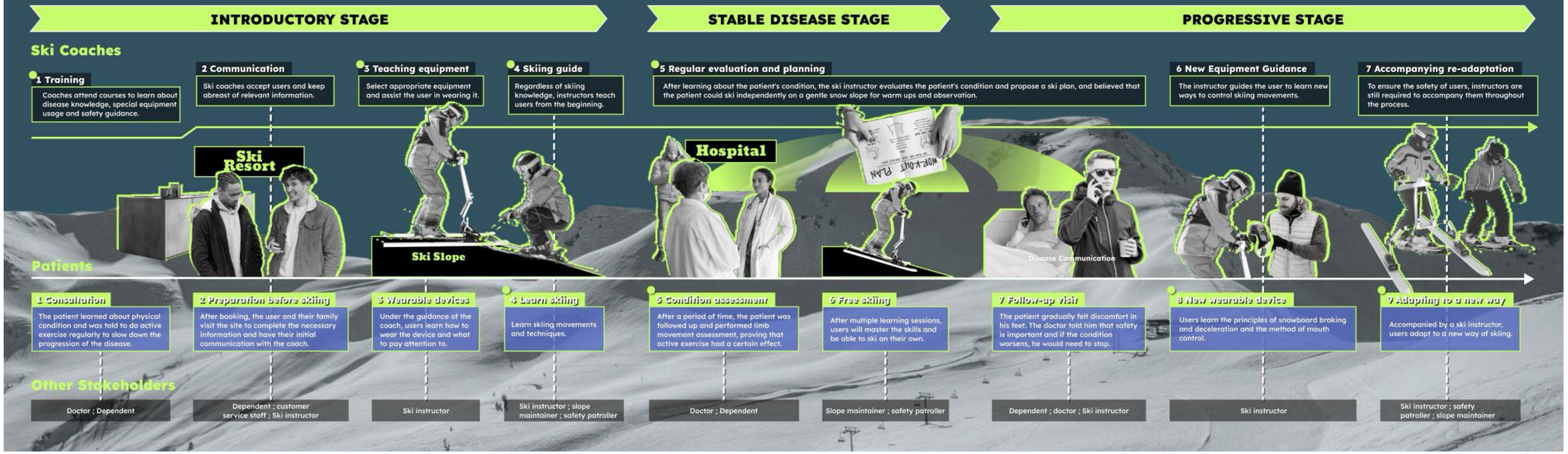
- For patients prior the second ALS stage, they can perform standard skiing braking moves.
- As condition progresses, users' leg control loosens and are equipped with mouth brake controller to brake and decelerate.
- When the knees and above area are affected, users cannot continue skiing.

Improved Stability

- Two outer support-boards help support the user's body
- Two light weight inner ski boards for freer skiing use
- Outer ski boards connected to the frame structure to form a steady triangular support.

STAKEHOLDERS AND SERVICE FLOW

According to the patient's familiarity with skiing and the changes in their condition, the service system will provide different accommodation to ensure the patient's skiing experience and safety. As the patient's closest contact during skiing, the skiing instructor will play a guiding role in all necessary aspects. Patients should discontinue skiing if they experience discomfort above the knee or further loss of sensation.



LUMOLINK

by Haotian Wang 2024. 5

Philosophy

Society is now re-opened and the world has seen a spike in social gathering activities. There has been a resurgence of outdoor activity focused on entertainment, human rights, demonstrations, concerts, and a lot more in the popularity, impacting political, social, and economic spheres. With rapid technological advancement, digital products are becoming more affordable, personal, accessible, and popular.

At this moment I am driven to introduce wearable techs into the market of social-gatherings to tackle a variety of existing issues surrounding safety, convenience, communication, navigation, and demonstrations during gatherings.

Idea

LumoLink transforms crowd engagement with its innovative palmbands, integrating seamlessly with our app for unmatched connectivity, safety, and ambiance. Picture parades and gatherings where synchronized LED displays unite participants, fostering a vibrant sense of community.

Beyond aesthetics, LumoLink serves as a vital tool in crowded spaces, featuring real-time messaging, emergency alerts, and location tracking for enhanced safety and engagement. Committed to sustainability, our rental model promotes eco-conscious practices without sacrificing functionality or style.

DESKTOP AND MARKET RESEARCH

Base on recent years worldwide statistical facts and trends and the passing of Covid-19, society is now re-opened and gathering activities strive on a trend that has never been seen before.

In past two years we are witnessing the resurgence of human activity following social reopening and an increased focus on entertainment and human rights, **demonstrations, concerts, and various social gatherings** have surged in popularity, impacting political, social, and economic spheres.

Example of Safety Issues During Gatherings

2017 Las Vegas Music Festival shooting: **61 deceased, 851 injured**

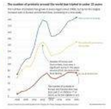
Seoul 2022 Halloween crowd crush stampede: **159 deceased, 196 injured.**

2023 Civil Rights Protest in France turned into **riots** and police confrontation.

Emergency: Cars running into protests causing **injuries and deaths.**

SOCIAL:
Socio-economic factors like prices, income levels, civil rights, security, resource shortages, and unemployment often drive protests worldwide. Global civil unrest and demonstrations increased by 3% last year, totaling 30,376 compared to 29,535 in 2022. A more open social climate encourages increased protests to advocate for human rights and equality, particularly in the US.

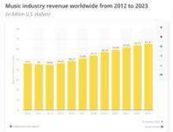
#WomenRights #Covid19 #Police #Worldpeace #Human Rights #LGBTQ #BlackLivesMatter #ClimateChange



Topics and Statistics for Increasing Social-Gathering Activities and Protests

Rising Concert-Gathering Market WorldWide

Worldwide Music Events:
This shows that over past years music concerts market is gaining more popularity and profit despite the Covid setbacks, making them a **profitable and future-promising market** to focus on.



+3.9% Revenue Annually

For the past five years, an annual average of 3.9% increase in worldwide music industry revenue.

Technology:

Traditional protest methods like rallies, gatherings, and marches could benefit from modern technology and philosophy, but emerging technologies from the past decade have been underutilized for this purpose. Proposed solutions include smart technology products like smartphones, apps, wristbands, and IoT devices, utilizing innovations such as 5G, GPS, IoT, motion capture, and analysis.

INSIGHT SUMMARY

Factual evidences have suggested that people are increasingly involved in large gathering activities, but meanwhile there are no substantial improvement being made to elevate people's experience, performance, safety, and accessibility in these events. Protests and entertainment/music events represent the majority of crowd-gathering, and what will the future be like to make these events even better?

USER RESEARCH/FIELDWORK

I conducted various user research methods, including individual interviews and topic-focused studies, to gain insights into the genuine emotions of experienced participants.

Research Methods

SMS Interview Documentation

TV News Report Research

Interview Debrief Boards Documentation

◀ Reddit Threads Research ▲ Youtube Comments Research

PERSONAS

A Organizer's Info

Name: Peter
Age: 33
Location: Brooklyn
Profession: Teacher

Experience in Crowd Gatherings:
Protests/Demonstrations: Attended 30+ activities, led in 10+.
Entertainment/Concerts: 5 times attended.

Motivations
Peter is a thoughtful and righteous person who teaches kids with care, love, and motivation. He is a technology lover who loves exploring new tech products in the market and use them in a meaningful way.

In his own time, Peter is a civil rights supporter. He has led multiple demonstrations but he wants changes to the traditional ways of protesting/gathering, so he decides to shape the activities into something more memorable, spectacular and meaningful.

A Participants's Info

Name: Brinley
Age: 23
Location: Manhattan
Profession: College Student

Experience in Crowd Gatherings:
Protests/Demonstrations: Attended 5 activities, led in 0.
Entertainment/Concerts: 10+ times attended.

Motivations
Brinley always has a heart for helping others. She is a fast learner College student and is open to embrace new things from many fields, she has heart for design, movies, and social-justice.

Brinley has been paying more and more attention to social justice and she has participated in quite a few demonstrations/protests to speak out for the ones in need. But now she is feeling dull about all protests are conducted in the same old-fashion way, so she is looking for new ways of activities.

CUSTOMER JOURNEY

To better understand how to improve various aspects of gatherings and demonstrations, I conducted a customer journey study that focused on the process of actions, identified friction points, and outlined potential opportunities for expansion.

PROCESS

Awareness & Recognition	Preparation	Performing	Evaluating
For Demonstration	For Demonstration	Concerning Issues at Demonstration	For Demonstration
What is unfair? / Which topics?	What's the need?	Safety & Emergency / Communication	Is it successful? Is it influential?
What needs attention / support?	When/Where to perform?	Emergency / More Help / Navigation	How to improve attention-grabbing
For Entertainment	For Entertainment	Concerning Issues at Entertainment	For Entertainment
Which activity / vibe?	What's the theme?	Overcrowded Safety / Personal Safety	Ending
	What feels cool?	Emergency / Communication & Help	

FRICTION

Awareness & Recognition	Performing
For Demonstration	For Demonstration
Unspecified	Traffic(Police/ambulance) + more / Communication issue between front and back of line-up
	Demonstration power weakens at night time / Poor managed line-ups and poor under-informed crowd
For Entertainment	For Entertainment
Audience is hard to engage on a better, broader, and more unified level	Audience is hard to engage on a better, broader, and more unified level / Hard to spot/ report emergency such as someone fainting out, overcrowding stampede, and safety issues

OPPORTUNITY

Support	Facilitation	Visual Elevation
How might we improve participant's experience of navigation?	How might we make Participants follow up.	How might we improve the scene in a spectacular and an all-hands-on-deck way.
How might we improve communication efficiency between individuals?	How might the participant receive message efficiently?	How might the gathering enter night time without losing performance?
How might we improve communication efficiency between individuals?	How might the organizer unify the crowd better?	How might the gathering enter night time without losing performance?
How might we introduce all party with sufficient info?	How might the organizer's message be distributed in a simple yet efficient way?	How might the organizer lead at night time?

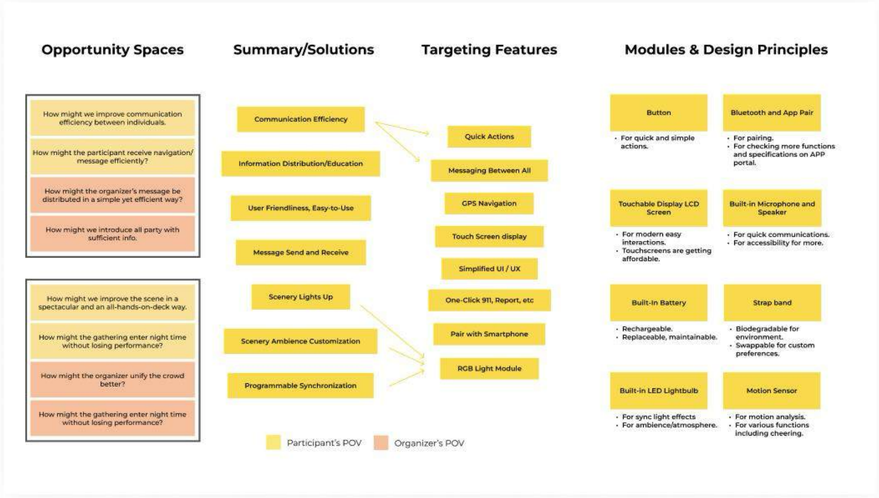
"**Support**" category and "**Visual Elevation**" category under opportunity were selected for providing solution to the most in-need spaces.

Participant's POV

Organizer's POV

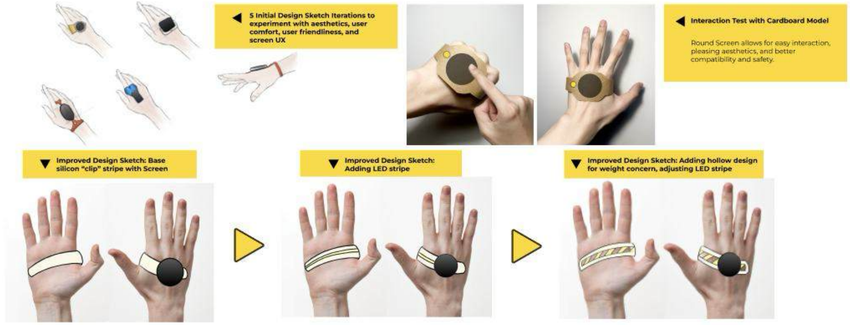
IDEATION

I approached design ideation from the perspectives of both organizers and participants to brainstorm a range of targeted features that address their specific needs.



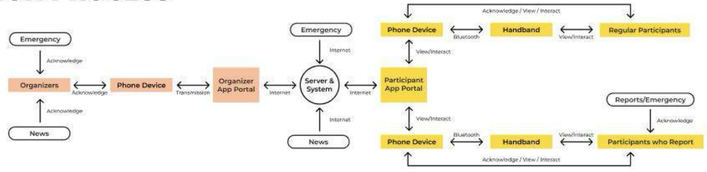
DESIGN AND SKETCHING

I have created a series of design sketches and mock-ups to identify the optimal design that balances aesthetics and user interaction while ensuring technical feasibility.



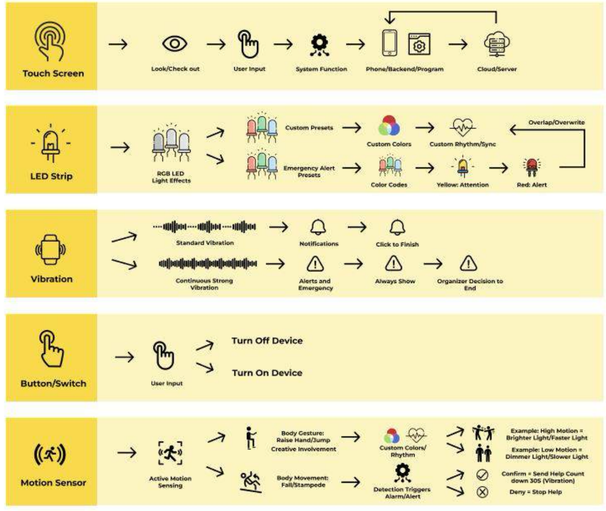
INTERACTION PROCESS

Organizers and participants are interacting through the well-structured chain of interaction including hardware such as phone and Handband, and software such has apps and cloud sever processing



SOLUTIONS

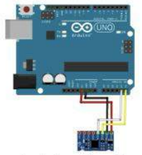
In order to bring out the desired features of the product, detailed user interaction solution and user experience architecture must be illustrated thoroughly.



FUNCTION TESTING AND DEMO

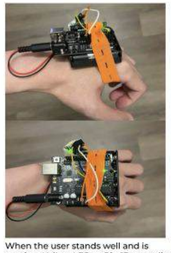
Arduino Fall-Sensing feature Technical Demo

Arduino UNO and the MU6050 3 Axis Accelerometer Gyroscope Module were used to test the technical feasibility of LumoLink's function "Fall Sensing" where encountering emergency

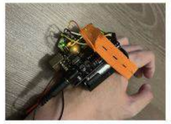


Arduino Circuit with MPU6050

Arduino Code



When the user stands well and is moving, Yellow LED at Pin 13 stays dim.

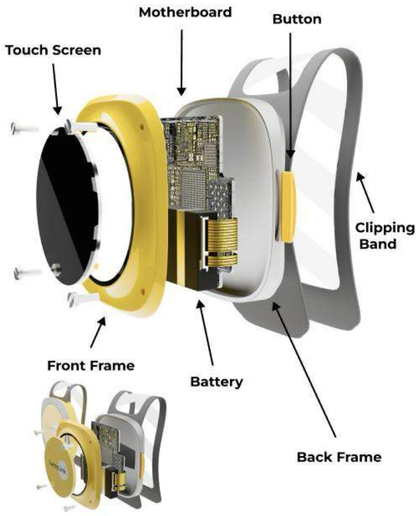


When the user fall to ground, Yellow LED lights up

Arduino Mock-up Device Testing

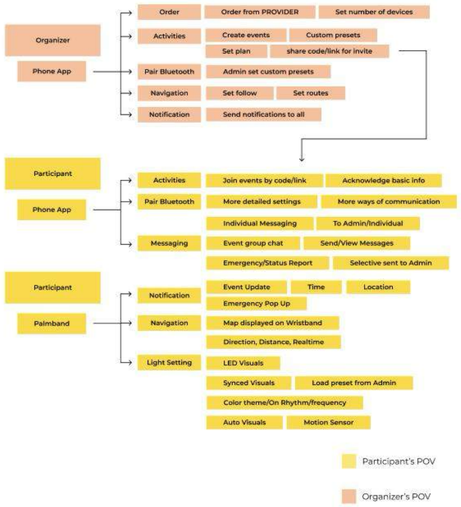
PRODUCT AND RENDERS

The palmband product is configured with all necessary parts including touch screen for information and interaction, motherboard for electrical framework and processing, rechargeable battery for power, button for switch, frame work for structural integrity and stylish clipping band for hand wearing.



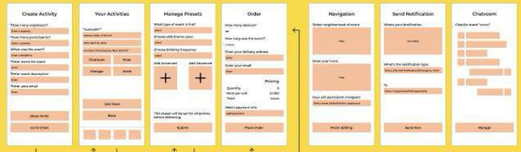
Wearing Mockups

INFORMATION ARCHITECTURE

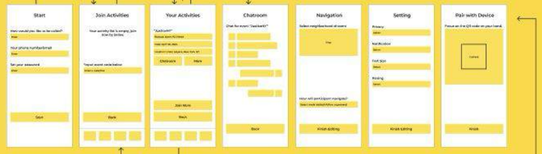


LOW-FI MOCK UPS

Organizer Mode/POV



Participant Mode/POV



DESIGN IDENTITY

"LumoLink" represents our core concepts: "Luminous" and "Link." This name embodies **the product's philosophy of elevating vibrant self-expression** through both literal and metaphorical illumination. At its core, **LumoLink seeks to connect people and ideas, uniting them in a shared sense of community and collaboration by bonding people with creativity and technology.**
The yellow and black color palette underscores safety and visibility, highlighting LumoLink's dedication to clear, effective, and reliable user interactions.

Color Palette

#FFD810

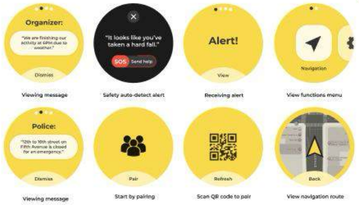
#282828

Logo

LumoLink

Aa Montserrat
Bold Semi-Bold Medium

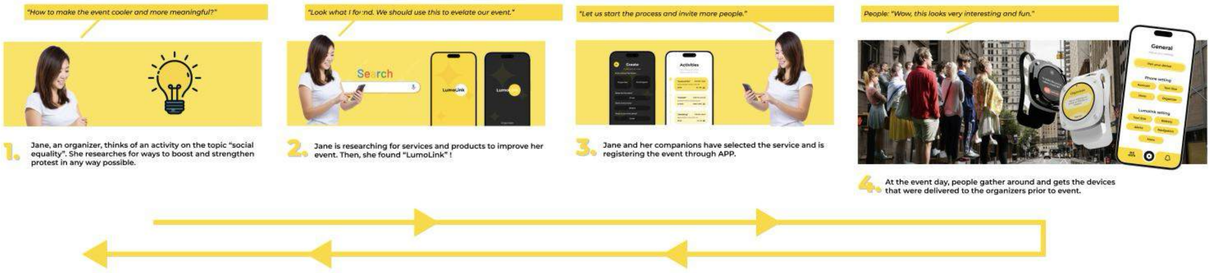
HIGH-FI MOCK UPS



LumoLink Participant's POV

LumoLink Organizer's POV

STORYBOARD



PROTOTYPE TEST AND FUTURE

1 Specifications for 3D-Printed Prototype ✓

A one-size-fits-all device design provides optimal flexibility and simplifies maintenance by fine-tuning its dimensions.

2 Prototype Finishes and Wearing Tests ✓

Evaluate the wear comfort for users with different palm sizes, and whether the material causes allergies or affects the user's activities.

3 NEXT: Functional Prototype and APP's Functionality Test

LED Display Performance: Test the brightness, color reproduction, and visual synchronization of the LED to ensure clear display in both day and night environments.

Real-time Message Transmission: Simulate large-scale usage scenarios and conduct group testing to verify the accuracy, delay, and stability of message transmission.

Emergency Alert Function: Test the trigger mechanism and feedback time of the alarm to ensure that users can receive help quickly in emergency situations.

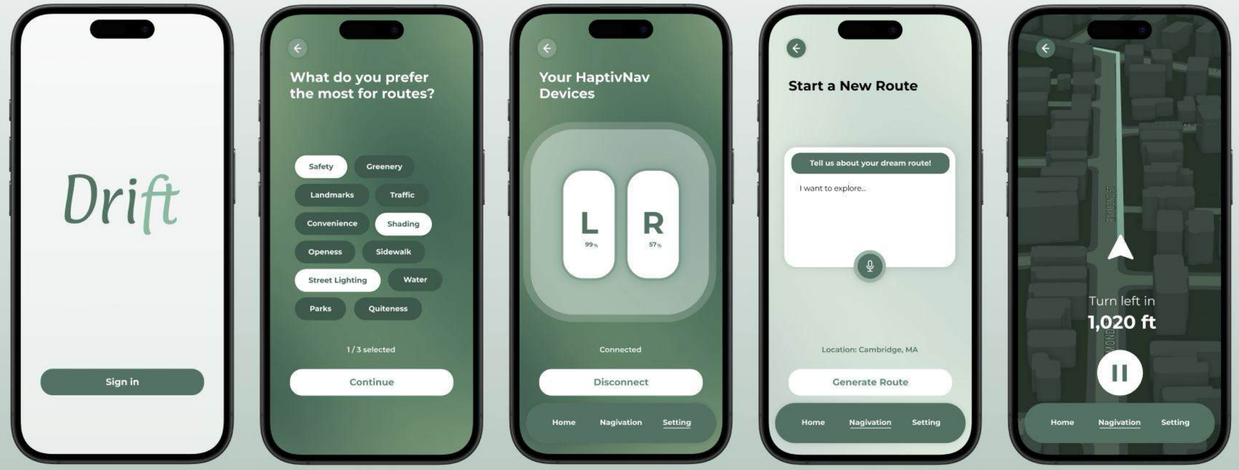
4 NEXT: Functional Prototype's Reliability Test

Durability Test: Conduct drop, stretch, and bend tests on the device to ensure its durability meets the requirements for parties and outdoor activities.
Data Security: Test the communication encryption between the app and the bracelet, as well as the user privacy protection mechanisms, to prevent data leakage or malicious attacks.

By optimizing core features and user experience through product testing, LumoLink aims to enhance event interactivity and safety while gradually expanding into more scenarios and markets. Strategically, it focuses on ecosystem development and sustainability; on the product level, it continuously upgrades features to meet diverse needs; and on the business level, it explores diversified revenue models and market expansion.

User experience

collect qualitative data for feedback loop



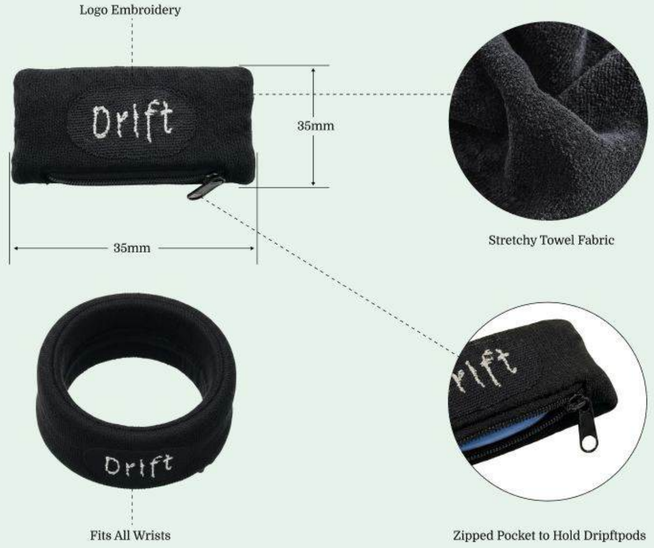
Render of Drift Kit

Strap Designs and Fabrication

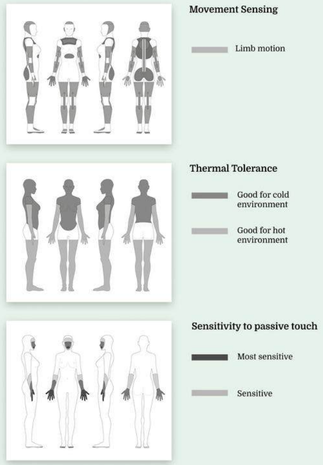



Band iterations | Finalized Design | Fabrication Process

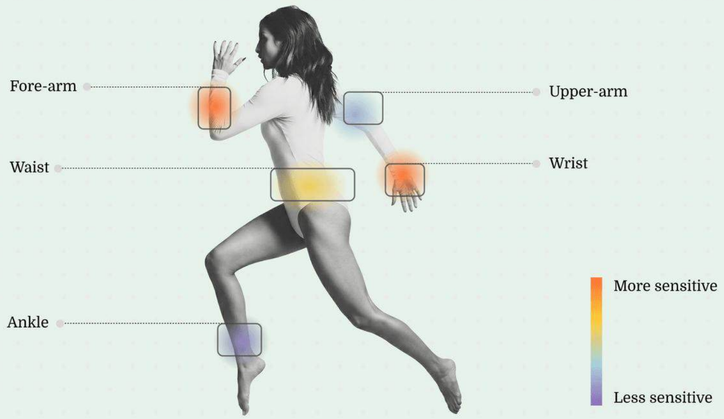
The Armband Prototype



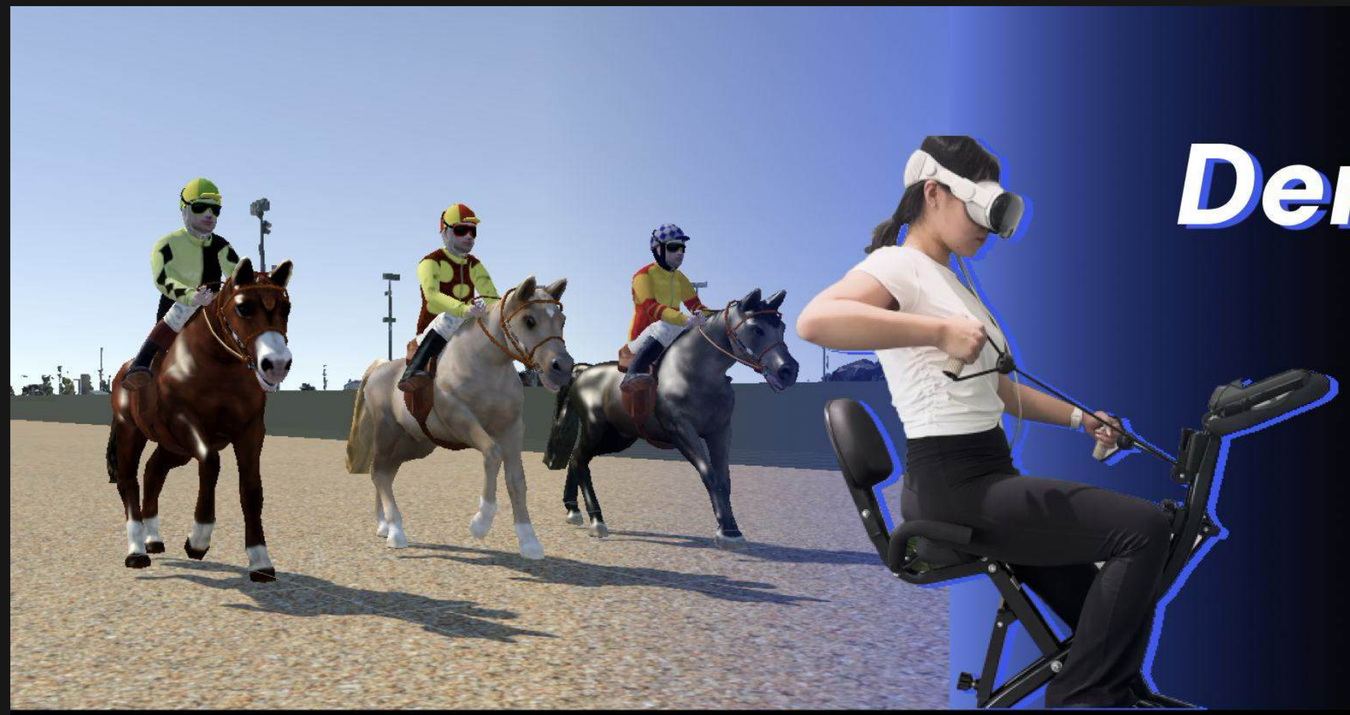
Research and user test: Where to Wear



Where to Wear It : Wearable Technology BODY MAPS Cite Zeagler, Clint. 2017



Vibration Sensitivity Test (while jogging)



DerbyDash

PROJECT OVERVIEW

To celebrate Louisville's cultural identity, we have developed an innovative proposal aiming at the gym "Zero-Sum" located in Louisville, KY. "DerbyDash", an innovative horse racing simulator game, is esigned to provide an immersive and realistic fitness experience. This game combines stationary bikes with a VR simulator, allowing users to engage in a unique and interactive workout. It offers diverse workout options while creating a socially engaging gym environment that enhances the overall fitness experience and elevates the gym experience to a brand new level.

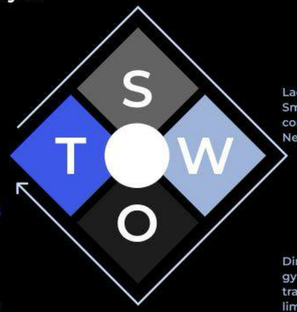
2024.8 Group Project: Haotian Wang, Shao Bingbing

BACKGROUND

State of the Gym

Zero-Sum, a gym rooted in the philosophy "The Best Survives," provides the perfect foundation for this project. Developed by Zyyo, a Louisville-based real estate company, this gym embodies a vision of fitness innovation and local culture.
Currently, Zero-Sum Gym is in the construction phase, with gym equipment installation underway. The facility is scheduled to open next spring.

Zero-Sum SWOT Analysis



S Strengths

The gym is well located at the first floor of a residential complex. Sufficient residential and hospitality developments nearby in the neighborhood, offering reliable customer base.

T Opportunities

Utilize technology and ideology of immersive experience such as VR and spacial playfulness to strengthen the uniqueness of the gym.

Weakness W

Lacking gym operating experience. Smaller space comparing to nearby commercial gyms.
Newly introduced and low on popularity.

Threats O

Direct threats from other commercial gyms in the area. Falling short on traditional workout equipment due to limited space.

BUSINESS LOCATION

Louisville, Kentucky

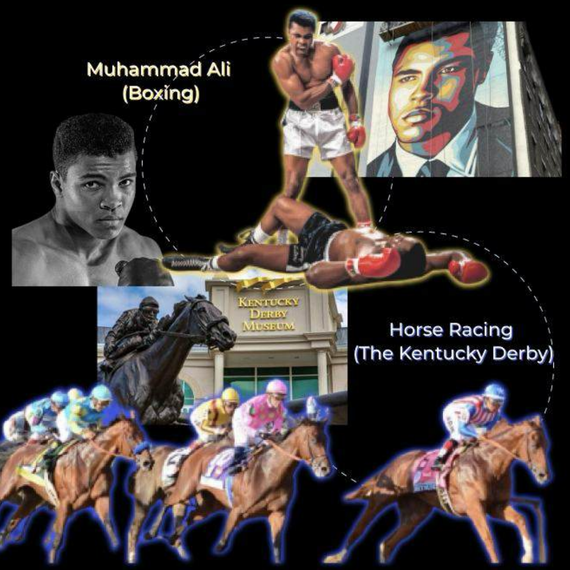
Louisville hosts several nationally recognized cultural events such as the Kentucky Derby. This map highlights the Nulu neighborhood's local icons and hospitality developments, where out target company develops real estate.

Demographic

Louisville Central CCD, Jefferson County

- Populations and People **33,260**
- Emplyment **55.3%**
- Families and Living Arrangements **15,890**
- Income and Poverty **$33,277**

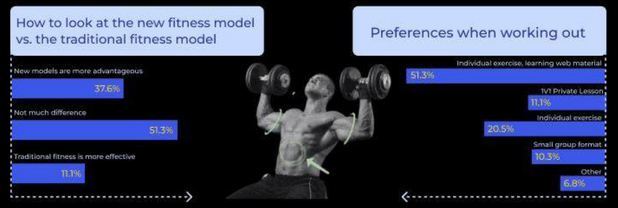
Louisville Cultural Identity for Incorporation

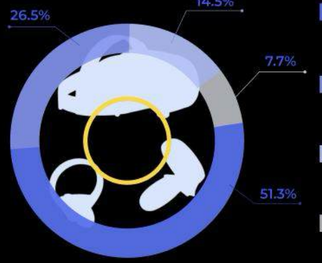


USER RESEARCH

User Requirements Analysis

We conducted target audience interviews by distributing questionnaires (250 samples) focused on the Louisville, Kentucky demographic. The key insights are summarized below:





- **Instructive, motivational functions**
  Voice AI coaches, assistants to analyze movement accuracy
- **Immersive anthropomorphic features**
  Immersive anthropomorphic features
  Simulation of seaside bike paths, hiking trails, etc.
- **Dynamic input type function**
  Rhythmic music bands to drive the mood, such as dynamic cycling, bouncy type of music
- **Creative game formats**
  e.g. escape games, rescue challenges, etc.

GYM TREND ANANLYSIS

Use case of interactive gym

Interactive experiences are a key trend in modern gyms. Many are combining VR and sports games to create immersive environments, constantly innovating to offer more engaging workouts.

EXR Virtual Rower

EXR is a virtual indoor rowing app that enhances workouts with immersive 3D environments and gamified challenges.

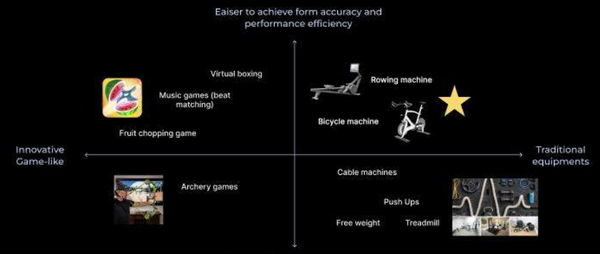
Black Box VR

Black Box VR offers the world's first full-service VR fitness experience. Users can perform cardio and resistance training with the game's full-body workout.

EXR Virtual Rower

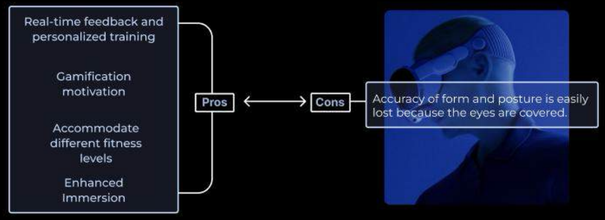
HOLOFIT is a VR fitness platform designed to enhance traditional cardio exercises such as rowing, biking and running through immersive virtual reality environments.

Zero-Sum experience positioning



Cardio machines like cycling and rowing are ideal for VR games due to their stability and controlled, repetitive movements, ensuring safety while enhancing immersive, gamified workouts that boost motivation and intensity.

VR Fitness Pros & Cons



GAME LOGIC

Why Vision Pro

Experience Design

Immersive experience

Apple Vision Pro goes beyond traditional virtual reality displays to provide a deeper level of immersion.

Reality Projection

Users can safely view their surroundings when needed, facilitating conversation and emergency situations.

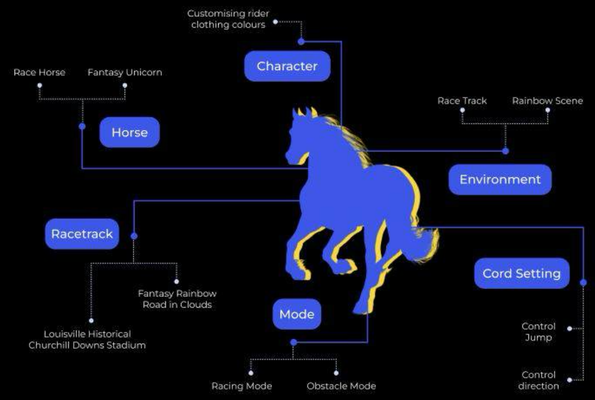
Stability

The head unit stays firmly in place during the ride, ensuring that the user experience is not compromised.

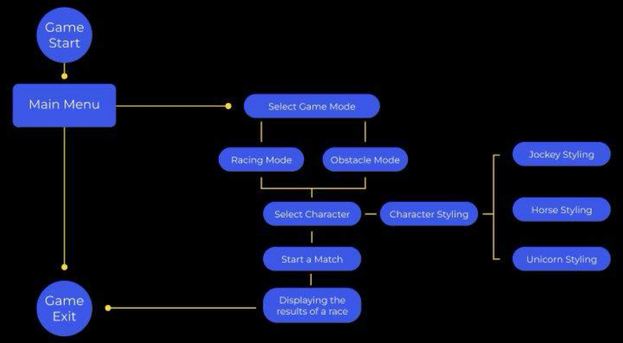
Eye Tracking

This technology serves as a cursor, freeing users' hands and eliminating the need for a handheld remote.

Mind Map



Game Flow

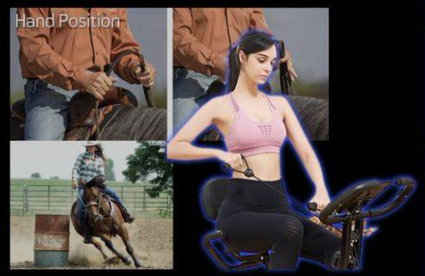


Conclusion

We are developing a horse racing simulator game targeting a gym, the Zero-Sum, located in Louisville, Kentucky. This game is designed to offer gym members a brand new interactive and revolutionary fitness experience with focus on realism, impressiveness, workout performance, cultural reference and more.

By combining stationary bikes with VR simulator, players can enjoy an immersive gaming experience while exercising. This not only gives members diverse workout options but also creates a more socially interactive gym environment, enhancing the overall fitness experience.

GAME MECHANICS



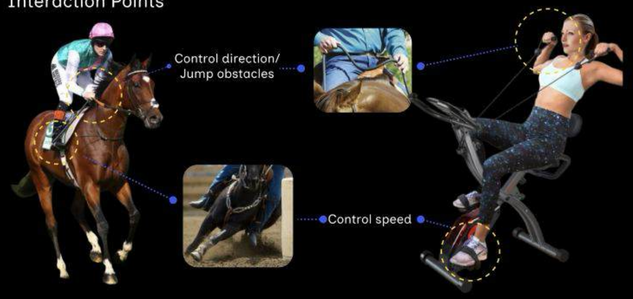
Action Consistency

The gesture of grasping the reins while riding a horse is very similar to the gesture of pulling on a rope on a sport bike, both of which are pulling the reins tight.

Sync Riding

The speed at which the player pedals directly affects the speed at which the horses in the game run, giving them a real sense of the fun of riding.

Interaction Points



ENVIRONMENT & CHARACTER DESIGN

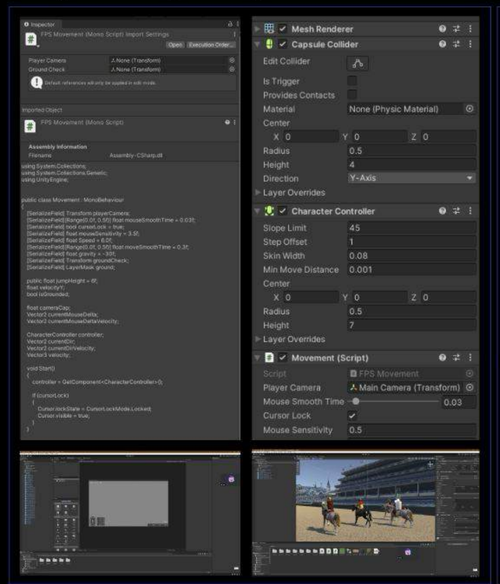
The design phase consists of two key stages. First, in the scene design preparation, we explored the idea of integrating Google Earth's 3D map tiles to efficiently recreate the Kentucky Derby stadium, utilizing Blender and innovative plugins like Blosm. Second, in the game development stage, we built the immersive scenery in Unity3D and developed the first-person riding simulator code. We also integrated a custom UI that tracks and displays the user's in-game performance as well as their workout metrics, creating a seamless blend of gaming and fitness.

Environment Design Produced by Haotian

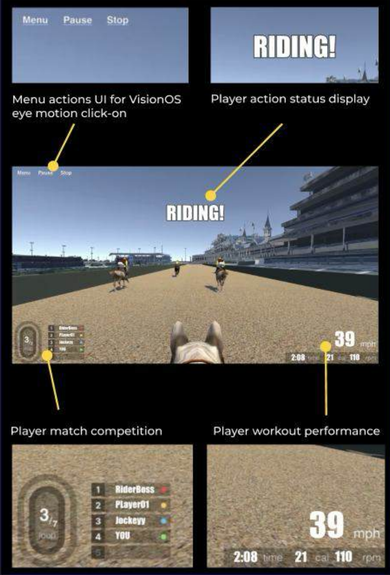
Character Design Produced by Bingbing

GAME DEVELOPMENT

Unity3D Development by Haotian

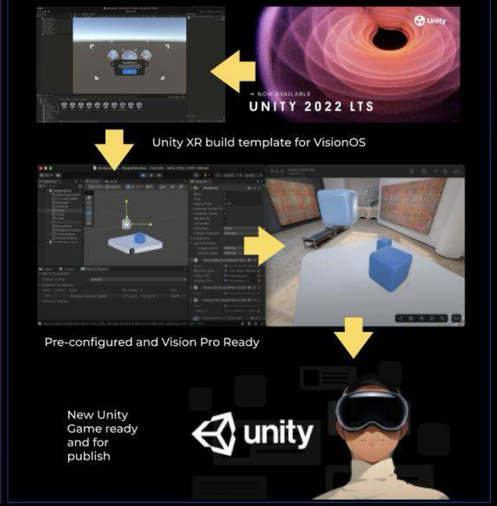


User Interface Design

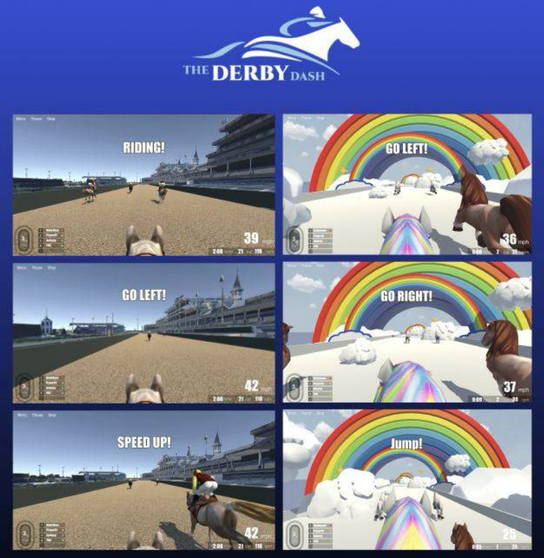


Unity3D for Vision OS Workflow

With Unity 2022 LTS from the Unity Hub, and the visionOS build target installed, the VR/XR game crafting begins with the visionOS template, which includes preconfigured project settings suitable for our project.



FINAL VERSION



Scene 1 Screen Captures

Scene 2 Screen Captures

BUSINESS PROMOTION AND MARKETING

Marketing via Online

Social Media and Local Media

Posting Zero-Sum gym related news and info such as gym amenity introduction on Zyyo's company Instagram account in the form of posts, stories, and reels.

LOUISVILLE BUSINESS FIRST

Spreading influence by having local media news such as www.bizjournals.com/louisville to write an article/news on the innova tivenew gym and the Derby Dash product.

Websites

Zero-Sum

Posting Derby Dash product on Zero-Sum' official gym website, serving as gym amenity introduction to potential members.

Zyyo

Posting Derby Dash and Zero Sum product on developer Zyyo' official website, spreading influence to investors and media.

THE BILLY GOAT

Sharing introduction to Derby Dash and Zero-Sum on TheBillyGoat.com, the leasing website for The Billy Goat apartment building, where the Zero-Sum gym is located. This will bring in interests from current and future tenants.

Marketing via Local

Louisville Kentucky Derby Event

KENTUCKY DERBY
fine print WOODFORD RESERVE

Collaborating with the nation-famous traditional horse racing event Kentucky Derby, and to sponsor the event in the name of Zero-Sum, Zyyo, and DerbyDash, emphasizing the relation of the gameplay to the actual horse racing sport.

Zero-Sum Gym Revenue Projection

Zero-Sum Monthly Revenue Projection 2025(USD/Month)

Based on the statistics of monthly gym revenue in Louisville and the trend for increasing popularity of a newly opened gym

BUSINESS MODEL CANVAS

Outlining business and marketing strategies through the business model canvas, demonstrating a complete planning for the product.

Key Partners

Game Supplier:
- game developers

Gym Equipment supplier:

Gym management:

Real Estate Developers:

Key Activities
- Providing gym service to clients.

Key Resources
- Top-notch Technogym equipment.
- Real estate development backgorund and networing.

Value Propositions
- Place to work out.
- High-End equipment.
- Innovative/unique exercising experience styled with new tech and local cultural characteristics.

Customer Relationships

Tourists:
- Daypass ticket.

Locals:
- High to low membership plans.
- times plans.

Channels
- Advertisement from Zyyo properties.
- Recommendation from internet for being innovative and new.

Customer Segments

Tourists:
- One-time visitors.
- Family visitors.
- Influencers.

Locals:
- Building residents.
- Zyyo property residents.
- Other Locals.

Cost Structure

Hardware:
- Regular equipments
- Immersive equipments.
- Interior remodification.

People:
- Gym workers

Software:
- VR platform maintenance.

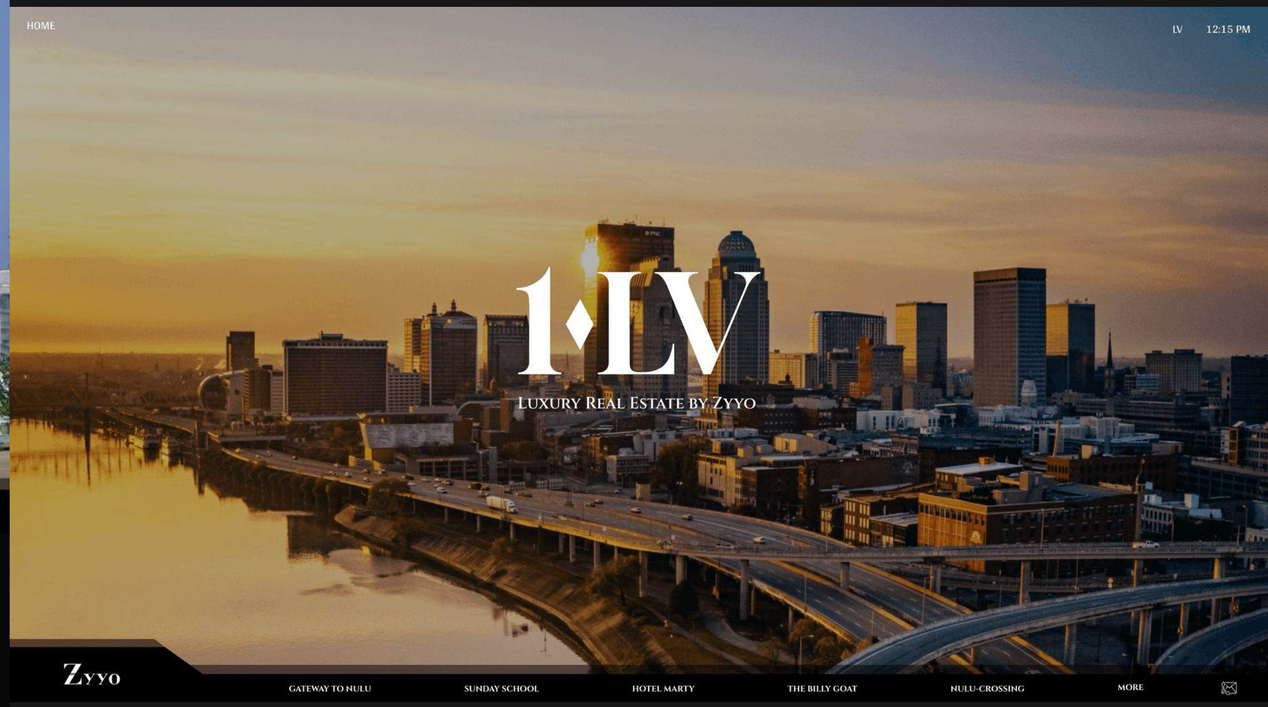
Marketing:
- Ads and promotions.

Revenue Streams

From Customers:
- Gym membership subscriptions.
- Gym day passes.

From Collaboration:
- Game companies seeking collab.
- Ads to be promoted at the gym.


Zyyo
CANOPY HOTEL
SUNDAY SCHOOL
THOMPSON HOTEL
THE BILLY GOAT
NULU-CROSSING
MORE
Zyyo
CANOPY HOTEL
SUNDAY SCHOOL
THOMPSON HOTEL
THE BILLY GOAT
NULU-CROSSING
MORE
1·LV
NULU CROSSING
WELCOME TO NULU-CROSSING: LOUISVILLE'S PREMIER RESIDENTIAL DEVELOPMENT OFFERING HIGH-END LUXURY RENTALS AND CONDOS. IMMERSE YOURSELF IN URBAN SOPHISTICATION WITH OUR EXQUISITE HOMES AND TOP-TIER AMENITIES INCLUDING A LOUNGE, GYM, PARK, AND POOL. EXPERIENCE LUXURY LIVING REDEFINED AT NULU0CROSSING, WHERE EVERY DETAIL IS CRAFTED TO ELEVATE YOUR LIFESTYLE.


HOME
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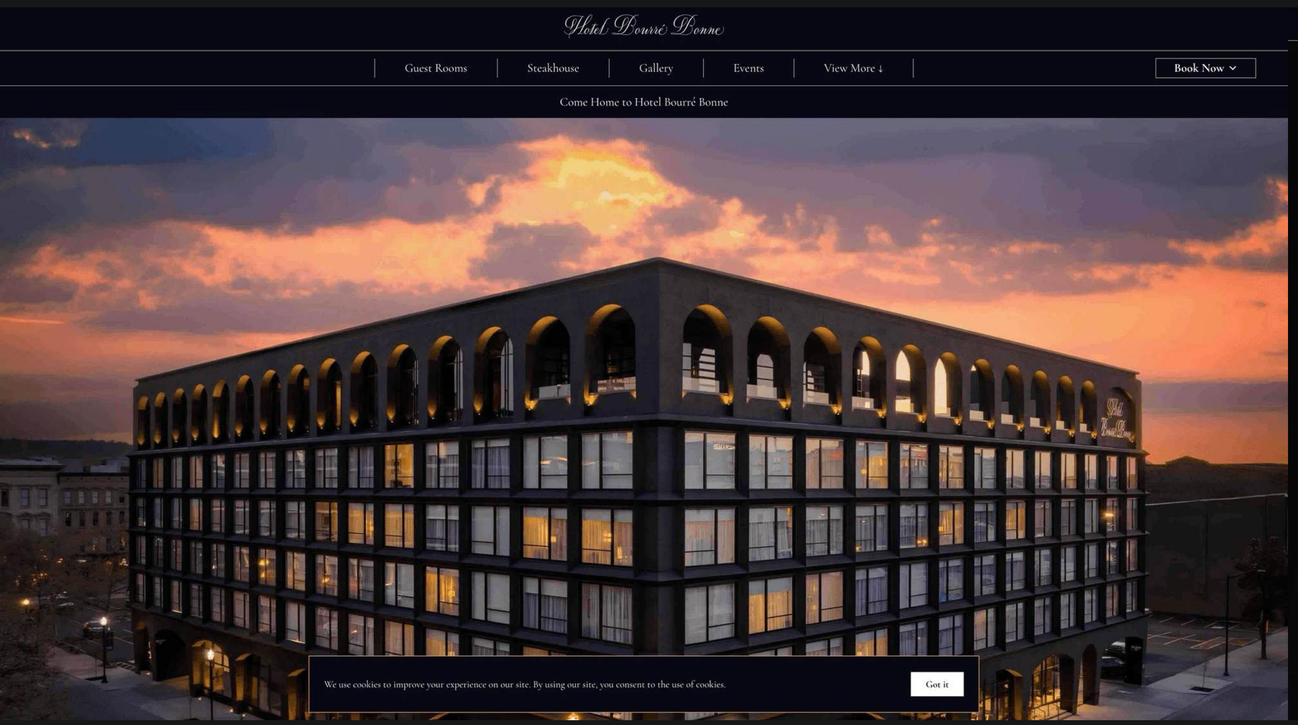
Zyyo
GATEWAY TO NULU
SUNDAY SCHOOL
HOTEL MARTY
THE BILLY GOAT
NULU-CROSSING
MORE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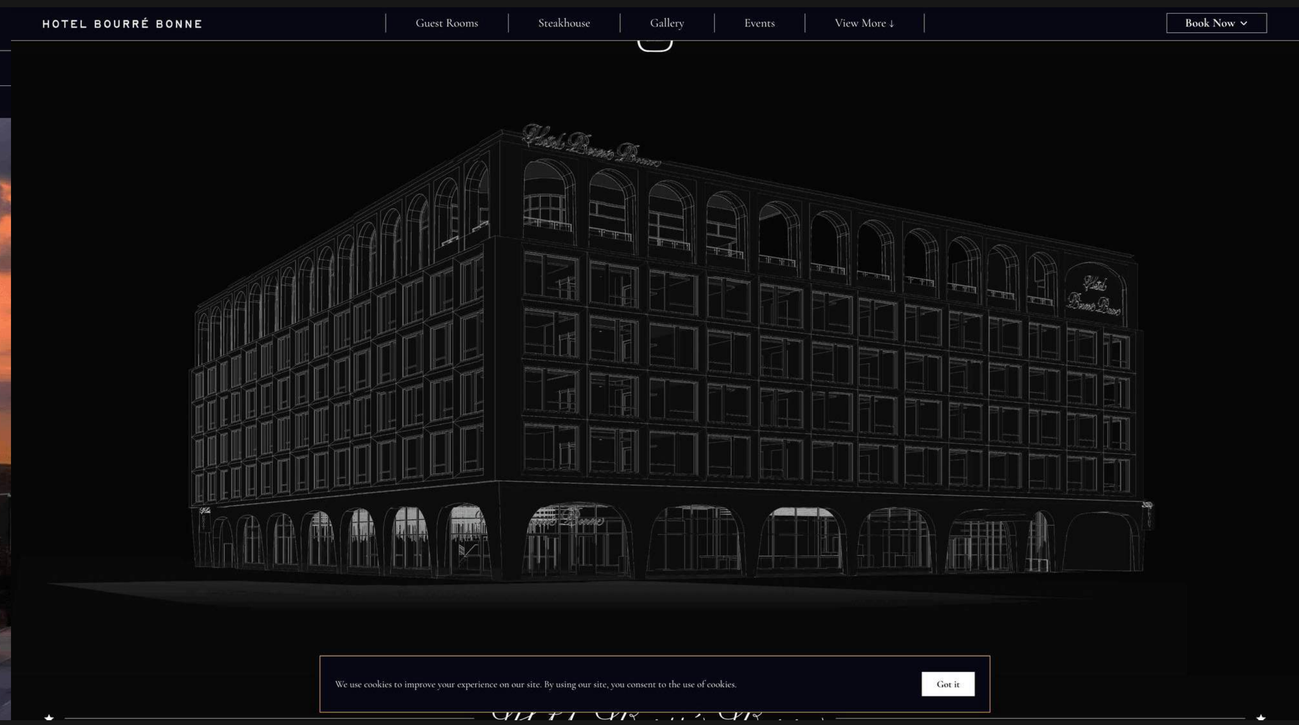
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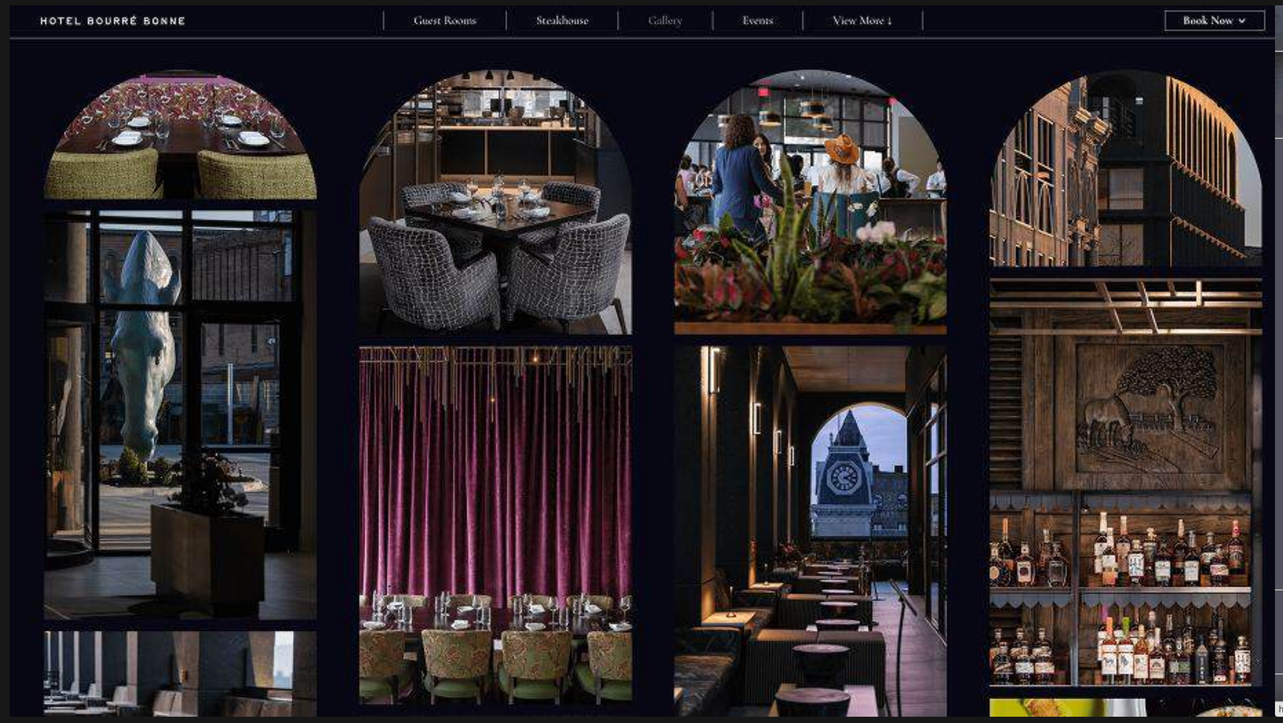
HOTEL BOURRÉ BONNE
Guest Rooms
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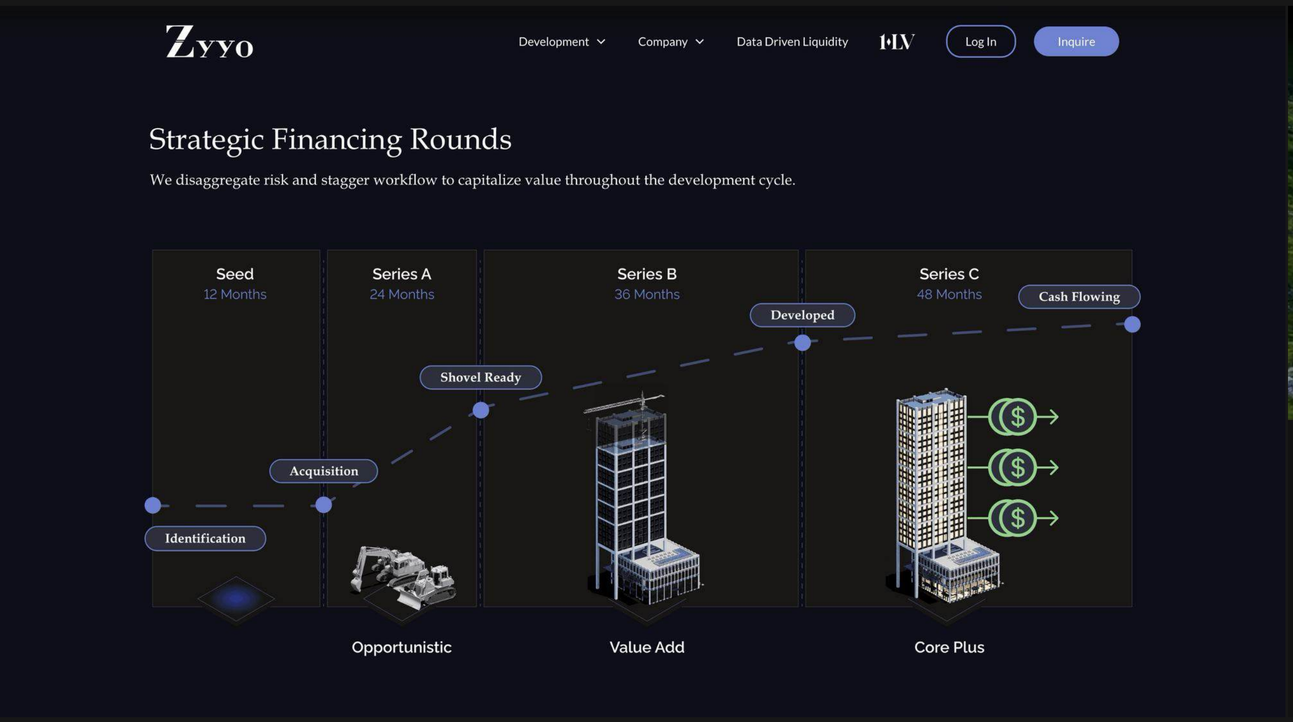
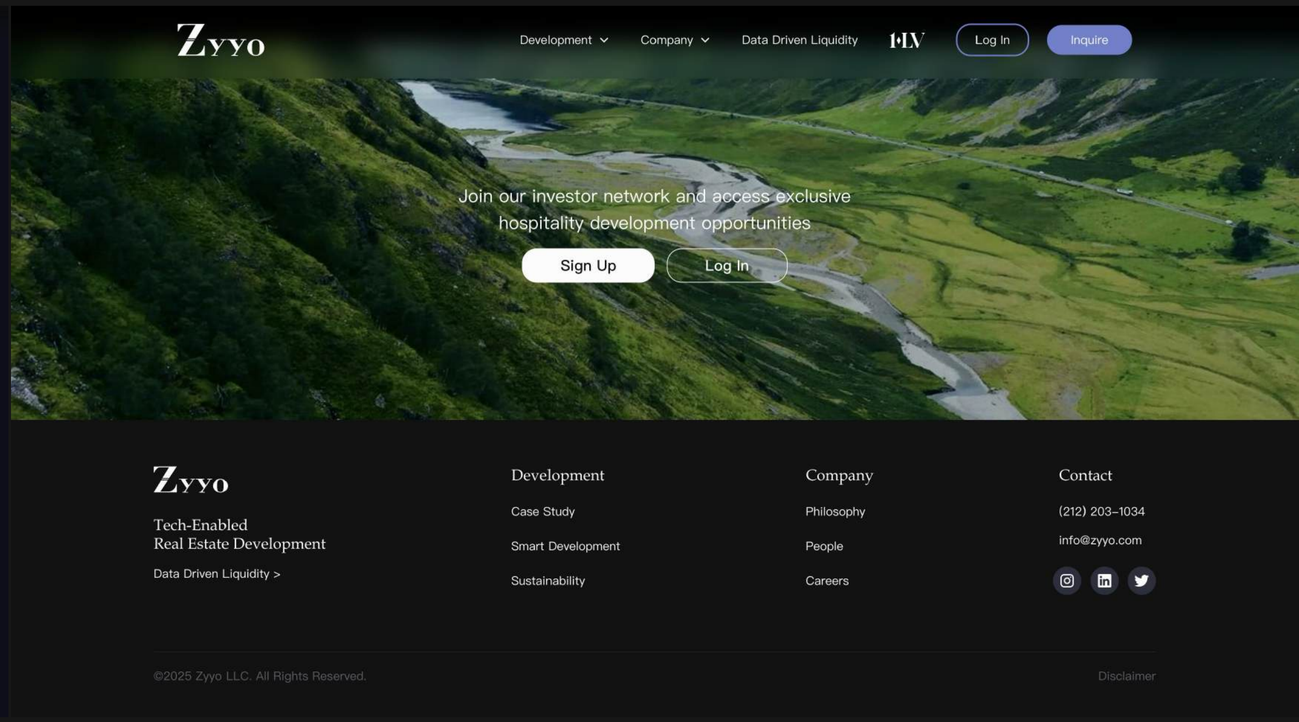
NULU CROSSING
Leasing Brochure
313 Units with Naturally-lit Bedrooms | Luxurious Amenities | Modern Interiors
1st FL Commercial 34.8k SqFt
2nd FL Commercial 29.3k SqFt
East Apartments 313 Units
West Apartments 212 Units
64.2K of Commercial Space
313 East Apartment Units
212 West Apartment Units
587 Total Parking Bays
https://www.nulucrossing.com/#





More websites designed:

https://www.zyyo.com/
https://www.bourrebonne.com/
https://www.1-lv.com/
https://www.thehotelmarty.com/
https://www.zennulu.com/
https://www.zero-sum.com/
https://www.harvest624.com/
https://www.gatewaytonulu.com/

大乐装

字体设计对比

大乐装构件厂管家

“成熟稳重，大方优雅，记忆度高”

构件厂管家

构件厂管家

构件厂管家

构件厂管家

构件厂管家

“零散，潦草，整体性低”

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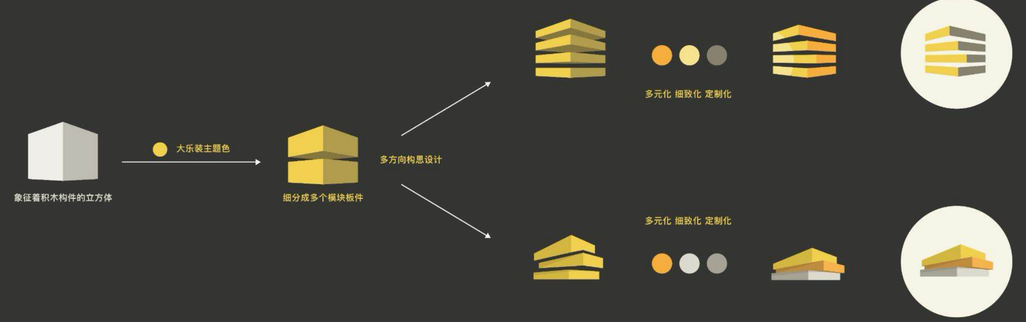
构件厂管家LOGO演变



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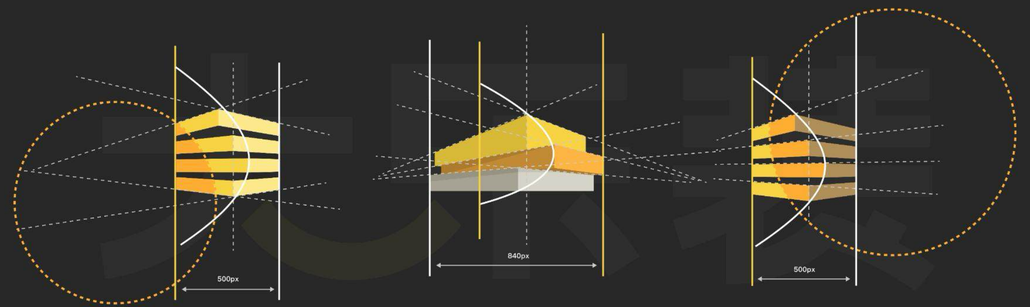
构件厂管家LOGO设计



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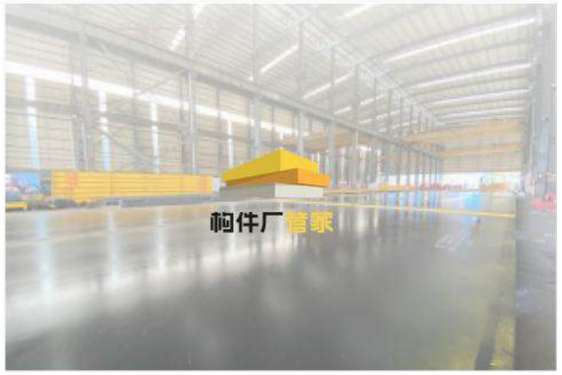
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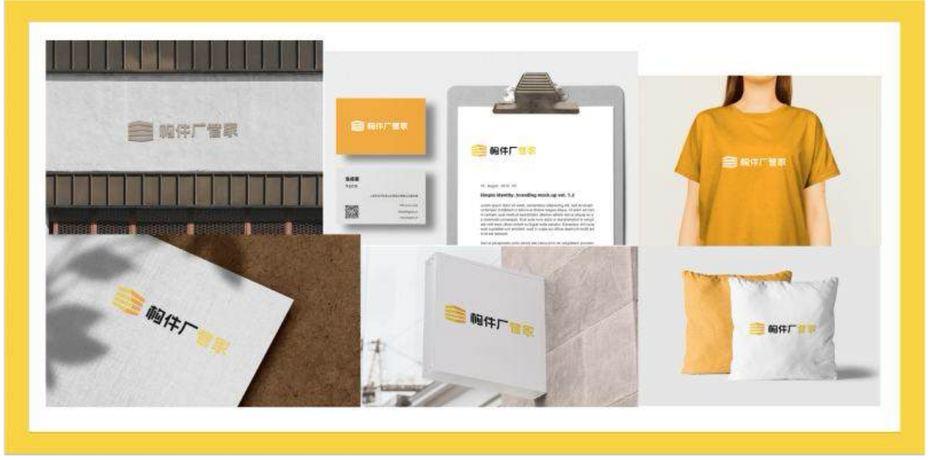
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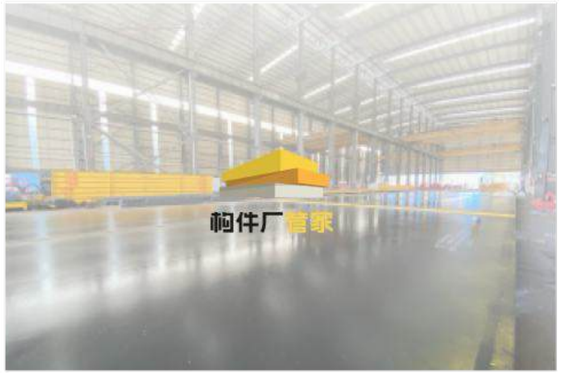
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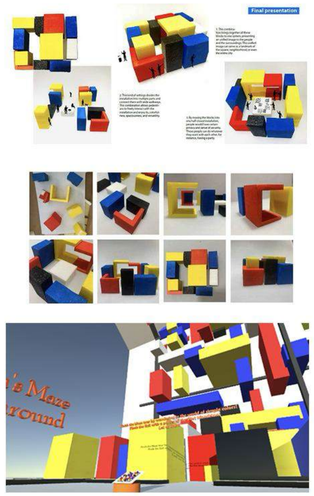
OTHER WORKS

“PlayRight”

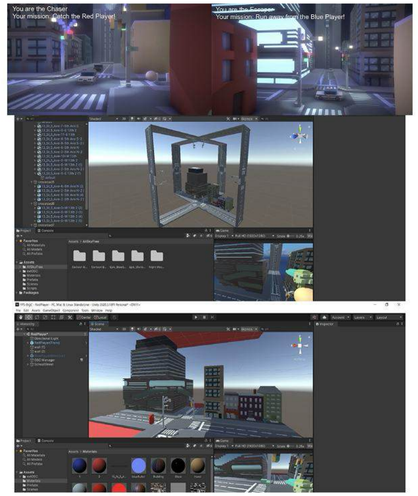
UX/UI and APP Design

“Mondrian Inspiration”



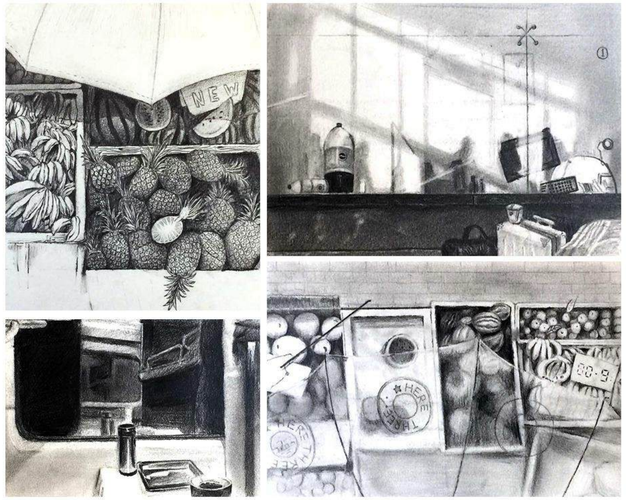
Game Design

“Dream Chaser”



Game Design and Interaction Design

Pencil Sketches



Drawing Practice

Work Renderings

Architecture Rendering, Architecture Design, Interior Design