

BLADE APP

PROJECT 01

SMART FENCING ASSISTANT & REFEREE SYSTEM

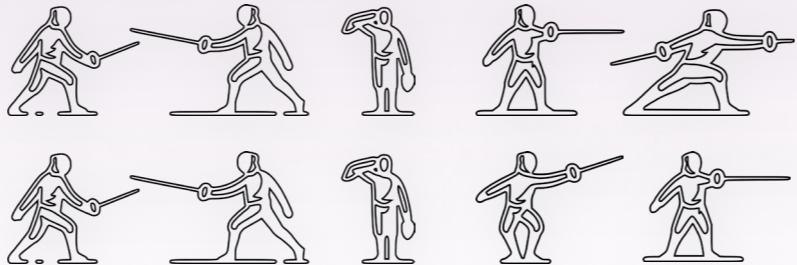
SFARS, a system that integrates training feedback and referee assistance. Using motion capture technology and artificial intelligence, the system aims to provide real-time, accurate feedback on training, while supporting referee decision-making through objective data to reduce the occurrence of human error and bias.

SFARS can be used on smart devices such as cell phones, which allows athletes to use it at any time without worrying about the high cost of equipment. The system not only helps fencers to improve their skills and optimize their training plans at home, but also provides assistance to referees during competitions to ensure that the competitions are fair and run smoothly.



BACKGROUND

I trained with my school's fencing team for six years, mastering demanding techniques from stride training to intricate hand movements.



We spent six months in basic training before even touching a sword, focusing on **mechanical movement** and foul prevention. These challenges inspiring the idea for SFARS.



Balancing school and sports was tough, with a two-hour commute reducing our training and academic efficiency.

Limited fencing venues and coaching also restricted our progress.



RESEARCH



Fencer Bhavani Devi ousted in quarters, blames referee



I didn't agree with the referee's decision on the first few points. At the first point, **when I asked for a video referral, he got angry**, which was surprising. It was a quarter-final, so I told myself to focus on the next touch.

During the 2023 Asian Games, Indian fencer Bhavani Devi expressed **concerns about unfair officiating** after the quarterfinals and said he suffered a major setback from it.

The **main disagreement** stemmed from **complex fencing rules** and **penalties after quick duels**. Without video assistance and with differing fencer opinions, decisions often seemed subject to **referees' subjective judgment**, raising **concerns about fairness and impartiality**.

Case Tips



Fencing Dreams in a Slum

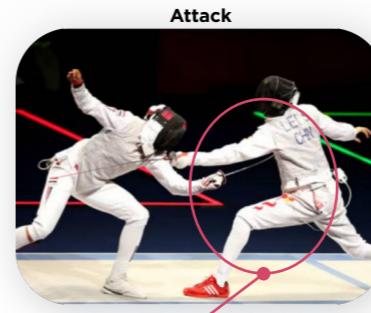


In Nairobi's Huruma slum, Coach Mbruwanyo uses fencing to help youth avoid crime, despite **poor facilities and low fencing recognition**. His students face significant challenges in gaining support and improving skills. They remain hopeful for better conditions and community backing.

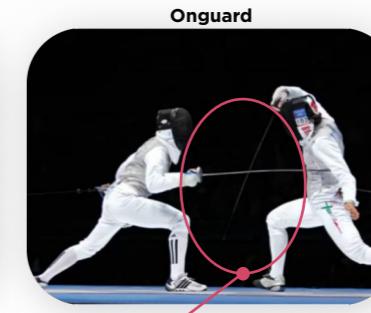
In a Kenyan slum, there is a group of fencing-loving teenagers with fencing dreams who keep swinging their swords and keep moving forward to a better life.

Fencing Rules

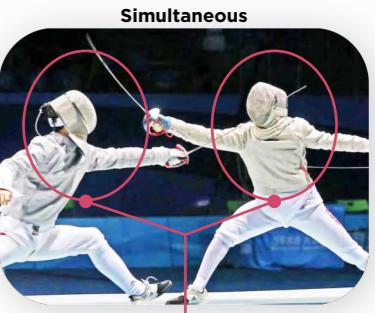
*Complex rules in fencing might lead to wrong calls and athletes' misunderstanding of the referee, affecting the fairness and athletes' performance. So this part will briefly explain some of the rules that apply to foil and sabre.



Attack



Onguard



Simultaneous

When Player A hits Player B and Player B does not hit Player A, Player A scores.

If A's sword is struck or defended by B while A is attacking, A's attack is nullified. At this point B makes a return attack to score a point.

When both teams hit each other, the more aggressive attacker scores, or is ineffective.

Related Studies

"**Referees' decisions may be unintentionally biased by a team's success**, extending our knowledge about how football referees may be influenced by social forces."

Erikstad, M. K., & Johansen, B. T. (2020). Referee bias in professional football: Favoritism toward successful teams in potential penalty situations. *Frontiers in Sports and Active Living*, 2. <https://doi.org/10.3389/fspor.2020.00019>

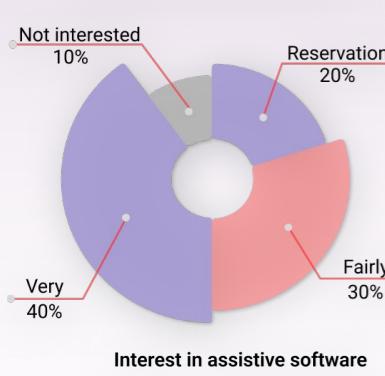
"**Referees' decisions may be unintentionally biased by a team's success**, extending our knowledge about how football referees may be influenced by social forces."

Tamir, I., & Bar-eli, M. (2021). The moral gatekeeper: Soccer and technology, the case of video assistant referee (VAR). *Frontiers in Psychology*, 11. <https://doi.org/10.3389/fpsyg.2020.613469>

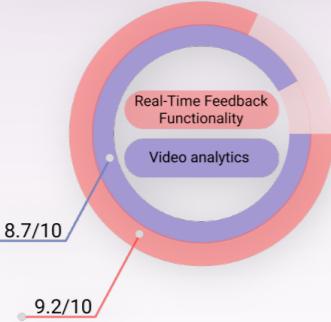
*VAR is Video Assistant Referee

Questionnaire

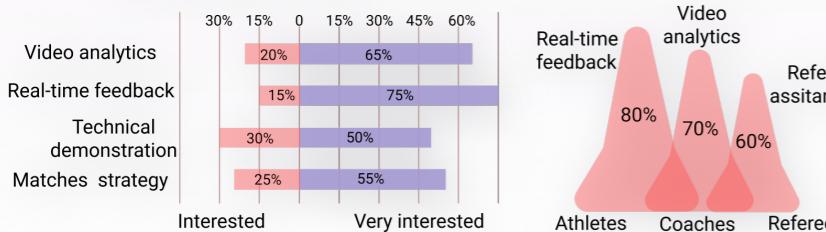
Expectations for the Blade APP



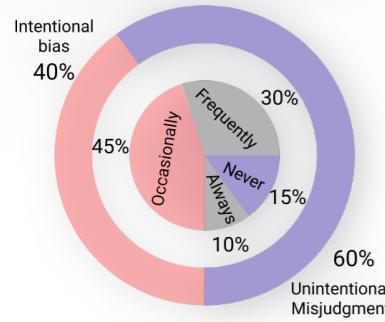
Grade for Specific Feature Request



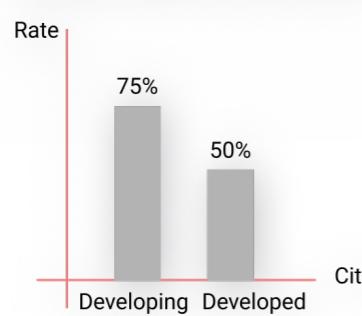
Differences in user type interests



Experienced Referee Bias



Regional Differences in Bad Calls



Technical Equipment at Competition



Olympics

Hawkeye Camera
For slow playback,
expensive, limited requests.

City-Level Fencing Competitions

No adjudication aids

National Secondary School League and Provincial League

No adjudication aids

Persona



About

Age: 24
Job: Professional fencer
location: Shanghai, China

Goals

- Improve decision making and reaction time in competition
- Receive personalized feedback to improve technique
- PAIN POINTS
- Geographic and financial constraints make accessing top-level training resources costly and challenging.
- Lack of technological support complicates objective performance analysis.

Career

- Began formal fencing training at the age of 12.
- Represented China in many international competitions and won several awards.
- Currently, she is the main member of a famous fencing club in Shanghai.



About

Age: 45
Job: Fencing coach
location: Beijing, China

Goals

- Provide targeted training programs to meet the needs of different students.
- Utilize technological tools to improve the effectiveness of teaching.
- PAIN POINTS
- Increasing student numbers make individual attention difficult.
- Lack of technological tools complicates tracking student progress and providing personalized feedback.

Career

- Started to receive systematic fencing training at the age of fifteen.
- He has won many awards in the China Fencing Championships.
- Currently working as a senior coach in a famous fencing club in Beijing.



About

Age: 38
Job: Fencing referee
location: Hangzhou, China

Goals

- Ensure the fairness and accuracy of the competitions.
- To continue to learn and adapt to new rules and technical changes in the sport of fencing.
- PAIN POINTS
- The need for quick and accurate decisions in major tournaments creates significant pressure.
- Handling disputes and complaints from athletes and coaches requires effective communication.

Career

- Fencing referee since graduating from university.
- He has refereed many international fencing events, including the Olympic Games.
- He is one of the referees certified by the International Fencing Federation.



About

Age: 29
Occupation: Software engineer, amateur fencer
location: Nanjing, China

Goals

- Gain in-depth knowledge of fencing techniques and competition strategies.
- Track and support favorite athletes and their progress in competition.
- PAIN POINTS
- Lacks a one-stop platform for comprehensive fencing competition analysis and data.
- Desires more channels for interaction with other fencing enthusiasts.

Career

- Working as a software engineer in a large technology company.
- Involved in fencing in his spare time and actively participates in various community-organized fencing activities.



About

Age: 17
Profession: High school student, Fencing player
location: Xi'an, China

Goals

- Systematically learn and master the skills of fencing.
- Gain more awards to enhance personal athleticism and visibility.
- PAIN POINTS
- Balancing demanding academics with fencing training requires rigorous time management.
- Limited access to advanced and personalized training resources hinders skill development.

Career

- Began fencing training at the age of 12.
- Active in regional and state level fencing competitions, winning several awards.
- Aims to make the college fencing team and compete at nationals.

User Journey Map

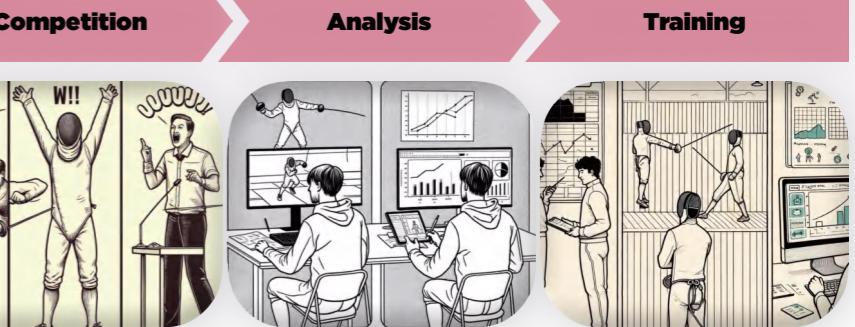
*This following chart shows changes in player behavior and demand based on a step-by-step breakdown of a full fencing competition.

Stage

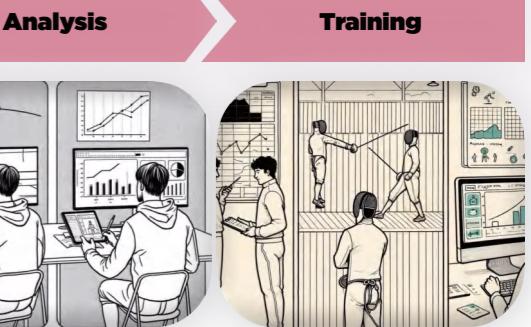
Preparation



Competition



Analysis



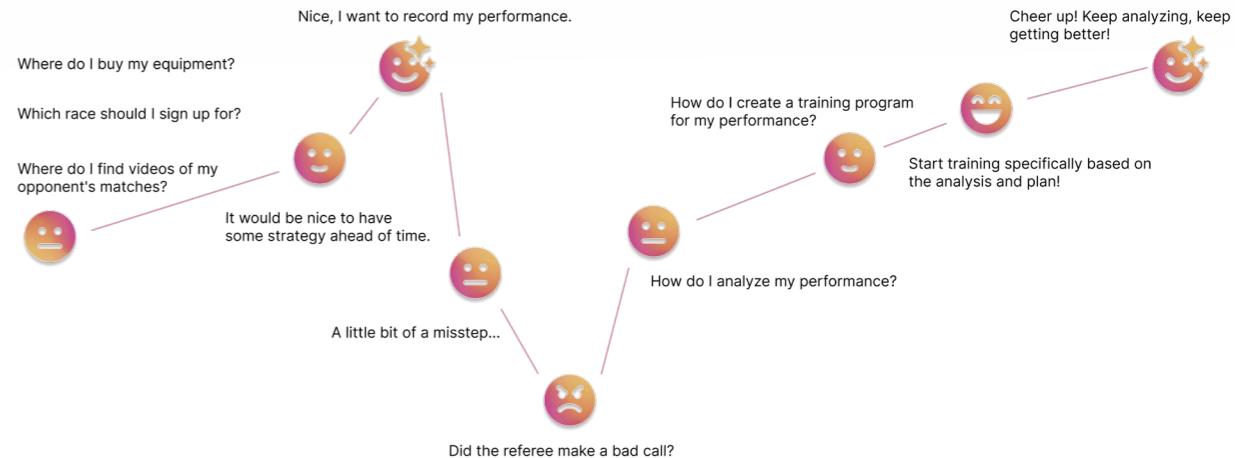
Training



Steps



Emotions & Thoughts

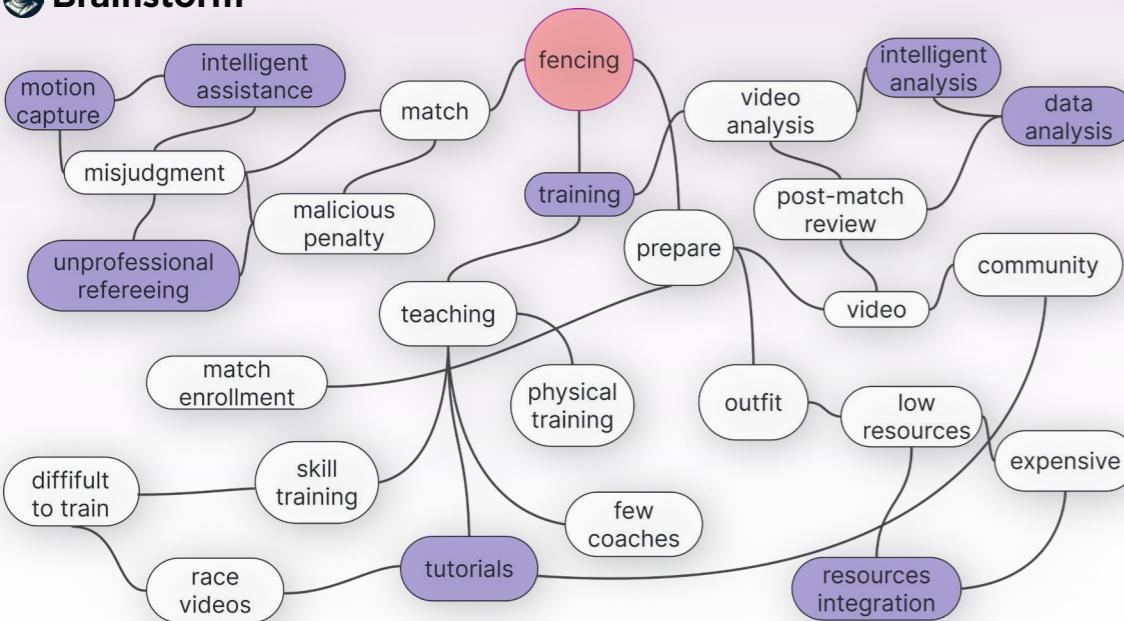


Pain Points

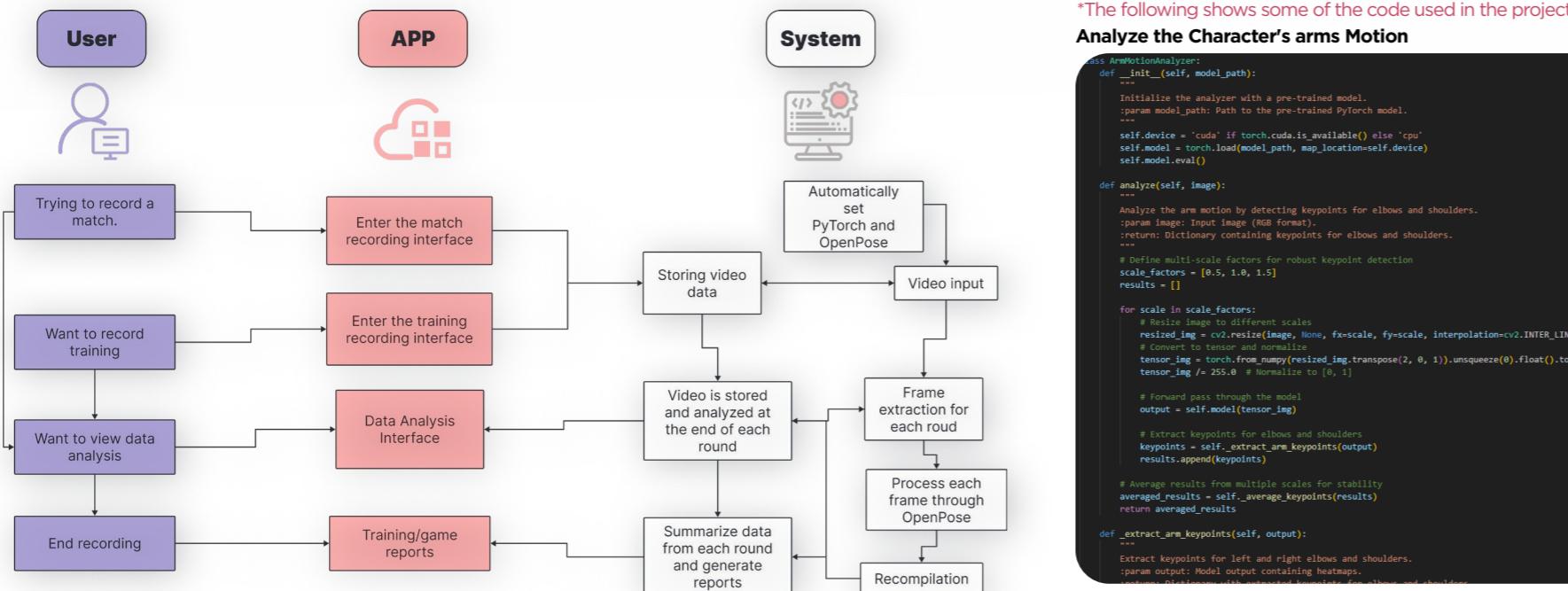
- Sales channels can be integrated
- Use of motion capture and artificial intelligence to assist referees
- Analyze deficiencies through video
- Specialized training through the resulting reports and data
- Record past race videos to view
- Generate data and reports through analysis
- Allows record own match
- Develop a training program based on the report
- Integrate race-related resources
- Allows to analyze own match
- Continuous analysis and improvement

BLADE APP

Brainstorm



APP System

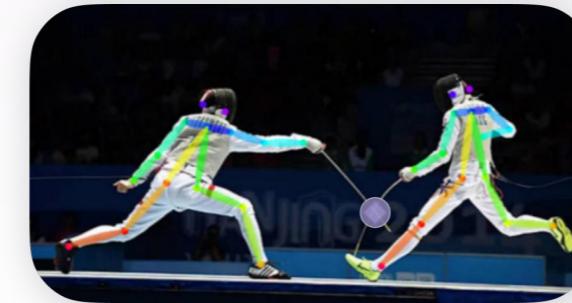


Smart Fencing Assistant & Referee System Coding

*The following shows key frames taken from the analysis video of the Olympic fencing competition.



This circle effect means the opposing player has been hit



This circle effect represents both swords generating a single strike, with a potential offensive priority shift present
*When simultaneous hits occur, whichever player has priority of attack scores a point.



After detecting the key points of the human torso, hands and feet, a skeletal model with different distinguishing colors is generated. Then, by means of playback, slow playback, etc., the viewer can better judge the athletic posture of the player.



*The following shows some of the code used in the project.

Analyze the Character's arms Motion

```

class ArmMotionAnalyzer:
    def __init__(self, model_path):
        ...
        Initialize the analyzer with a pre-trained model.
        :param model_path: Path to the pre-trained PyTorch model.
        ...
        self.device = 'cuda' if torch.cuda.is_available() else 'cpu'
        self.model = torch.load(model_path, map_location=self.device)
        self.model.eval()

    def analyze(self, image):
        ...
        Analyze the arm motion by detecting keypoints for elbows and shoulders.
        :param image: Input image (RGB format).
        :return: Dictionary containing keypoints for elbows and shoulders.
        ...

        # Define multi-scale factors for robust keypoint detection
        scale_factors = [0.5, 1.0, 1.5]
        results = []

        for scale in scale_factors:
            # Resize image to different scales
            resized_img = cv2.resize(image, None, fx=scale, fy=scale, interpolation=cv2.INTER_LINEAR)
            tensor_img = torch.from_numpy(resized_img.transpose(2, 0, 1)).unsqueeze(0).float().to(self.device)
            tensor_img /= 255.0 # Normalize to [0, 1]

            # Forward pass through the model
            output = self.model(tensor_img)

            # Extract body keypoints
            keypoints = self._extract_arm_keypoints(output)
            results.append(keypoints)

        # Average results across scales for stability
        averaged_results = self._average_keypoints(results)
        return averaged_results

    def _extract_arm_keypoints(self, output):
        ...
        Extract keypoints for torso, pelvis, knees, and feet from the model's output.
        :param output: Model output containing heatmaps.
        :return: Dictionary with extracted keypoints for torso, pelvis, and shoulders.
        ...

        heatmaps = output[0].cpu().detach().numpy()
  
```

Analyze the Character's Body Motion

```

class BodyMotionAnalyzer:
    def __init__(self, model_path):
        ...
        Initialize the body motion analyzer with a pre-trained model.
        :param model_path: Path to the pre-trained PyTorch model.
        ...
        self.device = 'cuda' if torch.cuda.is_available() else 'cpu'
        self.model = torch.load(model_path, map_location=self.device)
        self.model.eval()

    def analyze(self, image):
        ...
        Analyze body motion by detecting keypoints for torso, pelvis, knees, and feet.
        :param image: Input image (RGB format).
        :return: Dictionary containing keypoints for body parts and movement vectors.
        ...

        # Define multi-scale factors for robust keypoint detection
        scale_factors = [0.5, 1.0, 1.5]
        results = []

        for scale in scale_factors:
            # Resize image to different scales
            resized_img = cv2.resize(image, None, fx=scale, fy=scale, interpolation=cv2.INTER_LINEAR)
            tensor_img = torch.from_numpy(resized_img.transpose(2, 0, 1)).unsqueeze(0).float().to(self.device)
            tensor_img /= 255.0 # Normalize to [0, 1]

            # Forward pass through the model
            output = self.model(tensor_img)

            # Extract body keypoints
            keypoints = self._extract_body_keypoints(output)
            results.append(keypoints)

        # Average results across scales for stability
        averaged_results = self._average_keypoints(results)
        return averaged_results

    def _extract_body_keypoints(self, output):
        ...
        Extract keypoints for torso, pelvis, knees, and feet from the model's output.
        :param output: Model output containing heatmaps.
        :return: Dictionary with extracted keypoints for torso, pelvis, and feet.
        ...

        heatmaps = output[0].cpu().detach().numpy()
  
```

Model Generation Via Analysis

```

class MotionAnalysisModel(nn.Module):
    def __init__(self):
        ...
        A modular neural network designed for motion analysis, focusing on detecting body keypoints for elbows, torso, pelvis, and feet.
        ...
        super(MotionAnalysisModel, self).__init__()

        # Feature extraction backbone
        self.feature_extractor = nn.Sequential(OrderedDict([
            ('conv1', nn.Conv2d(3, 64, kernel_size=3, stride=1, padding=1)),
            ('relu1', nn.ReLU()),
            ('conv2', nn.Conv2d(64, 128, kernel_size=2, stride=2)),
            ('pool1', nn.MaxPool2d(kernel_size=2, stride=2)),
            ('relu2', nn.ReLU()),
            ('conv3', nn.Conv2d(128, 256, kernel_size=3, stride=1, padding=1)),
            ('pool2', nn.MaxPool2d(kernel_size=2, stride=2)),
            ('relu3', nn.ReLU())
        ]))

        # Separate output heads for different body parts
        self.elbow_head = nn.Conv2d(256, 2, kernel_size=1) # Left and right elbow
        self.torso_head = nn.Conv2d(256, 1, kernel_size=1) # Torso
        self.pelvis_head = nn.Conv2d(256, 1, kernel_size=1) # Pelvis
        self.foot_head = nn.Conv2d(256, 2, kernel_size=1) # Left and right feet

    def forward(self, x):
        ...
        Forward pass of the model.
        :param x: Input tensor of shape (batch_size, channels, height, width).
        :return: Dictionary containing outputs for different body parts.
        ...

        # Shared feature extraction
        features = self.feature_extractor(x)

        # Separate outputs for each body part
        elbows = self.elbow_head(features)
        torso = self.torso_head(features)
        pelvis = self.pelvis_head(features)
        feet = self.foot_head(features)

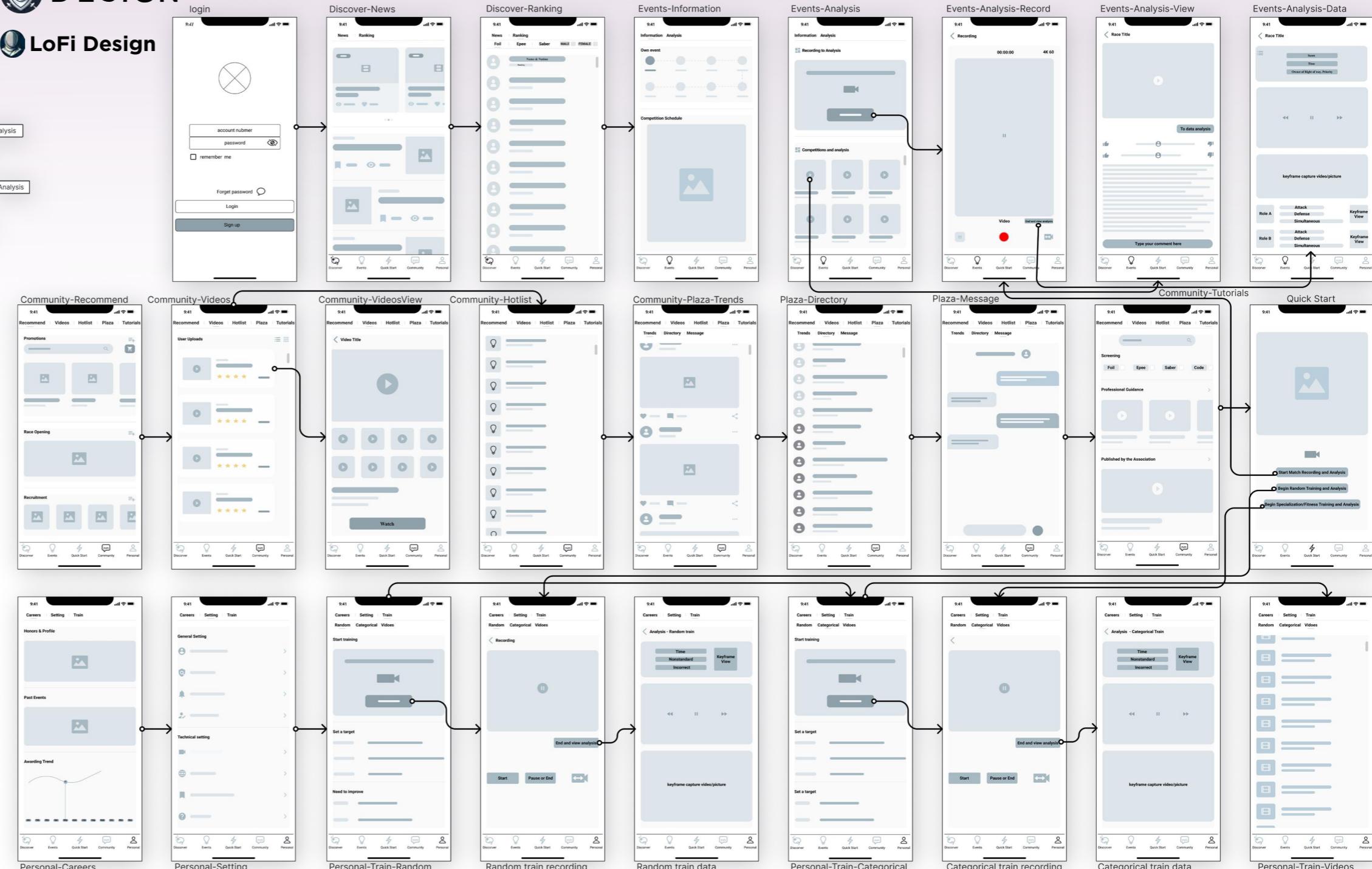
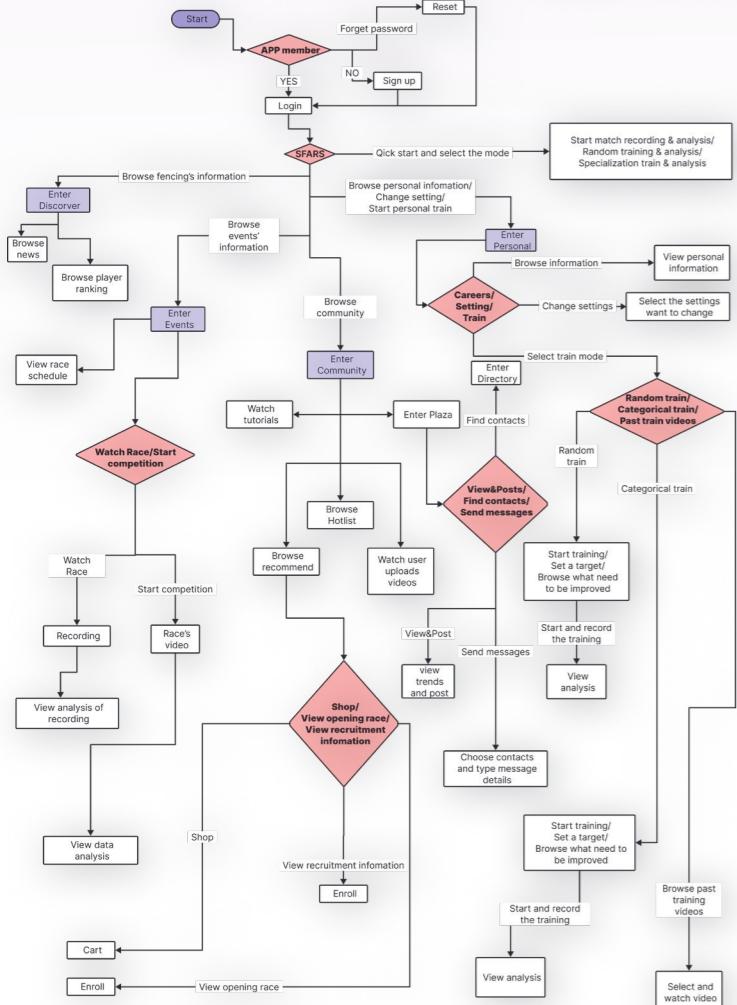
        outputs = {
  
```



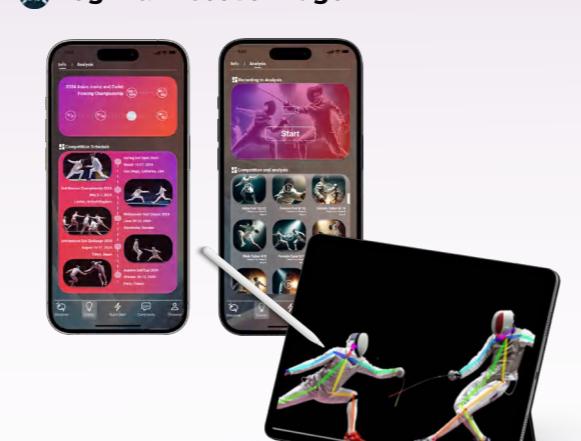
DESIGN

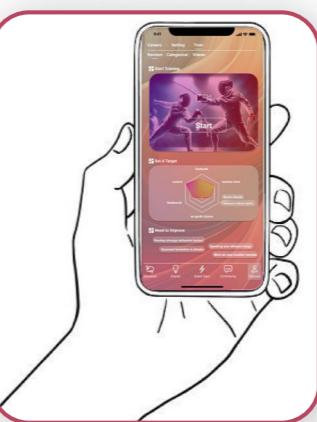
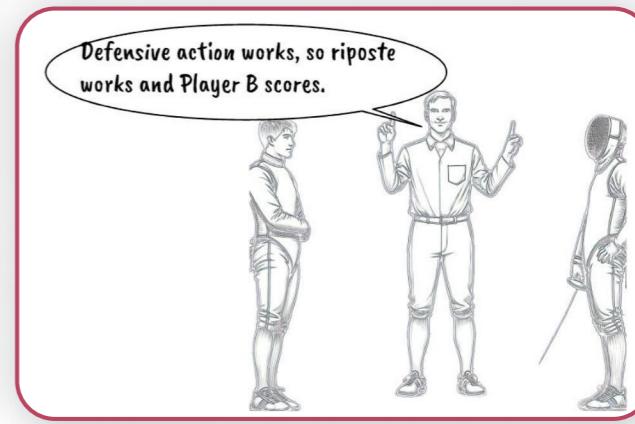
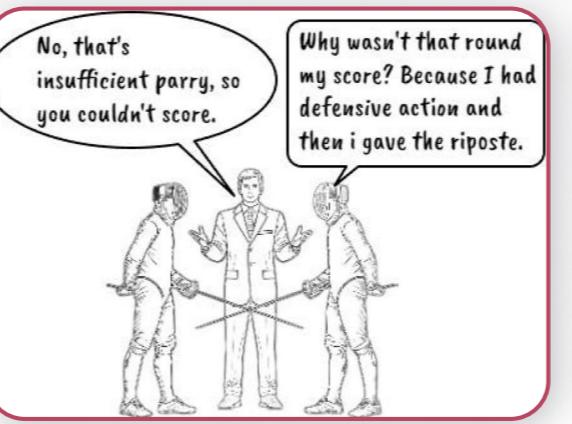


User Flow



 Login & Discover Page

 Login & Discover Page

 Quick Start & Community Page

 Personal Page


37 Days of Us

Project 02



"37 Days of Us" is an interactive narrative game designed to explore and deepen interpersonal relationships through structured questions and scenarios. Inspired by Arthur Aron's 36 questions, the game aims to facilitate self-disclosure, empathy, and meaningful communication between players. Players embark on a 37-day journey, each day representing a unique stage of life, where they work together to reconstruct memories and strengthen their relationship.

INTRODUCTION

Gameplay Overview

Player A: Holding a luggage game machine, you need to look for clues each day from the items in the luggage you get.

Player B: Holds a diary in which he records the tattered memories of the last 36 days. The complete diary needs to be deduced from clues with another player.

36 Questions: The game is structured around 36 progressively deeper questions designed to encourage self-disclosure and mutual understanding.

Dual-Player Interaction: Players must collaborate to unlock memory fragments and progress through each day.

Memory Fragments: Successfully answering questions and solving puzzles unlocks memory fragments, revealing the story and allowing players to advance.

Progression

Daily Tasks: Each day presents a new question or task that players must complete to unlock a piece of the protagonist's memory.

Error Handling: If too many errors are made, the protagonist becomes confused and players must revisit the previous day's memory.

Emotional Milestones: As players progress, they encounter emotional milestones that deepen their connection and understanding.

End Goal

Day 37: On the final day, players reflect on their journey, reviewing all the memories and posing a new, personal question to each other, symbolizing the ongoing journey of understanding and connection.



BACKGROUND

Today, I decided to start documenting my life. Maybe it's because recent events have touched me deeply. Relationships between people are so complex and subtle, and everyone struggles to understand their own emotions as well as the feelings of others.

Day 1 | Starting to Document My Life

The pace of modern society is so fast that we rarely have the opportunity to take a moment to have a deep dialogue to truly understand each other's hearts. All communication is relayed through electronic signals, and how long has it been since I've actually spent time with my family, my friends. Even though I've been away from the constant solitude of being abroad and back in my home for a week now. I still wasn't used to it and felt emotionally rusty and shy. I guess that's why I felt lonely.

So, I picked up a pen and began to write down these thoughts in my diary. Hopefully, by recording them in this way, I'll be able to understand myself better, and hopefully find some answers about how to better connect with others.



Day 7 | Misunderstandings in Life

This afternoon, my best friend Kobayashi and I got into an argument over a small matter. We were discussing shopping for gifts in a shop, and he thought we should buy practical things, while I thought the gifts should be more thoughtful. As a result, the two of us got more and more agitated and finally even accused each other.

When I got home, I calmed down and recalled the argument. In fact, Xiaolin was just trying to express his point of view, while I misunderstood his intention and thought he was dismissing my idea. This misunderstanding hurt our friendship.

I sat down at my desk and revisited the matter. Misunderstandings between people are so easy to create, and they often stem from our failure to truly understand each other's intentions. I wrote down these feelings in my journal, hoping to learn something from it and avoid making the same mistake in the future.

Day 16 | Communication Reconciles People

Last night, I had a profound dialogue with my family. There have been a lot of unresolved conflicts and misunderstandings between us, but last night's dialogue allowed us all to let go of the barriers in our hearts.

It's amazing how those topics that used to make us argue so much became so simple and clear after this honest communication. We each have our own opinions and feelings, and through communication, we found empathy for each other.

I felt an overwhelming sense of relief and joy, a feeling that words cannot describe. I wrote down every detail of this conversation in my diary to treasure this precious memory. Communication can really change a lot of things.



Day 27 | Misunderstandings in Life

I attended a gathering of old friends. We haven't seen each other for a long time, and we all have our own lives and busy schedules. But today, we dropped everything, sat together and talked a lot about our past memories and present life.

During the gathering, we played a lot of interactive games which brought back that sense of understanding and closeness that we once had. Through these simple interactions, our sense of connection with each other became deeper.

On the way home, I kept thinking about how important human connection is. That spiritual empathy and understanding is the most valuable thing in life. I recorded bits and pieces of the day in my journal and felt a deep sense of satisfaction.

BACKGROUND

So I thought we could make a narrative interactive game that incorporates some iconic experiences and theories from current research to help players explore real emotions and repair or deepen their relationships. Each day of the game symbolizes a different stage of life, and through the gradual unveiling of memories and stories, people can have deeper conversations and interactions, reconnect, and find ways to understand and reconcile.

Day 36 | Reflections on Relationships

The holidays are almost over. Keeping track of this time has given me a deeper understanding of relationships. Relationships in life are complex and varied, and everyone has their own emotions and stories.

Through these records, I realised how important a role communication and understanding plays in them. Whether it's the creation of misunderstandings, the resolution of problems through communication, and the deep connections that are made in the end, these have all given me a sense of how fragile and resilient human relationships can be.

I hope to be able to use these records to remind myself to cherish every opportunity to communicate and understand others in the future. Relationships are fragile, but they can also be repaired and deepened. I hope that through these reflections and records, I will be able to find more understanding and connection in the days ahead.

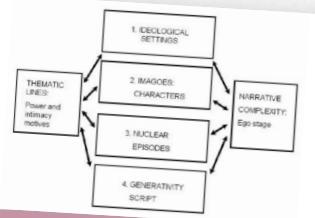
FOUNDATION AND REFERENCE

The Experimental Generation of Interpersonal Closeness: A Procedure and Some Preliminary Findings

Arthur Aron
State University of New York at Stony Brook
Edward Mellott
California Graduate School of Family Psychology
Elaine N. Aron
State University of New York at Stony Brook
Robert Darrle Valente
University of California, Santa Cruz
Reese J. Rater
Arizona State University

The Role of Transportation in the Persuasiveness of Public Narratives
Melanie C. Green and Timothy C. Brock
Ohio State University

Transportation was proposed as a mechanism whereby narratives can affect beliefs. Published in absorption into a story, transportation entails imagery, affect, and attentional focus. A transportation scale was developed and validated. Experiment 1 ($N = 97$) demonstrated that extent of transportation augmented memory for story content and increased persuasiveness of stories. Experiment 2 ($N = 60$) showed that highly transported readers found fewer false notes than those who were less transported. Experiments 3 ($N = 40$) and 4 ($N = 28$) again replicated the effects of transportation on beliefs and evaluations; in the latter, transportation led to reduced story-consistent beliefs and evaluations by using processing instructions. Reduced transportation led to reduced story-consistent beliefs and evaluations by using processing instructions. Reduced transportation and corresponding beliefs were generally unaffected by labeling a story as fact or as fiction.



The game "37 Days of Us" is built upon a robust theoretical foundation, the establishment of interpersonal intimacy can be accelerated through structured interactive procedures. The game integrates self-disclosure theory, empathy, narrative psychology, and media effects theory to provide players with a unique experience through deep interaction and emotional exchange:

Main Theory

Arthur Aron's 36 questions are a series of structured questions designed to facilitate intimacy between participants. These questions are arranged to gradually increase in depth and personal significance, encouraging mutual self-disclosure and fostering a sense of closeness and understanding between individuals.

Core Theories

Self-Disclosure

Self-disclosure involves sharing personal information, thoughts, and feelings to develop deeper relationships.

Gradual Escalation

A series of questions progressively deepens self-disclosure to build trust and intimacy gradually.

Reciprocity

Mutual self-disclosure builds trust and mutual understanding in relationships.

Empathy

Understanding and sharing others' feelings enhances emotional connections during self-disclosure.

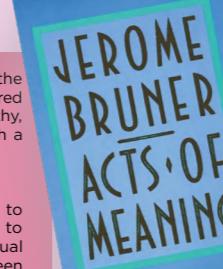
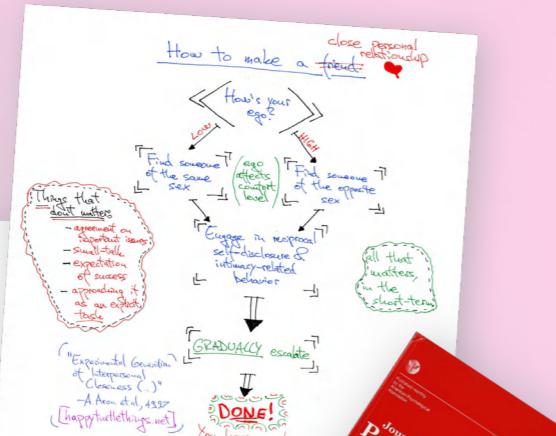
Narrative Psychology

Narratives help individuals make sense of their life experiences and construct their identities.

Narrative Transportation

Immersive narratives influence attitudes and beliefs, enhancing the impact of stories on individuals.

By leveraging these theories, "37 Days of Us" provides a unique and meaningful interactive experience that fosters deeper understanding and stronger connections between players. The game's design ensures that players engage in thoughtful and structured conversations, enhancing their communication skills and emotional intelligence in a playful yet profound manner.



INTERVIEW



Ge Shen

Growing up in a fragmented family, Ge struggled with expressing his emotions and understanding others. Through various trials and errors, he found solace in meaningful conversations and deep connections, leading him to explore innovative ways to improve communication in relationships.

Biography

Age ••••• 21

Gender ••••• Male

Background

Grew up in a fragmented family

Difficult

Difficulty expressing emotions

Conclusion

- Emotional expression is essential for building strong, healthy relationships. Without emotional expression, individuals may face misunderstandings and a lack of deep connection.
- Meaningful, deep dialogue plays a vital role in bridging emotional divides and promoting understanding between people.

Feifei Chang

Feifei need to deal with peer pressure and societal expectations as a teenager. These anxieties blocked her from communicating with her environment, whether it was speaking openly about the difficulties she faced or confiding in her parents.



Biography

Age ••••• 18

Gender ••••• Female

Background

Dealt with peer pressure and societal expectations

Difficult

Struggled with self-expression

Conclusion

- Self-expression is crucial for personal growth and mental well-being. Without it, individuals may struggle to connect with others and fully realize their potential.
- Supportive environments are essential in helping individuals navigate societal pressures and find their own voice.

USER RESEARCH

Connections with Interview

Ge's experience highlights the **importance of emotional expression and meaningful dialogue**, and that many face similar challenges.

So we need some **light-hearted yet deeply interactive experiences** to help individuals **improve their communication skills and build stronger relationships**.

Connections with Interview

Feifei's experience shows the **importance of overcoming societal pressures to find one's voice**.

So we need some **Interactive experiences** to help individuals **explore their feelings and improve communication skills**; which could **overcome struggles with self-expression**.

Game Formula

$$X+Y=Z$$

X = Main Theory = Self-Disclosure (A)

Y = Core Theory = Empathy (B) + Narrative Psychology (C) + Narrative Transportation (D)

Z = Improved Interpersonal Intimacy and Personal Growth

Elements Explained

A (Self-Disclosure): Encourages gradual sharing of personal information.

B (Empathy): Enhances emotional connections and support.

C (Narrative Psychology): Helps construct personal stories and understand life experiences.

D (Narrative Transportation): Immersive storytelling influencing attitudes and beliefs.

Application to Problems

Problem Z1 with Ge Shen

Formula: A + B = Improved Emotional Expression and Understanding

A (Self-Disclosure): Encourages gradual sharing of emotions.

B (Empathy): Builds emotional connections and understanding.

Problem Z2 with Feifei Chang

Formula: C + D = Overcoming Societal Pressures and Finding One's Voice

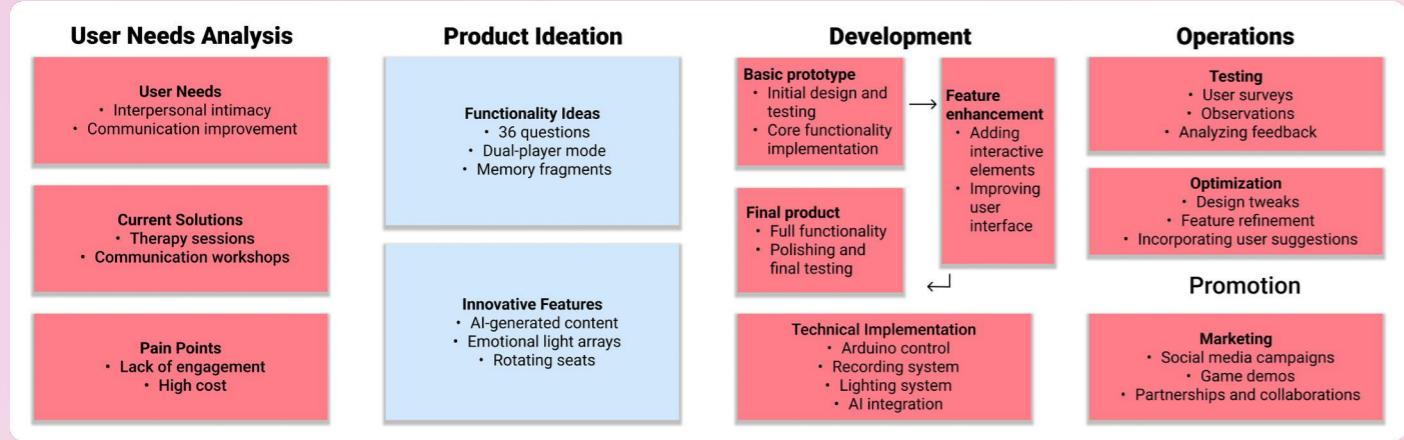
C (Narrative Psychology): Helps in constructing and understanding personal narratives.

D (Narrative Transportation): Immersive stories influence self-perception and attitudes.

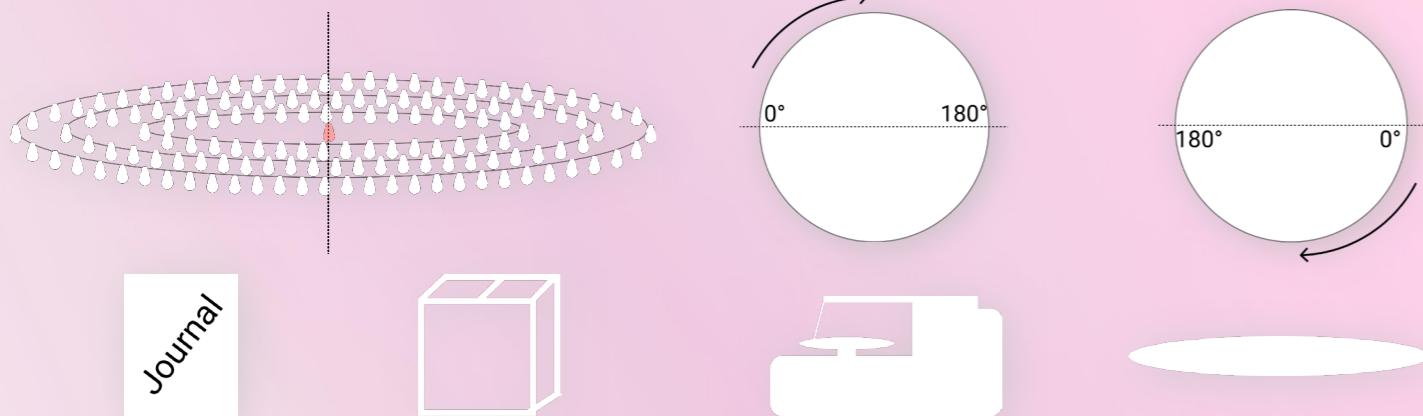
Summary of Connection

The formula illustrates how **self-disclosure (A) and empathy (B) can improve emotional expression and understanding** for Ge Shen (Problem X), while **narrative psychology (C) and narrative transportation (D) can help** Feifei Chang overcome societal pressures and find her voice (Problem Y). "37 Days of Us" **integrates these elements to foster interpersonal intimacy and personal growth**, addressing the issues identified in user interviews.

MIND JAM



DESIGN ELEMENTS



DESIGN ELEMENTS

The Finite Nature of Time 1 | Self-Exploration and Growth 2 | The Complexity of Relationships 3 | Understanding and Reconciliation 4

The 36 days in the game symbolise the finite duration of a lifetime, reminding players to value each day's interactions and choices.

Through answering questions and interacting with each other, players engage in deep self-reflection and exploration, experiencing the process of personal growth. Each question is an opportunity for self-revelation, and each answer is an opportunity for spiritual growth.

Relationships between people are like intertwined webs, where each dialogue may unravel a knot or weave a new connection.

Emphasis is placed on reconciliation through understanding and tolerance, finding peace even in the midst of differences. Reconciliation, whether with others or with oneself, is an important part of emotional growth.

GAME STEPS

Step 1

Player B obtains clue packages through Twister.

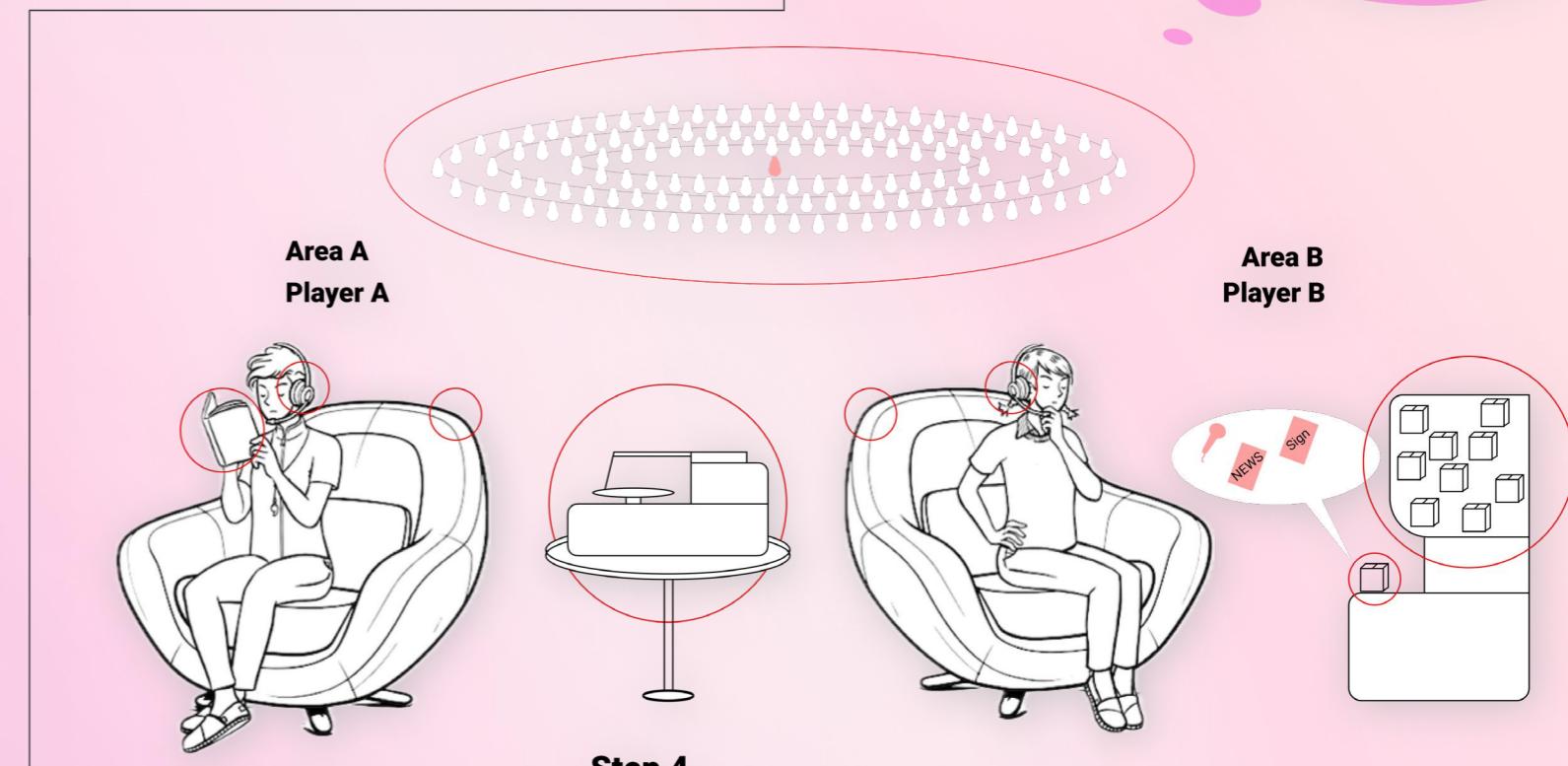
Step 2

Player A looks through the clue items to find the diary.

Detail view for light array



Normal-On
Seat swivelling, corresponding light array off



Step 3

Player A and Player B discuss and answer questions based on clues while a phonograph records.

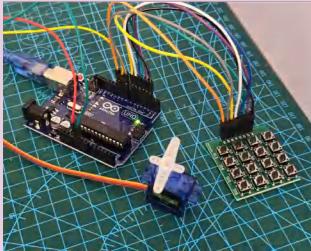
Step 4

Each time a question is answered, the seats rotate a small distance, gradually getting closer to each other. At the same time, the corresponding emotional light array goes off for one turn, pulling each other closer to the environment.

Step 5

At the end of Day 36, the players come face-to-face to symbolise the building of the relationship.

TECHNOLOGY DEMONSTRATION



The **Arduino development board** is connected to the button matrix and servo. All wires are connected and ready for testing.

The **button matrix** can be customised with multiple buttons, such as 5° clockwise or 5° counterclockwise rotation when pressed, as well as one-button reset.

And the **servo** can be turned clockwise from 0° to 180°.

CODE PART

```
#include <Keypad.h>
#include <Servo.h>

Servo myservo; // Create a servo object.

const int servoPin = 9; // servo signal line to digital pin 9

const byte ROWS = 4; // four rows
const byte COLS = 4; // four columns
const keypad keys[ROWS][COLS] = {
    {'1', '2', '3', 'A'}, {'4', '5', '6', 'B'},
    {'7', '8', '9', 'C'}, {'*', '0', '#', 'D'}
};

const byte rowPins[ROWS] = {6, 7, 8, 10}; // rows connected to Arduino pins
const byte colPins[COLS] = {2, 3, 4, 5}; // Columns are connected to the Arduino's pins

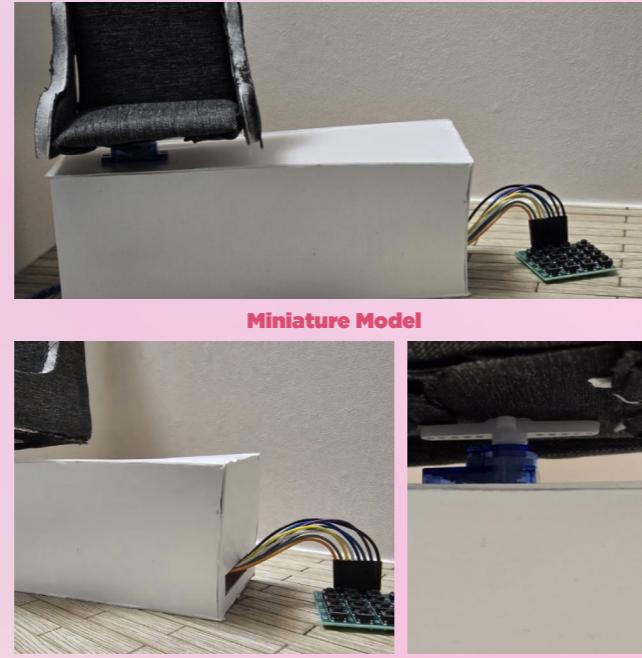
Keypad keypad = Keypad(makeKeymap(keys), rowPins, colPins, ROWS, COLS); int currentAngle = 0;

void setup() {
    myservo.attach(servoPin); // connect the servo to the specified pins
    myservo.write(currentAngle); // initialise servo angle
}

void loop() {
    char key = keypad.getKey(); if (key) {char key = keypad.getKey(); // initialise the servo angle.

    if (key) {
        if (key == 'A') {
            currentAngle = 0; // reset the servo angle
        } else if (key == 'B') {
            currentAngle -= 5; // decrease servo angle
            if (currentAngle < 0) {
                currentAngle = 0; // limit the minimum servo angle to 0 degrees
            }
        } else if (key == 'C') {
            currentAngle += 5; // increase servo angle
            if (currentAngle > 180) {
                currentAngle = 180; // limit the maximum servo angle to 180 degrees
            }
        }
        myservo.write(currentAngle); // update servo position
        delay(50); // de-jitter delay
    }
}
```

DEMO SHOW



FREELY THINKING FOR FUTURE

Virtual Reality?



Augmented Reality?

- Starting the servo and button matrix operation test. Pressing the defined button turns the servo clockwise by 5°.
- The other swing button is pressed again and the servo responds by turning 5° anticlockwise.
- Press the reset button and the servo angle will go straight to zero.

Customizable Storylines ?

More Emotional Interaction ?



'37 Days of Us' plans to introduce **more AI-related technologies** in the future. We plan to leverage **Dynamic Content Generation technology** to create personalised dialogue and scenarios through AI, making each gaming experience unique. **Emotion Recognition** is also a key focus for future development, analysing facial expressions and tone of voice to provide players with more adaptive feedback and interactions. We also hope to integrate Augmented Reality (AR) and Virtual Reality (VR) technologies into our games to provide a more **immersive and interactive experience** for players. In addition, there are plans to introduce a '**Memory Book**' feature, which will allow players to create a digital book of in-game memories, preserving their journeys and memories forever. With these future innovations, players will have the opportunity to experience richer emotional experiences that will help them build stronger emotional connections in-game and in real life.

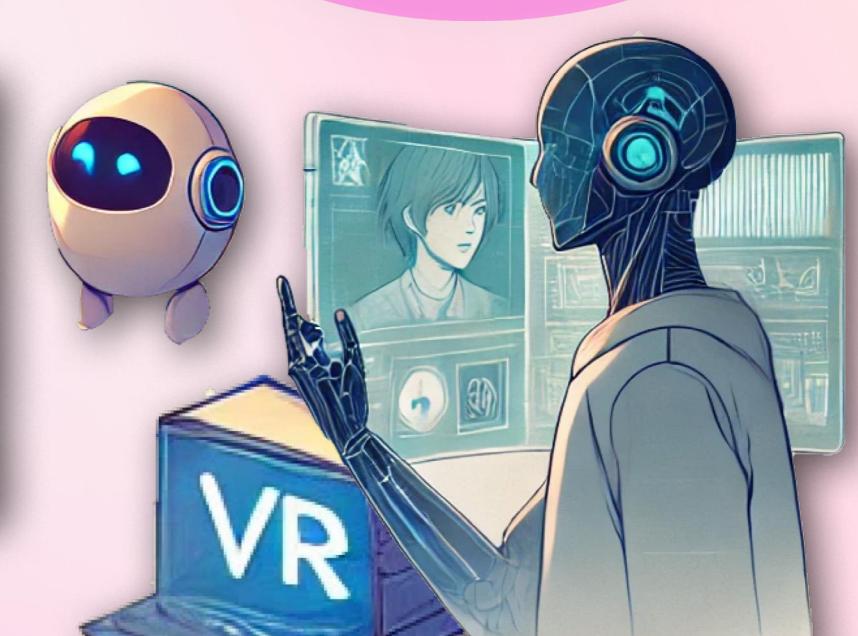
AI !!!

Dynamic Content Generation: Use AI to create personalized dialogue and scenarios.

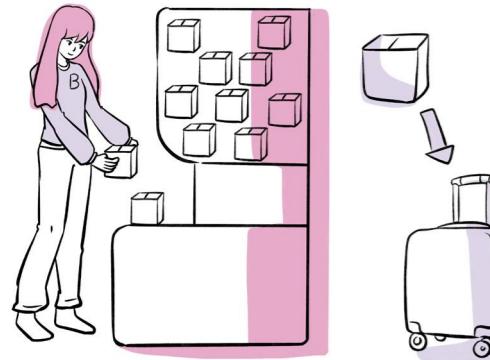
Emotion Recognition: Integrate AI to analyze facial expressions and tone of voice for adaptive responses.

Memory Book !!!

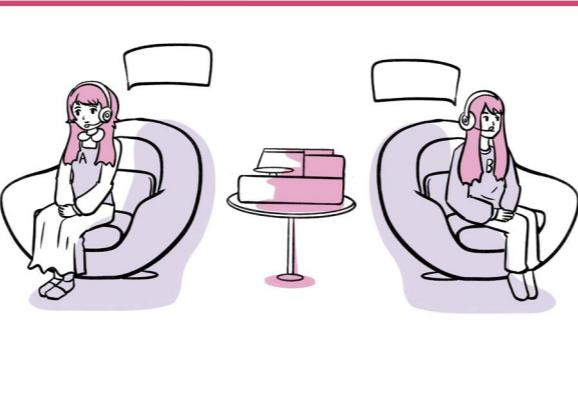
Enable players to compile their memories into a digital book.



INTERACTIVE GAMEPLAY AND MECHANISM OVERVIEW



It's a new day and Player B is removing the clue parcel from the Twister and preparing to start today's interactive quest.



The two players rely on clues to piece together the complete diary and memories of the day, extrapolate the questions according to the story.



Player B takes the small suitcase from the clue parcel for that day and then identifies the luggage related with the memories of that day.



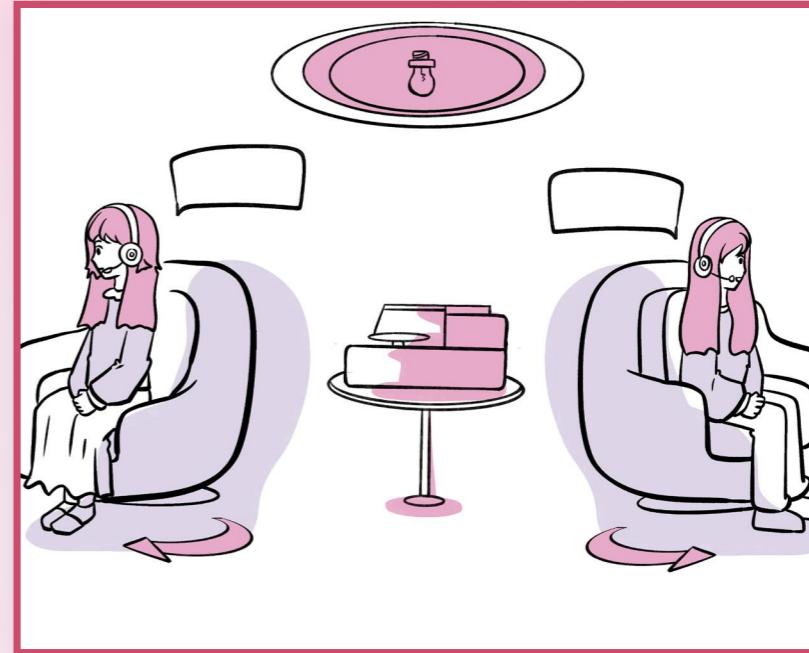
The two players begin their own discussion after inferring the story and questions, and self-disclosure follows the interaction.



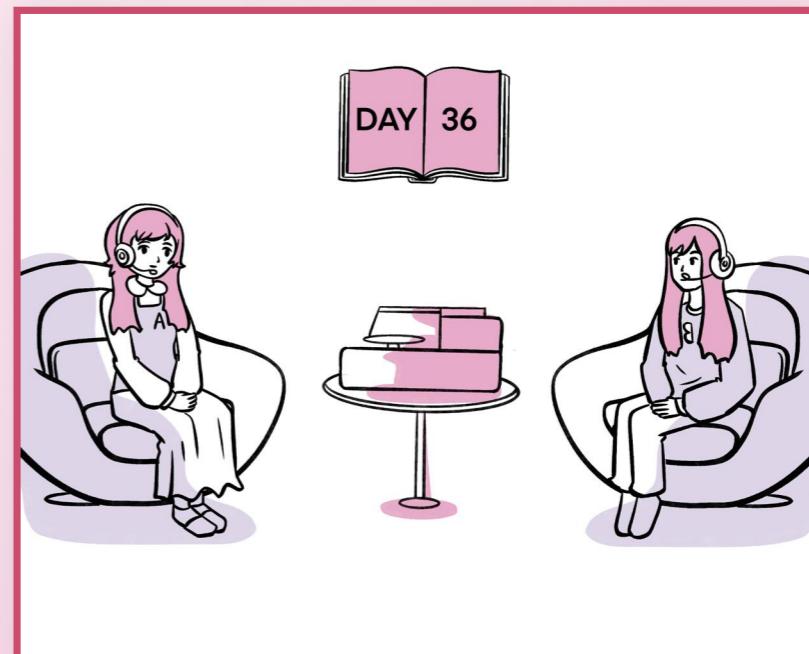
After learning about the clue luggage that Player B has been given, Player A begins to read his diary, recalling and recording relevant experiences in an attempt to retrieve his memories.



The two players begin their own discussion after inferring the story and questions, and self-disclosure follows the interaction.



With more and more self-disclosure, both parties recognise each other's performance on the day and begin to interact physically, with the emotional light array fading inwards and the seats rotating towards each other to symbolise the closing of the distance between them.



Eventually, all 36 days of the diary were unlocked, and the players experienced multiple self-disclosures and emotional discussions. Eventually they face each other and the light shrinks to their sides, symbolising they accept each other and build a good relationship.

Cospedia

Project 03

The screenshot shows the CosPedia website interface. At the top, there's a navigation bar with links to Home, Symphony!, Puzzle!, Library!, and Canvas!. A search bar is also present. Below the navigation, there are several panels with text and small illustrations:

- A panel on the left with a character sitting cross-legged: "Super Anxiety. Anxiety about face. Anxiety about body image. Anxiety about makeup. Anxiety about height. Anxiety about love. Anxiety about not being passionate enough."
- A central panel with a character in a white dress: "CosPedia ! ! ! ! Breathing life into fantasy. 67 in Symphony! 29 in Puzzle! 30 in Library! 24 in Canvas!"
- A panel on the right with a character in a white dress: "So annoyed with the current Cos trend. Why makeup should be talked about. Please, Cosplayers, be safe! Why is it that perfect looks are attacked because of their size? Why kids with no makeup get talked about. How come my carefully prepared favors are thrown away?"
- At the bottom, there's a footer with the text: "CosPedia ! ! ! ! All text on this site is available under the terms of the Creative Commons Attribution-ShareAlike 4.0 License; additional terms may apply. Copyright © 2024. All rights reserved."

A large red 'X' is drawn over the center of the website screenshot.

BACKGROUND

Online Toxicity in the Cosplay Community

The cosplay community, especially in Asia, faces significant challenges with **online toxicity**. Cosplayers are often **cyber-bullied for minor costume flaws**, especially those who can't afford high-quality props, makeup, or wigs. This issue is exacerbated when portraying niche characters, leading to harsh and unfair criticism.

Unfair Criticism of "Out of Character" (OOC) Cosplays

Fans frequently accuse cosplayers of being "**OOC (out of character)**" for making necessary adjustments for photoshoots, using less expensive props, or lacking the perfect look. This criticism is particularly harsh in regions like China, where there is little tolerance for original IP or creative reinterpretations.

Polarization in the Cosplay Market

The **market is highly polarized**. Top cosplayers benefit from ample resources and positive feedback, while others struggle due to lack of support and constant criticism. This environment discourages new cosplayers and stifles creativity and diversity. Influential cosplayers tend to receive fewer negative reviews, as their fans defend them, leaving less popular cosplayers vulnerable.



"OOC" (out of character)

Aims to improve the cosplay experience by providing an open-source communication platform. It features modules for collaborative cosplay, character libraries, character creation, and personal creation. All website creation modules are based on Wikipedia to offer users a highly free editing and discussion environment. The platform simplifies the cosplay creation process, promotes a supportive and interactive community atmosphere, reduces creative stress for cosplayers, and provides positive emotional feedback.

COSER INTERVIEW



- | | |
|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| A1 | I love selecting characters and taking pictures. The make-up, costumes, and wigs can be a hassle. |
| A2 | Time management and money are big issues. New cosplayers often feel overwhelmed by buying props and costumes. |
| A3 | Online negativity is tough, especially when minor flaws lead to harsh criticism. It's hard for those who can't afford high-quality props and costumes. |
| A4 | It's discouraging to put effort into a costume and get criticized online, especially for niche characters. |
| A5 | I was criticized for standing pose in cosplay photo different with anime character in a photo, and it was talked about for a long time. |
| A6 | I'd use the platform for inspiration, ideas, and to find event buddies. A kind community boosts confidence and helps with cosplaying niche characters. |
-
- | | |
|-----------|-------------------------------------------------------------|
| Q1 | What is your favourite part of cosplay? |
| Q2 | How does that affect your creativity and motivation? |
| Q3 | What problems do you think most Cosplayers encounter? |
| Q4 | Have you ever been caught up in similar criticism? |
| Q5 | What other challenges do you see in cosplay? |
| Q6 | So what do you hope the online platform will help you with? |

BACKGROUND

Symphony !

Symphony is the collaborative heart of CosPedia, where cosplayers can work together to edit and improve each other's cosplay projects. This section is designed to facilitate interactive and constructive feedback, helping cosplayers refine their work through various stages of development.

Features:

Collaborative Editing: Users can contribute to each step of a cosplay project, providing feedback and suggestions.

Stages of Creation: Projects are divided into stages such as First Movement, Second Movement, Third Movement, and Final Movement, representing different parts of character.

Case:

A cosplayer uploads their initial concept and design for a costume in the First Movement stage. Other users provide feedback on fabric choices and design tweaks. As the project progresses to the Second Movement, the cosplayer incorporates this feedback and uploads updates, receiving further input on construction techniques and finishing touches.

Puzzle !

Puzzle focuses on the creative aspect of cosplay, allowing users to create new characters or reinterpret existing ones. This section provides tools and resources for mixing and matching different elements to create unique and imaginative cosplays.

Features:

Character Creation: Tools for designing new characters by combining various elements.

Reinterpretation: Users can give existing characters a fresh twist, adding their own creative flair.

Resource Integration: Access to a vast library of character elements to use in the creation process.

Case:

A user decides to create a steampunk version of a popular anime character. Using the tools in Puzzle, they can upload and mix different elements of character and create unique contexts.

Library !

Library is a comprehensive repository of detailed character information, tutorials, and resources. It serves as an essential reference for cosplayers looking to accurately recreate characters or learn new techniques.

Features:

Character Database: Extensive collection of character details, including costumes, props, and backstories.

Tutorials: User-driven guides on various aspects of cosplay, from makeup to prop-making.

Resource Links: Direct access to suppliers and materials for creating high-quality cosplays.

Case:

A cosplayer looking to recreate a detailed armor set from a video game character can find a step-by-step tutorial on crafting techniques and material recommendations in the Library section.

Canvas !

Canvas is the creative showcase module of CosPedia, where users can share their cosplay insights and tips. It features detailed tutorials and practical tips, providing valuable learning resources and inspiration.

Features:

User Submissions: Users can upload and share their cosplay projects, complete with step-by-step guides and personal tips.

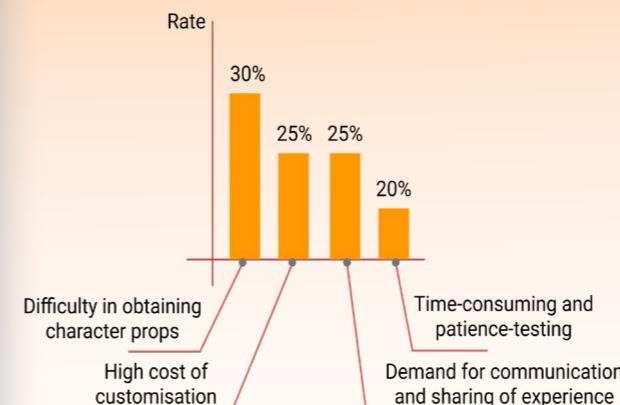
Reinterpretation: A curated collection of user submissions showcasing a variety of cosplay styles and techniques.

Case:

A cosplayer who has mastered the art of wig styling can upload a detailed tutorial in Canvas, sharing their techniques and tips with the community. Other users can follow along and ask questions in the comments section.

Market Research

Difficulties During Cosplay



Analyze

Challenges in Cosplay:

Obtaining props and high customization costs.
Time management and need for experience sharing.

Support Needs:

Event organization and costumes/props.
Learning platforms and cultural promotion.

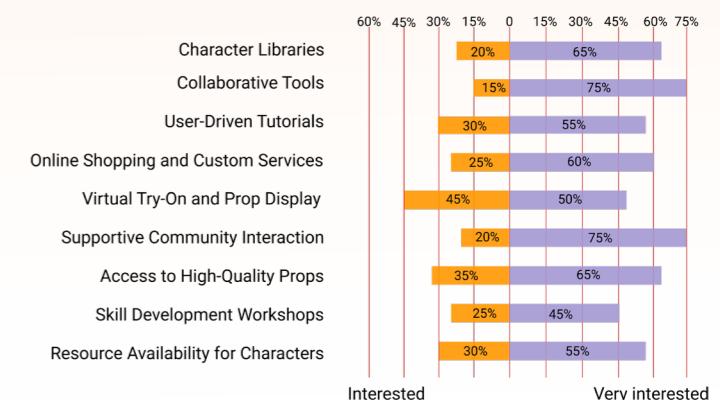
Platform Feature Interest:

High interest in character libraries, collaborative tools, and tutorials.
Positive reception to shopping services, virtual try-ons, and community interaction.

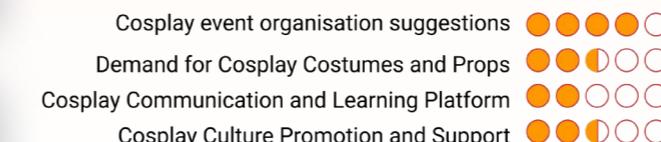
Market Sentiment:

Increasing satisfaction and decreasing dissatisfaction from 2020 to 2024.

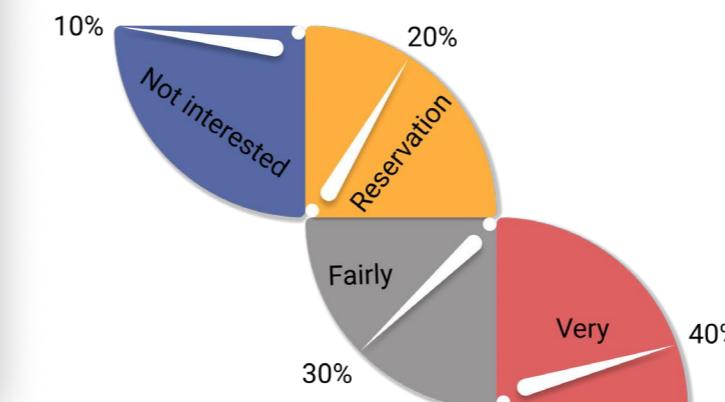
Interest in Cosplay Platform Features



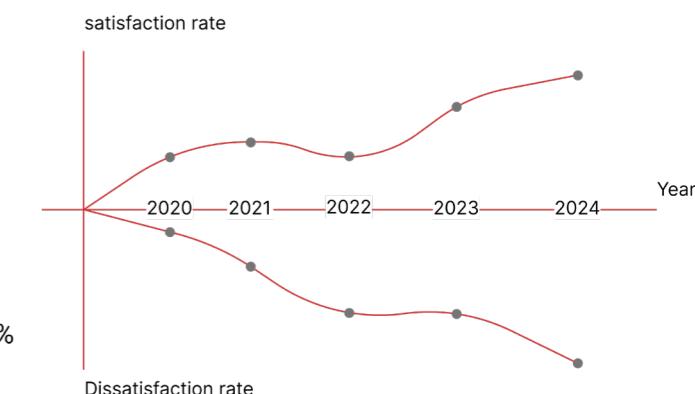
Demand for Different Supports Requirement%



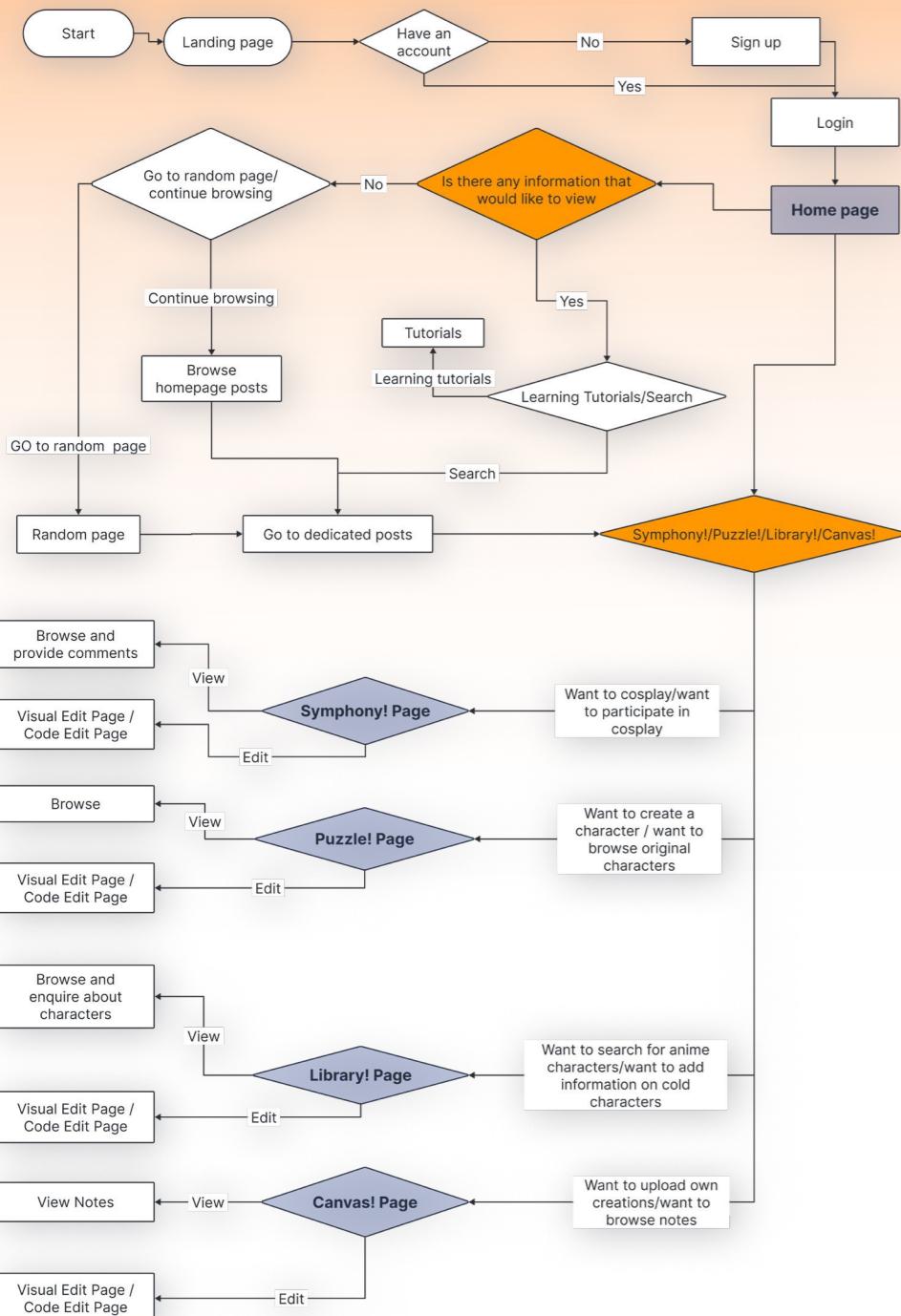
Expectations for the CosWeb



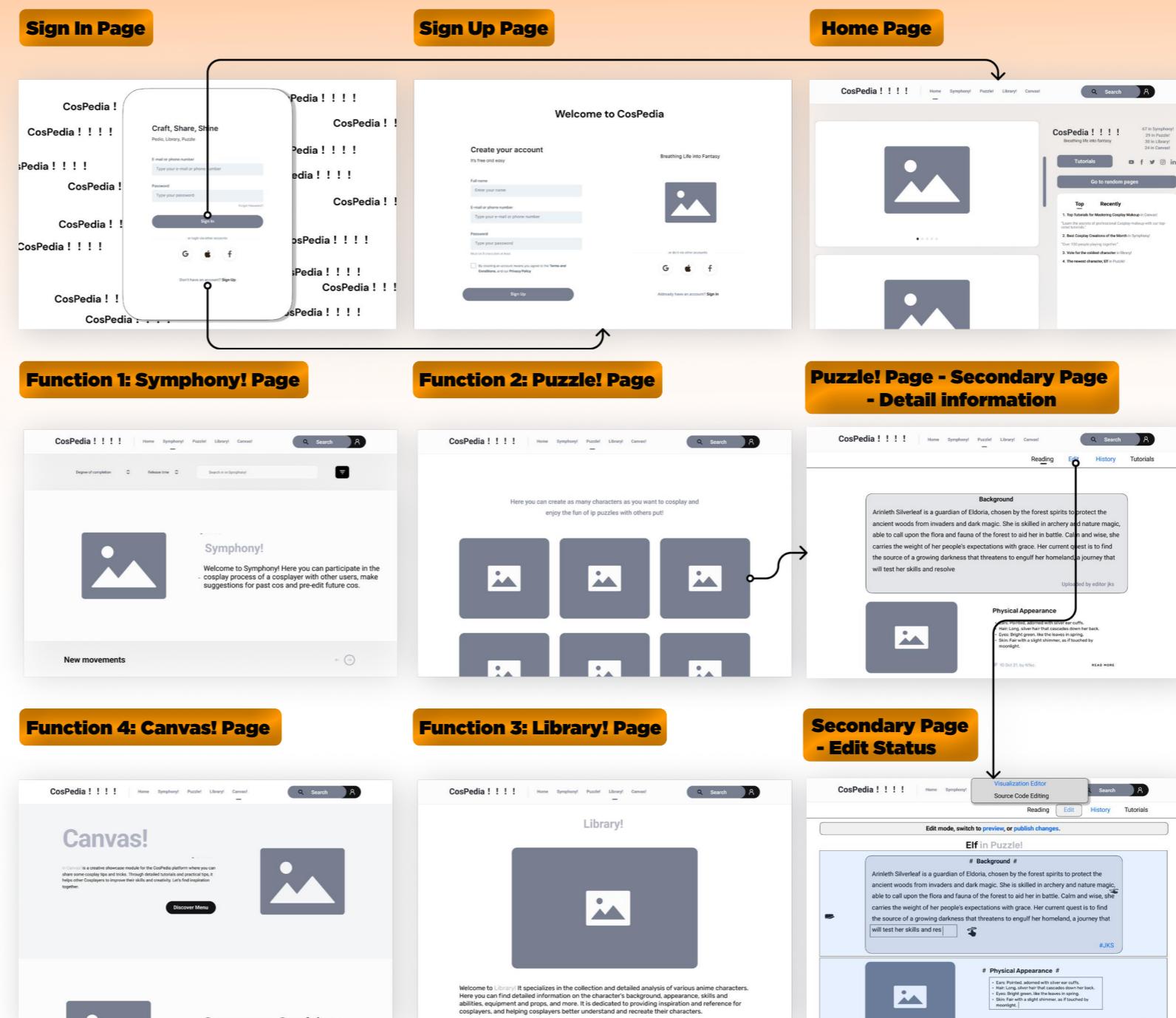
Coser's Satisfaction with the Current Market



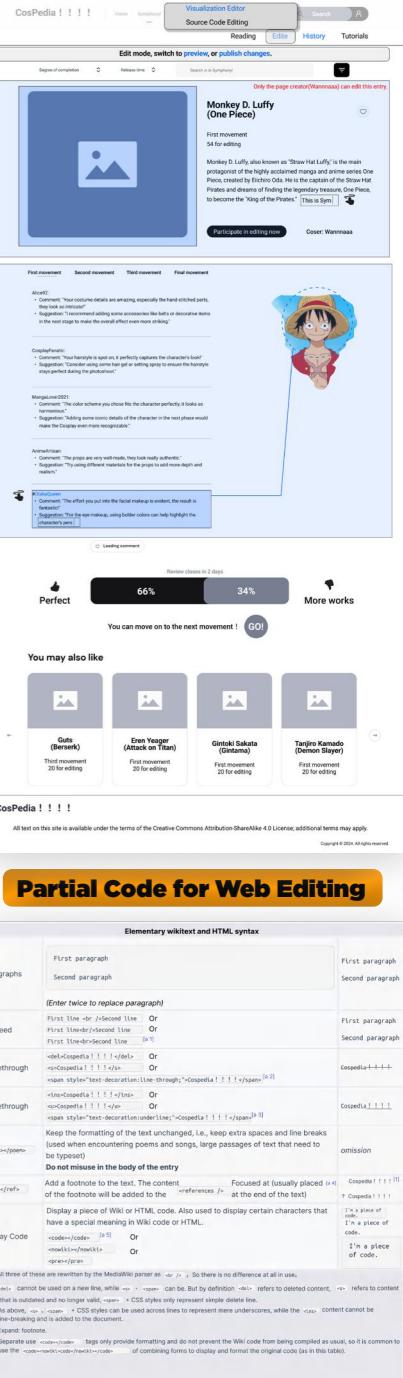
USER FLOW



WIREFRAME STRUCTURE



Core Function - Symphony! Page - Detailed Edit Status



HI-FI SHOW

Sign In Page

Library! - information Page

Canvas! - information Page

Puzzle! - information Page

Sign Up

Library! - information Page

Puzzle! - information Page

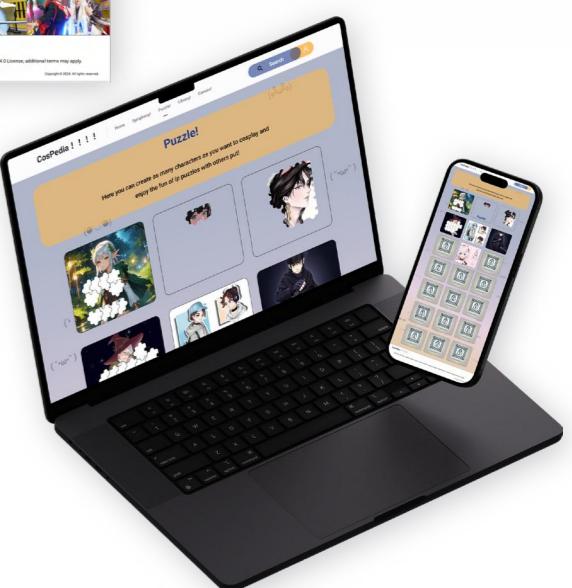
Symphony! - Main Page

Puzzle! - information Page

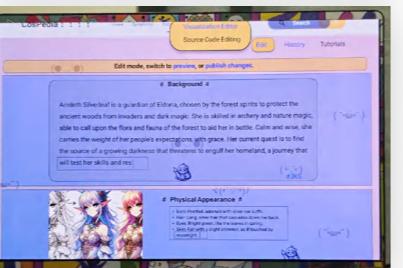
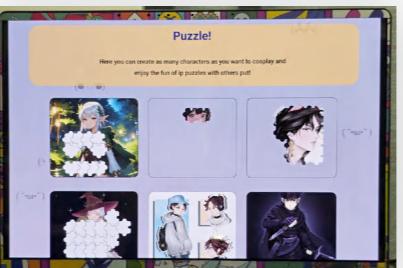
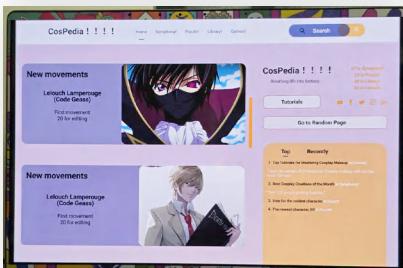
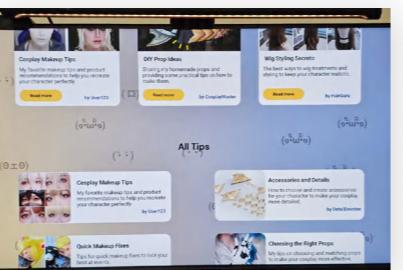
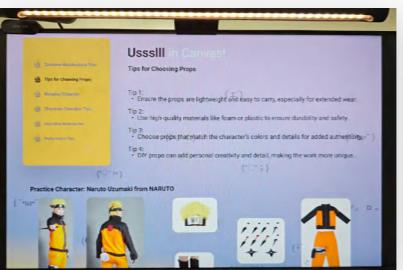
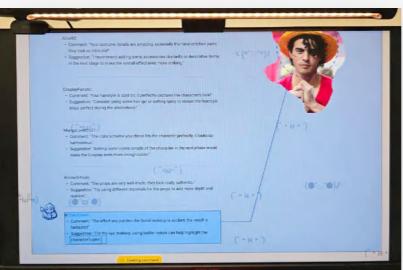
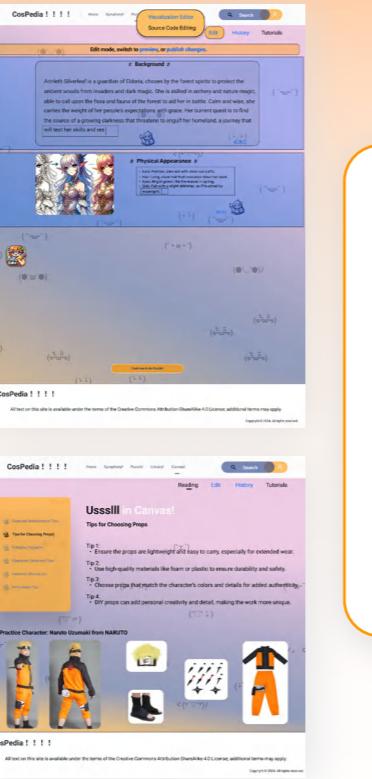
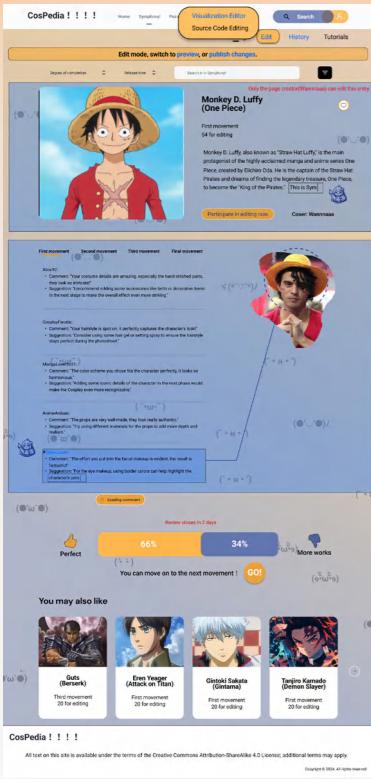
Homepage (Could do Waterfall Browsing)

Canvas! - Main Page

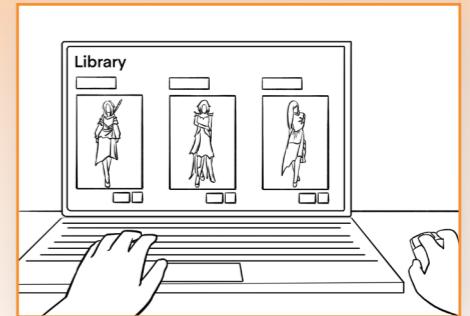
Symphony! - information Page



EDITING STYLE



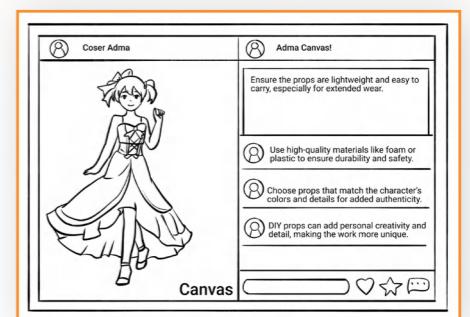
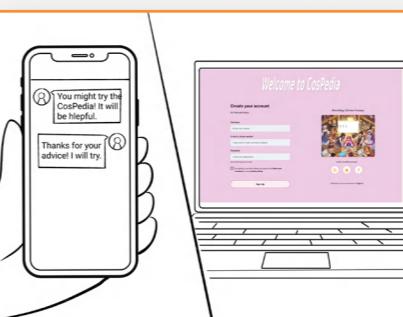
STORYBOARD



03
Adma loses her cosplay confidence and begins to doubt herself.



06
With more and more cos, Adma has become very knowledgeable. So she wants to help some newbie cosplayers by sharing her cos tips on Canvas.



09
Adma feels a sense of fulfilment and belonging in her interactions with the Cospedia community.

There are two Web-editing styles

Visual Editing: the website automatically partitions the different parts of the sub-pages, and the user can make changes to the different partitions directly through a visual style of editing. This approach is easy to use and allows for quicker manipulation of text or images.

Source Code Editing: By learning wikitext and HTML syntax in the website tutorials, users can basically learn how to edit subpages using code. This mode of operation is more complicated, but can achieve more text or image effects, such as deletion lines, quotes, etc..

PetGuardian

Project 04



INTRODUCTION

PetGuardian is a mobile app that provides real-time AR-based first aid guidance for pet emergencies. It helps pet owners detect injuries such as fractures or poisoning through a camera scan and offers step-by-step instructions to stabilize pets. In addition to emergency care, the app offers tools for managing long-term pet health, ensuring pets receive proper care in both urgent and everyday situations.

BACKGROUND



Toxicity



Fracture



Disoriented



Situations

In these critical moments, every second counts. The difference between life and death, recovery and long-term disability can depend on how quickly and accurately you can respond. However, many pet owners, whilst caring, **lack professional knowledge of first aid** and may cause further harm by **mishandling their pets** when trying to help them.



Daily Guarding

In these critical moments, every second counts. The difference between life and death, recovery and long-term disability can depend on how quickly and accurately you can respond. However, many pet owners, whilst caring, **lack professional knowledge of first aid** and may cause further harm by **mishandling their pets** when trying to help them.



PROBLEMS

Every year, countless pets suffer or even lose their lives due to untimely or mishandled first aid. While the love and care of pet owners is unquestionable, gaps in knowledge are often the problem.

Problem Details



Many pet owners lack adequate first aid knowledge, which can lead to worsening their pets' injuries due to improper handling during emergencies.

Demand

Real-time First Aid Guidance



Timely recognition of health issues, especially early symptoms of chronic and infectious diseases, is often difficult for pet owners, delaying necessary treatment.

Early Identification of Diseases



Some pet owners mistakenly use human medications for their pets, which can be dangerous and lead to severe, life-threatening complications.

Professional Medication Advice



Stray animals are highly susceptible to diseases, but rescue efforts face challenges due to limited resources and a lack of effective tools for identification and management.

Stray Animal Rescue Support

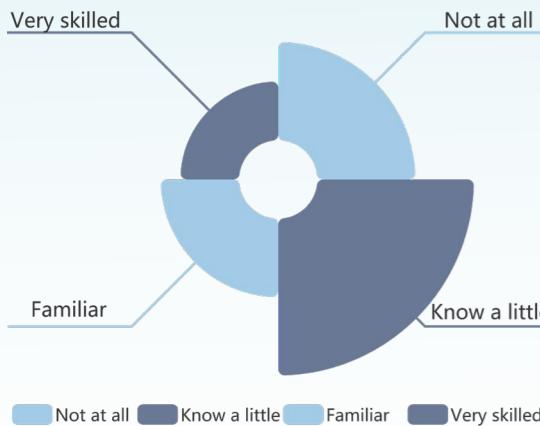


Many pet owners lack a structured health management plan to monitor and prevent chronic conditions like obesity and gastrointestinal issues in their pets.

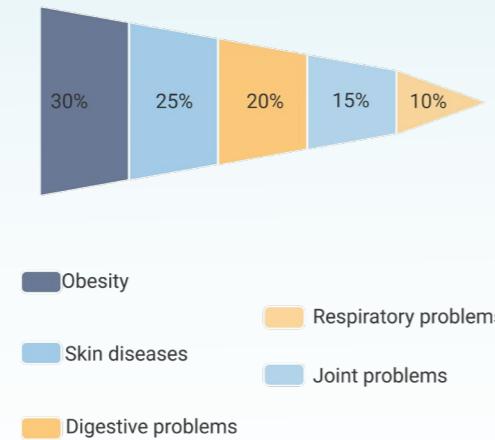
Long-Term Health Management

QUESTIONNAIRE

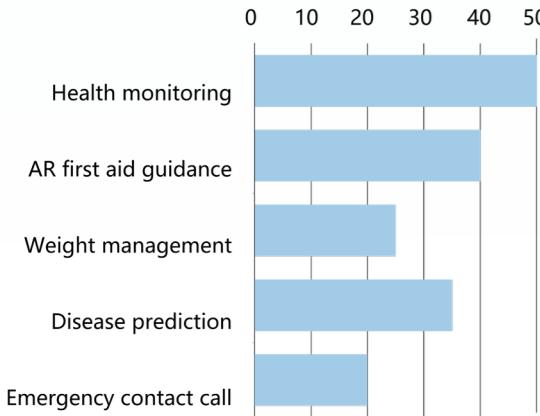
Level of Knowledge of Pet First Aid



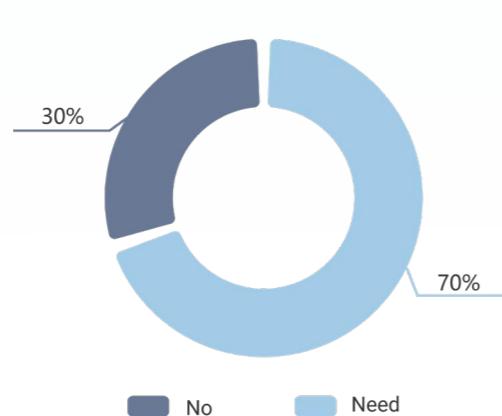
Common Health Problems in Pets



Functions that Users want to Get through the App



Pet Owner's Need for First Aid Instruction



Pet Health Status Research Score



- Most pet owners lack first aid knowledge and feel uncertain in emergencies.
- Strong demand exists for first aid guidance and health monitoring, especially for common health issues.
- Users seek personalised health advice and aspire to improve pet care through technology like AR and disease prediction.

Have you Experienced a Health Problem or Emergency with a Pet or Some Animal, but are Struggling with a Lack of Support for it?

When my pet breaks a bone, all I can do is avoid moving it, but I don't know what to do about it.

He vomited and I just waited and hoped it would get better on its own.

I've used human medication for my pets, but I'm worried every time.

I want to help stray animals, but I don't know how healthy they are.

I'll keep an eye on my pet's diet, but don't have the tools to track his health.

I know my pet may have been poisoned, but I'm not sure what first aid to take.

The pet was bleeding and all I could do was hold it down with a paper towel, but wasn't sure what to do next.

While out on a field trip, my car was accidentally loaded with a passing animal and I wasn't sure how to help him, and there was no vet hospital nearby.

I'm concerned about my pet's weight, but don't know how to create a sensible weight loss plan.

My pet has a chronic illness, but I'm not sure how to manage it in my daily life.

The pet is experiencing shortness of breath and I'm not sure if it's a serious problem.

My pet is always scratching, but I don't know if it's a skin condition.

When I was renovating, the trees I cut down and my gear hit some critters and I wanted to help them with first aid first, but I didn't learn about it.

Interview

Persona



Newbie Pet Owner - Ming Lee
Age 28
Occupation Software Engineer

"A first-time pet owner who just got a puppy; loves his dog but lacks experience, often feeling unsure in emergencies."

- Pain Point.**
- Not knowing how to administer first aid when your pet is injured or sick.
 - Fear of misuse of human medication or incorrect handling leading to aggravation of pet injuries.
 - Lack of systematic and planning for long-term health management of pets.

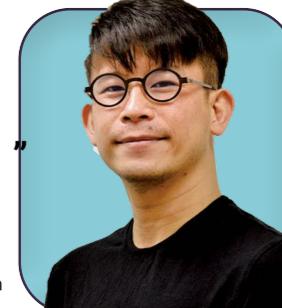


"On her way home from work, Zhang Ting saw a limping dog with an injured, slightly bleeding leg. Anxious to help but unsure what to do, she hesitated, fearing her untrained actions might make things worse."

'Experienced but busy pet owner' - Zhang Hui
Age 35
Occupation Market manager

"With years of experience in pet ownership and two cats, her busy schedule leaves little time for learning new pet care tips."

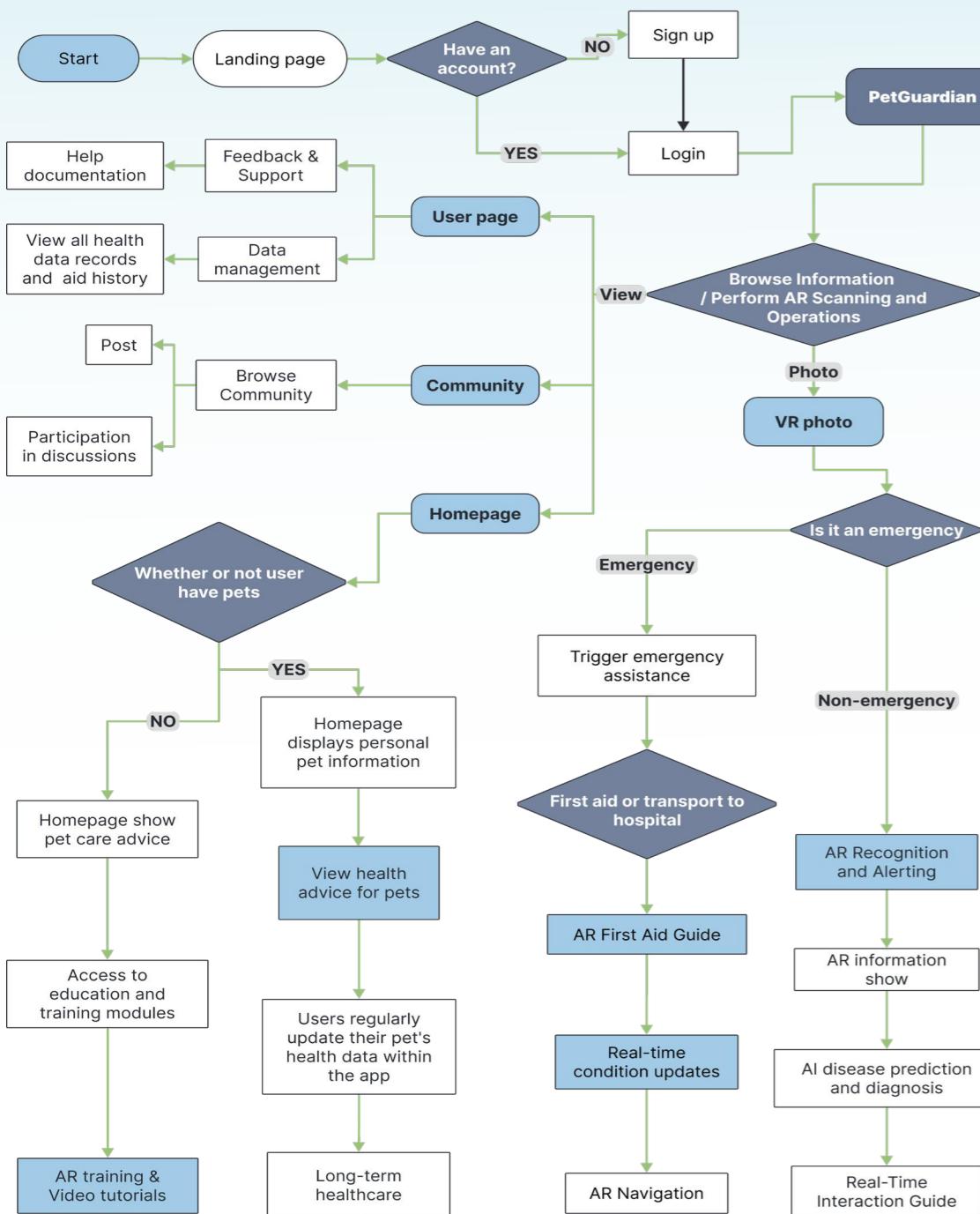
- Pain Point.**
- Unable to get the needed information and guidance quickly in case of emergency.
 - Worried about not being able to detect pet health problems in time, especially chronic diseases.
 - Unable to systematically track pets' health status due to busy daily work.



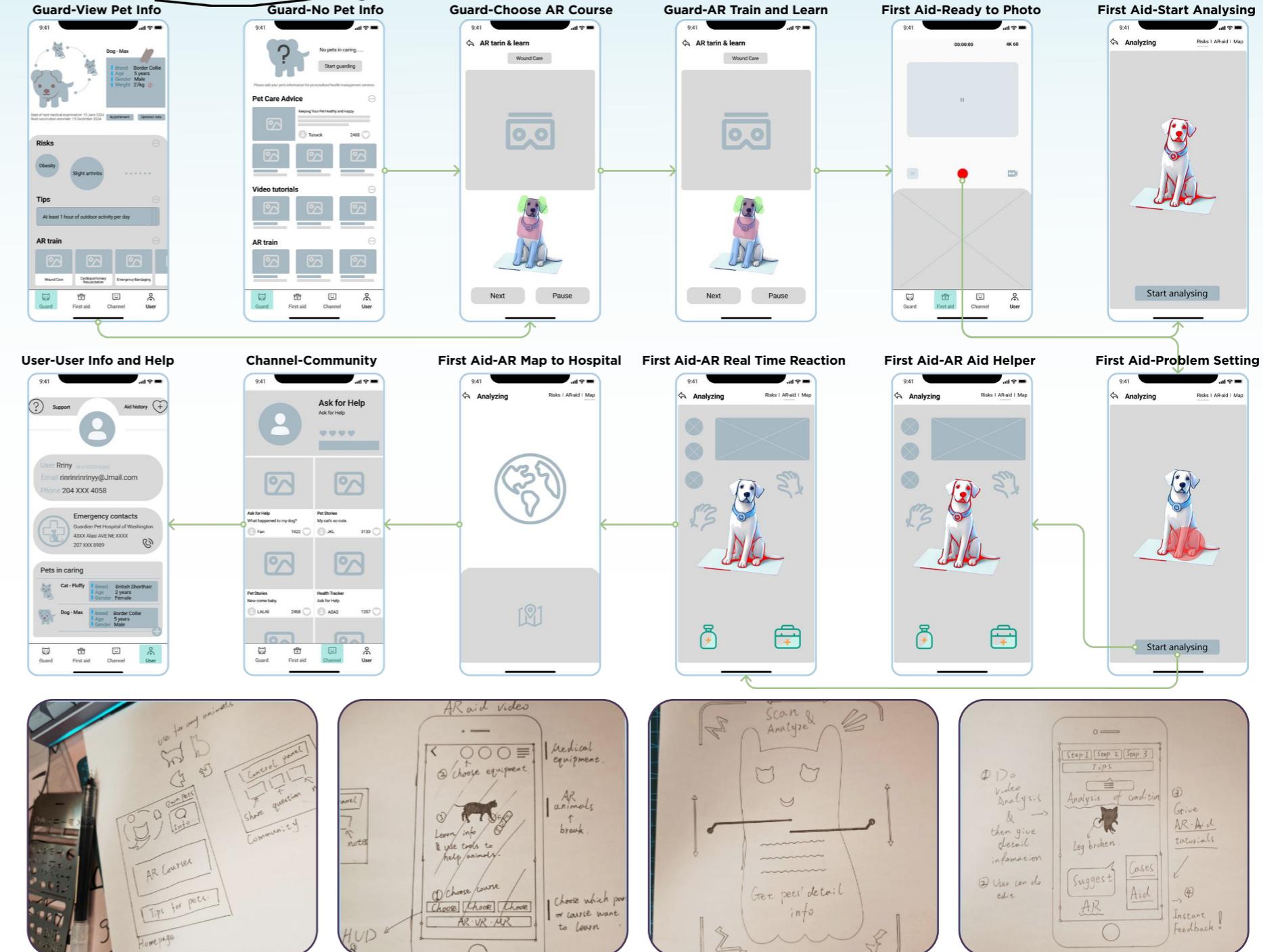
"Passionate about rescuing stray cats and dogs, Wang Wei has extensive experience but lacks professional medical knowledge, particularly in handling emergencies."

- Pain Point.**
- Inability to recognise health problems of stray animals in a timely manner, leading to the complexity of rescue work.
 - Lack of a reliable tool to guide him in emergency rescue.
 - Difficulty in systematically managing and tracking the health status of stray animals when faced with multiple strays.

USER FLOW



LOFI STRUCTURE



```

import socket
import logging

# Setup logging for better debugging
logging.basicConfig(level=logging.INFO)

# Load YOLO model
try:
    net = cv2.dnn.readNet("yolov3.weights", "yolov3.cfg")
    logging.info("YOLO model loaded successfully.")
except FileNotFoundError as e:
    logging.error("Model files not found. Ensure 'yolov3.weights' and 'yolov3.cfg' are in the correct directory.")
    raise e

# Load class labels (e.g., for injuries)
try:
    with open("coco.names", "r") as f:
        classes = [line.strip() for line in f.readlines()]
    logging.info("Class labels loaded successfully.")
except FileNotFoundError as e:
    logging.error("Class names file not found.")
    raise e

# Function to preprocess the image
def process_image(image_path):
    try:
        image = cv2.imread(image_path)
        height, width, channels = image.shape
        blob = cv2.dnn.blobFromImage(image, 0.00392, (416, 416), (0, 0, 0), True, crop=False)
        net.setInput(blob)
        return image, height, width
    except Exception as e:
        logging.error(f"Error processing image: {e}")
        raise e

```

```

YOLO detection function
def detect_injury(image, height, width):
    try:
        output_layers = [net.getLayerNames()[i[0] - 1] for i in net.getUnconnectedOutLayers()]
        detections = net.forward(output_layers)

        for out in detections:
            for detection in out:
                scores = detection[5:]
                class_id = np.argmax(scores)
                confidence = scores[class_id]
                if confidence > 0.5: # Only display results with high confidence
                    center_x = int(detection[0] * width)
                    center_y = int(detection[1] * height)
                    w = int(detection[2] * width)
                    h = int(detection[3] * height)
                    x = int(center_x - w / 2)
                    y = int(center_y - h / 2)
                    cv2.rectangle(image, (x, y), (x + w, y + h), (0, 255, 0), 2)
                    label = f"({classes[class_id]} {confidence: .2f})"
                    cv2.putText(image, label, (x, y - 5), cv2.FONT_HERSHEY_SIMPLEX, 1, (255, 255, 255), 2)
    except Exception as e:
        logging.error(f"Error during injury detection: {e}")
        raise e

```

CODE PART ↗:

Pet First Aid & Health Management Platform

PetGuardian is a pet first aid platform that integrates **computer vision** and **AI natural language processing technologies**, with core functionality relying on **real-time injury detection** from **YOLO (You Only Look Once)** and **first aid advice** from **AI language mode**. Through this combination of technologies, PetGuardian is able to quickly detect injuries and generate personalized first aid steps in the event of a pet accident.

The system first processes and analyzes the pet's image using the YOLO model, a target detection algorithm that segments and scans the image using a convolutional neural network (CNN) to detect injuries in real time and superimpose markers on the image to show the injured area.

After the detection process, the system passes the injured part to ChatGPT and the AI model generates detailed first aid recommendations based on these inputs. This process is implemented by the OpenAI library, which incorporates a natural language processing model to ensure that the user receives timely guidance on how to perform first aid.

03 AI First Aid Advice Generation



After detecting an injury, PetGuardian **calls on ChatGPT** to **generate personalized first aid advice**. Then **AI model** will **generates clear, detailed first aid steps based on the type of injury** entered and provides the user with **timely and accurate guidance**. This ensures that even if the pet owner has no relevant medical experience, they will be able to perform simple and effective first aid based on the system's recommendations.

AI Function

The system generates personalized first aid recommendations based on the type of injury. For example, for a fracture, ChatGPT will guide the user on how to immobilize the fractured part of the pet to avoid further injury. Users can ask more relevant questions and the AI model can provide detailed explanations and next steps.

01 Yolo Real-Time Pet Injury Detection

PetGuardian's first step is to perform pet injury detection using a pre-trained YOLO model. The system uses **YOLO (You Only Look Once)** technology, a **fast and efficient target detection algorithm** that **scans an entire image and localizes multiple injuries at once**. Based on a convolutional neural network (CNN), the YOLO model is able to detect common injuries in pets, such as fractures, lacerations, and bleeding.



Work Flow

- The user takes a real-time image of the pet through the cell phone camera.
- The YOLO model segments the image into grids and recognizes the injuries in each grid, and the detected injury sites are marked with bounding boxes and displayed on the screen.
- For example, when a fracture is detected in a pet, the system displays a highlighted area with a fracture label to help the user quickly identify the injury.

02 AR Visualization & Interaction

After detecting an injury, PetGuardian provides **real-time visualization** and interaction through **Augmented Reality (AR) technology**, which allows the user to **see markings of the injured area and first aid recommendations directly in the scanned image**. AR not only enhances the user's intuitive experience, but also guides the user to perform the correct first aid actions through multi-sensory feedback.

Functional Details



Real-time display of the pet's injured area on the screen with visual markers for each injured part.

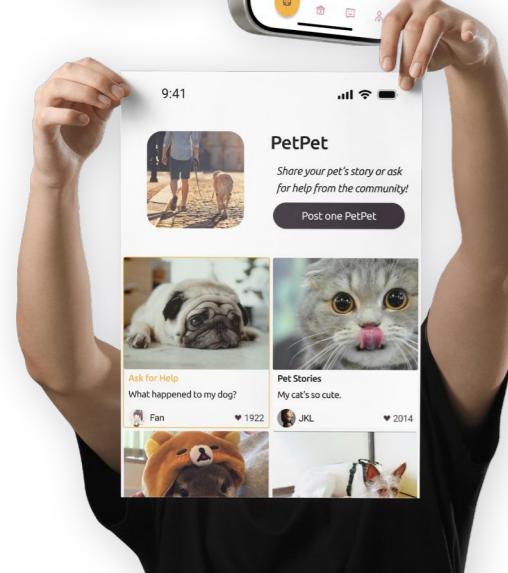
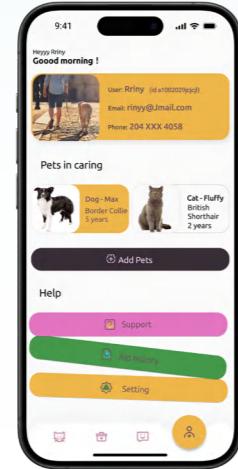
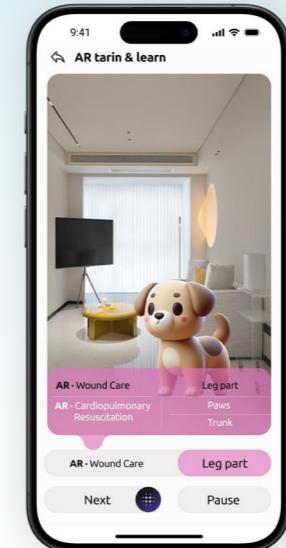
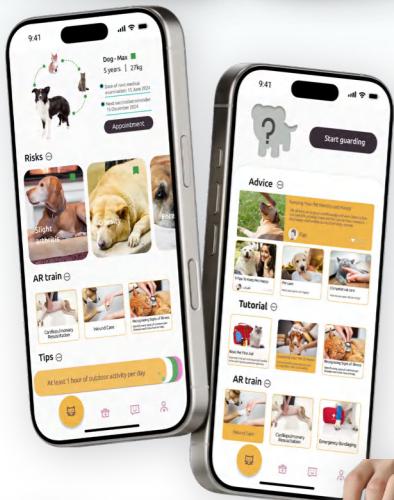
Users can click on the injured area, and the system will display a detailed description of the injury and operation steps, such as bandaging, stopping bleeding, fracture immobilization, and so on.

Through this AR visualization, users not only have a clear understanding of their pet's injuries, but also get guidance through interaction, thus reducing misuse in emergency situations.

HIFI SHOW



Guardian App
"Scan, Detect, Save"
"Care Beyond the Fur"
"First Aid at Your Fingertips"

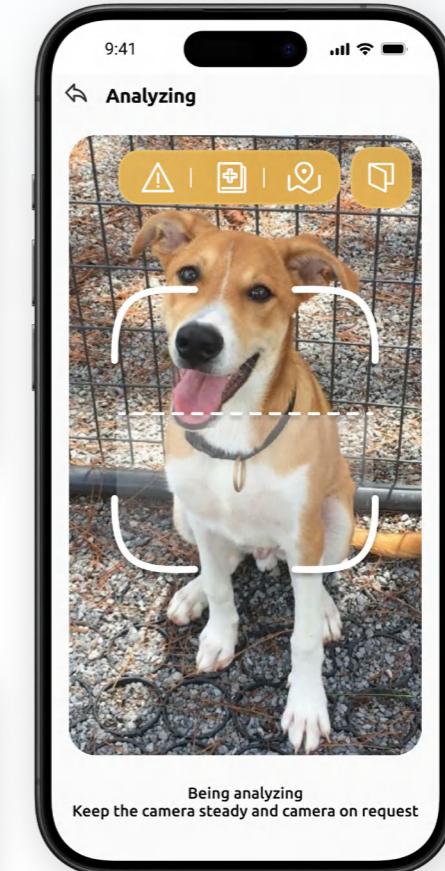


- After completing the scan, the system will **load and position the pet model based on the captured spatial data** to avoid unnecessary floating or misalignment.
- Users will then enter an **AR tutorial to receive guidance on each step of the operation**, such as interacting with the virtual pet and learning how to deal with the pet's virtual injuries.



- The application prompts the user to **properly scan and identify the injured area of the pet**. Marker points are then added to the wound area for analyzing the status of the wound. The **user can modify the marker points to correct the information**.
- The app then analyzes the wound and provides the user with specific first aid instructions.

- Slowly move the device from one side to the other to scan the floor.
- If the mapping is incorrect, the user can reposition the object.



Being analyzing
Keep the camera steady and camera on request

