

1. Team Information

Our team consists of six people, each of whom plays in their own area of expertise and is willing to devote themselves to this project with great enthusiasm.

Shino Peng (Front-end Developer): As a skilled independent game developer, it is not difficult for Shino to handle game front-end programming. Besides, as a game designer with 1-year industry experience, Shino brings professional game design insights and a deep understanding of player engagement, ensuring good user experience.

Haoran Liang (QA Test): An expert in puzzle games. His familiarity with Pokémon Go, the inspiration behind NatureGo, allows him to refine the game's mechanics to enhance player engagement. Besides, he is skilled in both Black-box and White-box testing, so Haoran can ensure the game is well-balanced.

Feiyang Han (Back-end Developer): Has sufficient coding skills and familiar with Python and Django framework, which will be adopted to develop the backend services of our project. Interested in biology, keen to develop species identification feature, which will support one of the major functionalities in our project NatureGo.

Liyu Chen (Project Manager): Liyu, an outdoor adventure enthusiast with a strong background in design and organization, plays a key role as the product manager. She oversees character development, refines gameplay mechanics, and makes critical decisions on outdoor scanning features. Beyond design, she ensures smooth team coordination, tracks project progress, and manages essential documents, reports, and presentations to maintain clarity and efficiency.

Yongjian Wan (Data Engineer): Specializing in database development, Yongjian ensures efficient data management and game progression tracking. As the team coordinator, he manages project timelines and facilitates communication with mentors, ensuring smooth collaboration and steady progress.

Tianyi Qi (UI/UX Designer): With a background in product design and extensive experience in location-based projects, Tianyi plays a key role in shaping the visual style and interaction design of the game. As a Pokémon fan, he understands the appeal of collection-based gameplay and applies his expertise to create an engaging, child-friendly art style. He will hand-draw all the initial UI sketches for our project and later refine them digitally using tools like Photoshop and Procreate. Additionally, he will oversee the game's overall artistic direction, including style and color management.

2. Project Overview

NatureGo is a multiplayer online game designed for children and their families, aiming to encourage outdoor exploration and engagement with the natural world through gameplay. Core game mechanics of NatureGo are as follows:

a. Real-World Object Recognition System

Players can scan real-life animals, plants, or landmarks. The game uses OpenAI's image recognition API to identify the scanned object. Upon successful recognition, the system identifies the object, presents a brief, kid-friendly educational description, and automatically adds it to the player's compendium.

This feature is designed to support children's learning about biodiversity and the world around them through active exploration.

b. Collection-Based Skill Point Rewards

The system checks whether the scanned object is new to the player. Only new discoveries grant skill point rewards.

This feature is designed to motivate children explore a wide variety of environments and collect as many different species or landmarks as possible, which can encourage outdoor activity and continuous learning.

c. Skill Point Allocation and Battle System

Players can spend skill points to enhance their character's attributes (e.g., attack, defense, speed) and join multiplayer battles after upgrading their stats. Winning battles grants players virtual currency.

This feature is designed to combine progression with competitive gameplay to foster interaction, which enhances the social aspect of our game, increasing engagement among children.

d. Redeem Virtual Badges

Players can spend their earned virtual currency in the in-game store, which offers virtual badges to enhance the player's abilities.

This feature is designed to give players goals and incentives, helping to maintain long-term engagement.

3. Implementation Plan

3.1 Technology Learning

| Name | Allocated to | Week |
|--------------------------------|---------------------|-------------|
| Django (Back-end) | Feiyang | 3-4 |
| React Native (Front-end) | Shino | 3-4 |
| Firebase (Database) | Yongjian | 3-4 |
| OpenAI API (Image Recognition) | Feiyang | 3-4 |
| PyTorch (AI Model Training) | Haoran | 5-8 |

3.2 Implementation Process

a. Supporting Activities

| Name | Allocated to | Week |
|--------------------|---------------------|-------------|
| Documents | Liyu | 3-12 |
| Visual Art | Tianyi | 4-10 |
| Game Design | Shino | 3-6 |
| Testing | Haoran | 3-12 |
| Spreadsheet Monkey | Yongjian | 7-12 |

b. Back-end Functionalities

| Name | Allocated to | Week |
|--------------------------|---------------------|-------------|
| Account System | Feiyang, Yongjian | 5-6 |
| Image Recognition Module | Feiyang, Haoran | 5-6 |
| Compendium System | Feiyang, Shino | 6-7 |
| Progression System | Feiyang, Shino | 7-8 |
| In-game Economy System | Feiyang, Shino | 8-9 |
| Combat System Back-end | Feiyang, Shino | 6-10 |

c. Front-end Functionalities

| Name | Allocated to | Week |
|----------------|---------------------|-------------|
| Account UI | Shino | 5-6 |
| Scan UI | Shino | 5-6 |
| Compendium UI | Shino, Feiyang | 6-7 |
| Progression UI | Shino, Feiyang | 7-8 |
| Economy UI | Shino, Feiyang | 8-9 |
| Battle UI | Shino, Feiyang | 6-10 |

4. Ethics, Security and Privacy Analysis

For our child user base, NatureGo will implement comprehensive protection measures:

- Strictly comply with children's privacy protection regulations (COPPA, GDPR-K).
- Collect only the data necessary for the application and avoid collecting personally identifiable information.
- Provide parents with a complete data control interface to view, modify or revoke authorisations at any time.
- Built-in safety tips in the app (e.g., "please explore with a guardian").
- Enforces time limits and health alerts.
- Geo-fencing warnings for dangerous areas.
- Access to authoritative API data sources to ensure the accuracy of science information.
- Implement content moderation mechanism for community interaction.
- Ensure that third-party service providers (e.g., computer vision APIs) comply with privacy regulations.

5. Collaboration Plan

5.1 Collaboration Tools

We managed our teamwork using TAPD, a popular project management tool similar to Jira and widely used in China's internet industry. Our team members are familiar with it, which helped improve efficiency.

5.2 Team Management Protocols

a. Weekly Meetings

The team will hold a meeting every Monday at 1:00 PM to review the completion status of last week's tasks and assign tasks for the upcoming week.

b. "RED BUTTON" Protocol

If a team member is unable to complete an assigned task, they must notify the team by Wednesday midnight through the "RED BUTTON" protocol. The project manager will then redistribute the task based on workload availability to ensure a balanced workload. If a team member takes on additional responsibilities beyond their original scope, their future workload will be adjusted accordingly to maintain fairness.

6. Deliverable Project Plan

6.1 Gantt Chart (Appendix A)

6.2 Timeline with Milestones and Deliverables (Appendix B)

6.3 Assumptions in Scoping the Project

Technical Feasibility

The image recognition functionality is assumed to be achievable using the OpenAI API and meets project requirements.

User Devices and Network Conditions

It is assumed that target users have mobile phones with camera and stable internet connectivity.

Team Resources and Skillset

Our team is assumed to be able to learn and utilize the necessary frontend, backend, and AI integration skills.

Time and Resource Constraints

Each team member is expected to allocate approximately **10 hours per week** to this project.

Target User Behavior

It is assumed that users are willing to engage in outdoor activities and can use basic scanning and photography features and they are not trying to cheat in game play.

API Availability and Stability

Third-party services (OpenAI and Firebase) are assumed to remain available and stable during the development and operational phases.

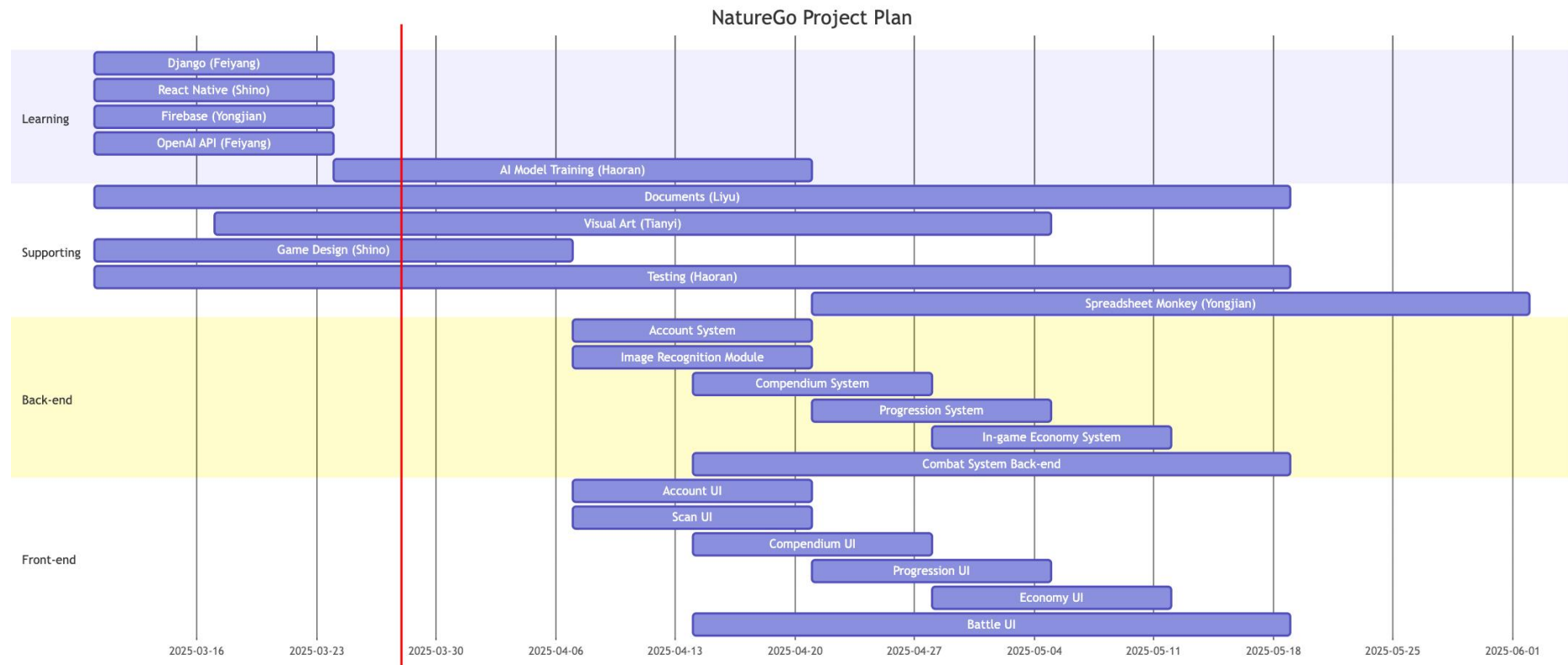
6.4 Detailed Distribution of Tasks

| Character | Name | Main Responsibilities |
|----------------------|--------------|---|
| Project Manager (PM) | Liyu Chen | Project management Team coordination Documentation |
| Front-end Developer | Shino Peng | Front-end development Gamification design Back-end and interaction design support |
| Back-end Developer | Feiyang Han | Front-end development Gamification design Back-end and interaction design support |
| Data Engineer | Yongjian Wan | Data collection and optimization Database design and maintenance Data preprocessing and cleansing |
| Visual Designer | Tianyi Qi | Child-friendly interface design Icon design User experience optimization |
| Tester | Haoran Liang | Test case writing Functional and UX testing Bug reporting |

6.5 Risk Assessment and Mitigation Strategies

| Risk | Impact | Likelihood | Mitigation Strategy |
|--|---|------------|---|
| OpenAI API instability or failure | Core recognition function may not work, affecting UX | Mid | Cache results Use backup APIs Add error handling |
| Low image recognition accuracy | Incorrect results may reduce educational value | Mid | Limit scope Enhance input quality manual correction |
| UI/UX too complex for children | May cause user dropout and reduce educational effectiveness | Mid | Child UX testing icon and voice guidance |
| Project schedule overrun | MVP may not be delivered on time | Mid | Define milestones Use agile iterations activate 'RED BUTTON' |
| Team member overload | Task delays, slower progress | Mid | Regular workload checks Dynamic task assignment Regular adjust workload |
| High third-party API costs | Budget overrun, affecting project sustainability | Low | Alternatives approach like training local AI model |

Appendix A: Gantt Chart



Appendix B: Timeline with Milestones and Deliverables

