

Milestone III Submission

Team Name:

GreenLobang

Proposed Level of Achievement:

Apollo

Github repo link:

<https://github.com/OthnielChang/GreenLobangNew.git>

Motivation

Currently, numerous sustainability initiatives are taking place across NUS. For instance, many cafes offer a small monetary rebate for bringing your own cup for takeaway coffee. Additionally, various sustainability-driven clubs organize fun eco-activities for students to participate in. Despite these efforts, many of these events and initiatives often experience low participation rates.

Identified Challenge:

The primary suspected reason for the low participation rates is the lack of awareness about these events. There is currently no centralized platform to inform students about these sustainability practices and events.

Proposed Solution:

To address this challenge, we plan to create a one-stop platform in the form of an app, NUS GreenLobang, to inform and engage students about these sustainability initiatives.

By consolidating all sustainability-related information and events into a single, accessible platform, we aim to:

- **Increase Awareness:** Ensure that students are well-informed about the various

sustainability initiatives happening around campus.

- **Boost Participation:** Encourage higher participation rates by providing a comprehensive overview of all eco-friendly activities and incentives.
- **Facilitate Engagement:** Create an interactive and user-friendly platform that fosters engagement and collaboration among the NUS community.

Our goal is to bridge the information gap and create a vibrant, sustainability-conscious community at NUS.

Aim

We aim to create a one-stop platform that shares sustainability practices and events at NUS. This platform will serve as a hub for students, faculty, and staff to engage, collaborate, and contribute to sustainability initiatives. By implementing a reward system, we intend to incentivize and recognize sustainable behaviors, thereby upholding and promoting a culture of sustainability across NUS.

Primary Aim:

- **Centralized Platform:** Establish NUS GreenLobang as the primary hub for all sustainability-related activities and information.
- **Engagement and Collaboration:** Foster a community where students, faculty, and staff can actively engage and collaborate on sustainability initiatives.
- **Incentivizing Sustainable Behaviors:** Implement a reward system to encourage and recognize sustainable actions, promoting a culture of environmental stewardship.

Secondary Aim:

- **Boost Participation:** Increase participation in sustainability events within the NUS community by leveraging the point system.
- **Collaborative Rewards:** Partner with various platforms and companies to offer attractive rewards, motivating students to participate in sustainability events.
- **Consistent Engagement:** Ensure a steady influx of participants eager to earn points and rewards, thereby maintaining high engagement levels in sustainability initiatives.

By achieving these aims, NUS GreenLobang will not only enhance the sustainability efforts on campus but also create a lasting impact on the university's environmental culture and practices.

Storyline

Introduction: The Vision for a Greener Campus

In the heart of Singapore lies the vibrant National University of Singapore (NUS), a melting pot of diverse cultures, cutting-edge research, and progressive ideas. Amid the bustling activities and academic pursuits, a green wave is rising—a collective call for sustainability and environmental stewardship. Amidst this growing awareness, we envision an innovative solution: NUS GreenLobang, an app dedicated to fostering a sustainable campus community.

Act I: A Platform for Change

Scene 1: The Sustainable Group's Initiative

Meet the passionate members of the NUS Green Committee, a dedicated group striving to implement eco-friendly initiatives across the campus. They face a challenge: how to efficiently communicate their green events, workshops, and initiatives to a broader audience. The committee brainstorms and realizes the need for a centralized platform to:

- Post upcoming green initiatives.
- Engage with students, staff, and vendors.
- Encourage participation and awareness.

This leads to the birth of NUS GreenLobang—a seamless, user-friendly app designed to be the hub for all sustainability-related activities at NUS.

Scene 2: The Student's Perspective

Alex, an environmentally conscious student, is eager to contribute to the green movement. Between classes, projects, and social activities, Alex seeks a straightforward way to stay updated on sustainability initiatives and find Community Involvement Programs (CIP) opportunities. Through NUS GreenLobang, Alex can:

- Access a calendar of upcoming green events.
- Receive notifications about new initiatives and workshops.

For Alex, the app transforms the abstract idea of sustainability into concrete, accessible actions.

Act II: Engaging the Community

Scene 3: The Vendor's Commitment

Sarah runs a popular cafe on the NUS campus. She is passionate about reducing her environmental footprint and wants to support the university's sustainability goals. However, she needs a way to connect her efforts with the broader community and attract eco-conscious customers. With NUS GreenLobang, Sarah can:

- Participate in the campus reward system by offering discounts and rewards for sustainable practices, such as using reusable cups or minimizing food waste.
- Promote her business as a green-friendly establishment.
- Collaborate with other vendors to create a cohesive, sustainable campus environment.

By contributing to the reward system, Sarah not only boosts her business but also becomes a vital part of the campus's green movement.

Scene 4: The Community's Impact

NUS GreenLobang brings together students, staff, and vendors, fostering a community where sustainability is not just an ideal but a practiced reality. The app's success is measured not only in participation rates but in the tangible reduction of the campus's environmental footprint.

Act III: The Outcome and Future Vision

Scene 5: A Greener Campus

A year after the launch of NUS GreenLobang, the campus is visibly greener. Participation in sustainability events has skyrocketed, and the reward system has incentivized eco-friendly behaviors. The app has become an indispensable tool for students, staff, and vendors alike.

Scene 6: Expanding Horizons

Inspired by the success at NUS, other universities and institutions express interest in adopting similar platforms. The NUS Green Committee shares their journey and insights, hoping to inspire a global movement towards sustainability in educational institutions.

Conclusion:

NUS GreenLobang is more than an app; it is a testament to the power of community and technology in driving sustainable change. By bridging the gap between intention and action, it empowers every member of the NUS community to contribute to a greener future.

Join us in this journey towards sustainability. Together, we can make NUS not just a place of learning, but a beacon of environmental stewardship for the world. Download NUS GreenLobang today and be part of the change!

NUS GreenLobang Features and Technology Stack

Feature 1: User Registration and Login

Description:

The User Registration and Login feature is essential for students, staff, and vendors to access and engage with the NUS GreenLobang platform. This feature enables users to create personalized profiles, manage their account settings, and securely log in to the application.

Features Description:

Sign Up:

- **Email Registration:** Users can create an account using their email address.
- **Username Creation:** During registration, users can set a custom username that will be displayed on their profile and used for identification within the platform.
- **Strict formatting on email and password to ensure smooth flow.**
- **Forget password function :** allow users to reset password via email.

Profile Management:

- **Profile Customization:** Users can personalize their profiles by adding or updating their username and other optional information such as profile pictures and bio.
- **Profile Updates:** Users can modify their profile details at any time, ensuring their information is always up-to-date.

Authentication:

- **Password Authentication:** Secure password-based authentication to ensure that user accounts are protected.
- **Password Visibility Toggle:** Users can choose to show or hide their password during the registration and login process to prevent typographical errors and enhance security.

Login:

- **Credential-based Login:** Once an account is created, users can log in using their email and password.

- **Session Management:** Ensures that users remain logged in until they choose to log out, with appropriate session timeout for security.

Technology Stack:

Front-End:

- **React Native:** For cross-platform mobile app development, ensuring that the application is available on both iOS and Android devices.
- **Expo:** To streamline the development process, making it easier to build, deploy, and test the application.

Back-End:

- **Node.js:** Handles user authentication and profile management, providing a robust server-side environment for processing user requests and managing sessions.

Database:

- **Firebase/Firestore:** Utilized for handling user authentication and storing user profile data. Provides real-time database capabilities and secure storage for user information.

Additional Tools:

- **Expo:** Utilized for enhancing the development workflow, providing tools for building, deploying, and testing the mobile application efficiently.

Detailed Workflow:

1. Sign Up Process:

- User accesses the sign-up screen.
- Enters email, desired username, and password.
- Password can be toggled between visible and hidden states for convenience.
- Upon submission, user details are sent to the Node.js backend.
- Backend validates and creates a new user record in Firebase/Firestore.

2. Profile Management:

- After logging in, the user can navigate to their profile settings.
- User updates their username or other optional information.
- Changes are sent to the backend and updated in Firebase/Firestore.
- Confirmation of changes is displayed to the user.

3. Login Process:

- User accesses the login screen.
- Enters email and password.

- Password visibility can be toggled.
- Credentials are sent to the Node.js backend for verification.
- Upon successful authentication, the user is logged in and redirected to the main application.

Feature 2: Home Screen

Description:

The Home Screen serves as the central hub for users to interact with the various features of the NUS GreenLobang app. It provides a user-friendly interface with easy navigation, a customized welcome message, and live weather updates. The home screen consists of large 2 by 2 rows of icons representing different features, and a sidebar for quick access to the user profile, about section, and sign-out functionality.

Features Description:

Header:

- **Sidebar Access:** A menu icon that allows users to open the sidebar.
- **Custom Welcome Message:** Displays a personalized welcome message using the user's username, enhancing the user experience.

Weather Widget:

- **Live Weather Updates:** Provides real-time weather conditions, helping users to check weather suitability for sustainability events.
- **Integration with OpenWeather API:** Fetches current weather data specific to Singapore.

Feature Icons:

- **View Calendar:** Icon that navigates users to the Event Listing feature.
- **List Events:** Icon that navigates users to the Event Listing feature.
- **View Events:** Icon that navigates users to the Event Viewing feature.
- **Interactive Map:** Icon that navigates users to the Interactive Map feature.
- **Sign Out:** Icon that logs out the user and redirects to the login page. Sign-out functionality is available both on the home screen and in the sidebar.

Sidebar:

- **Profile Section:** Allows users to view and update their credentials, including changing their username.
- **About Us:** Provides information about the app and its purpose.
- **Sign Out:** An additional sign-out option for convenience.

Technology Stack:

Front-End:

- **React Native:** Used for creating a responsive and user-friendly interface. The StyleSheet API is utilized for styling components.

Back-End:

- **JavaScript (React Native Integration):** Main language used to build the app, ensuring seamless integration with React Native.
- **Node.js:** Used as a runtime environment to host the app on the server.
- **StackNavigator:** Utilized for navigation, allowing users to move between different components of the app efficiently.

APIs:

- **OpenWeather API:** A free-to-use API for fetching live weather updates in Singapore, providing accurate and up-to-date weather conditions on the home screen.

Additional Tools:

- **Expo:** Enhances development and deployment by allowing real-time changes and simplifying the installation and integration of various features.

Detailed Workflow:

1. Home Screen Initialization:

- Upon login, the user is directed to the Home Screen.
- The app fetches the user's username from the database and displays a personalized welcome message in the header.
- The sidebar icon is available for quick access to additional features.

2. Weather Widget:

- The app requests current weather data from the OpenWeather API for Singapore.

- Live weather updates are displayed on the home screen, helping users plan for sustainability events.

3. Feature Icons:

- **View Calendar:** Users tap the icon to navigate to the Event Listing feature, where they can view upcoming events.
- **List Events:** Similar to the View Calendar, it directs users to the Event Listing feature.
- **View Events:** Navigates users to the Event Viewing feature for detailed information about specific events.
- **Interactive Map:** Directs users to the Interactive Map feature, where they can explore various locations related to sustainability events.
- **Sign Out:** Users can log out by tapping this icon, which redirects them to the login page.

4. Sidebar Navigation:

- **Profile Section:** Users can open the sidebar, view their profile details, and update their username or other credentials.
- **About Us:** Provides information about the NUS GreenLobang app.
- **Sign Out:** An additional sign-out option is available in the sidebar for user convenience.

Feature 3: Event Listing Feature

Description:

The Event Listing feature allows users to create and share their own sustainability events, workshops, and initiatives on campus. This feature empowers the NUS GreenLobang community to engage with and participate in various sustainability activities.

Features Description:

Create Events:

- **Detailed Event Information:** Users can create events with comprehensive details, including the event title, date, time, and a detailed description.
- **Date and Time Selection:** Simplified and standardized using the react-native datetime picker library, ensuring consistency and ease of use.

Upload Photos:

- **Photo Upload:** Users can upload photos directly from their gallery to enhance their event listings. This visual element helps in attracting more participants.

Colour Coding:

- **Event Colour Coding:** Users can choose a colour for their event, making it easier to filter and distinguish between different events.

Technology Stack:

Front-End:

- **React Native:** Used for creating a responsive and user-friendly interface. The StyleSheet API is employed for styling the components.

Back-End:

- **JavaScript (React Native Integration):** Main language used to build the app, ensuring seamless integration with React Native.
- **Node.js:** Used as a runtime environment to host the app on the server.

Database:

- **Firebase:** Utilized to store all events under a separate collection, ensuring efficient data management.
- **Firebase Storage:** Used for storing uploaded photos, with image quality limited to 0.5 and one photo per upload due to storage constraints (for now).

Additional Tools:

- **Expo:** Enhances development and deployment by allowing real-time changes and simplifying the installation and integration of various features.

Detailed Workflow:

1. **Event Creation:**
 - Users navigate to the Event Listing feature from the home screen.
 - They select the option to create a new event.
 - Users fill in the event details, including the title, date, time, and a detailed description.
 - Date and time are selected using the react-native datetime picker library for a consistent user experience.
2. **Photo Upload:**

- Users have the option to upload a photo from their gallery to accompany the event listing.
 - The app limits the image quality to 0.5 and restricts to one photo per upload to manage storage constraints.
 - The photo is uploaded to Firebase Storage and linked to the event.
3. **Colour Coding:**
- Users choose a colour for their event, aiding in easy filtering and visual distinction.
 - The selected colour is stored along with the event details in Firebase.
4. **Event Storage:**
- Once all details are filled in, the event information is sent to the backend.
 - The Node.js server processes the request and stores the event details in Firebase under a separate collection for events.
 - The uploaded photo is saved in Firebase Storage, and its reference is linked to the event in the database.
5. **Event Display:**
- Created events are displayed in the Event Listing feature, with their details, photos, and colour coding visible to all users.
 - Users can filter and view events based on their preferences and the colour coding.

Feature 4: Event Viewing Feature

Description:

The Event Viewing feature is the heart of NUS GreenLobang, providing users with a comprehensive view of upcoming sustainability events, workshops, and initiatives on campus. This feature allows users to browse, view detailed information, add events to their personal calendars, and share events with friends on various platforms.

Features Description:

Browse Events:

- **Event Information:** Users can view detailed information about each event, including date, time, location, and a description.
- **Date Scroll Bar:** A scroll bar at the top of the screen allows users to quickly navigate to events on specific dates.

View More Detailed Information:

- **Detailed Event View:** By clicking on an event container, users can view more detailed information about the event.
- **Add to Personal Calendar:** Users can add events to their personal calendars to keep track of events they are interested in.
- **Share with Friends:** Users can share upcoming events with friends on common platforms such as Telegram, WhatsApp, email, and Instagram.

Add to Personal Calendar:

- **Calendar Integration:** Users can add events they are interested in directly to their personal calendar for easy tracking.

Share with Friends:

- **Social Sharing:** Users can share events with friends on platforms like Telegram, WhatsApp, email, and Instagram. The shared message includes the event's title, description, date, and time.

Colour Coding:

- **Event Colours:** Events are displayed in different colours, making it easier to distinguish between different types of activities (e.g., red for volunteering work, green for recycling work).

View Photo:

- **Event Photos:** Users can view the corresponding photo of the event, providing a visual representation of the activity.

Technology Stack:

Front-End:

- **React Native:** Used for creating a responsive and user-friendly interface. The StyleSheet API is employed for styling components.

Back-End:

- **JavaScript (React Native Integration):** Main language used to build the app, ensuring seamless integration with React Native.
- **Node.js:** Used as a runtime environment to host the app on the server.
- **React Native Share Library:** Utilized for ease of sharing events on various platforms.

Database:

- **Firebase:** Utilized to store all events under a separate collection, ensuring efficient data management.
- **Firebase Storage:** Used for storing uploaded photos, with image quality limited to 0.5 and one photo per upload due to storage constraints.

Additional Tools:

- **Expo:** Enhances development and deployment by allowing real-time changes and simplifying the installation and integration of various features.

Detailed Workflow:

1. **Browsing Events:**
 - Users navigate to the Event Viewing feature from the home screen.
 - Events are displayed with basic information (title, date, time, location, and a brief description).
 - A scroll bar at the top allows users to browse events by date.
2. **Viewing Detailed Event Information:**
 - Users click on an event container to view more detailed information.
 - Detailed view includes full event description, date, time, location, and any uploaded photos.
 - Users can add the event to their personal calendar using a calendar integration.
 - The option to share the event is provided, with preformatted text for easy sharing.
3. **Adding Events to Personal Calendar:**
 - Users select the option to add the event to their personal calendar.
 - The app uses calendar integration to add the event details to the user's calendar.
4. **Sharing Events with Friends:**
 - Users select the option to share the event.
 - The app uses the React Native Share library to share the event details (title, description, date, and time) on platforms like Telegram, WhatsApp, email, and Instagram.
5. **Colour Coding and Photos:**
 - Events are displayed with colour coding to indicate the type of activity (e.g., red for volunteering, green for recycling).
 - Users can view event photos to get a better idea of what the event involves.
6. **Data Storage and Management:**
 - Event details and photos are stored in Firebase, ensuring efficient data management and retrieval.
 - Firebase Storage handles the uploaded photos, with constraints on image quality and number of uploads to manage storage effectively.

Feature 5: Calendar

Description:

The Calendar feature provides a visual representation of all upcoming sustainability events that users are interested in. It helps users manage their schedules efficiently and reminds them of events they have shown interest in, ensuring they never miss an important activity.

Features Description:

Personal Calendar:

- **User-Specific Events:** Each user can add events they are interested in to their personal calendar.
- **Event Management:** Users can view multiple events they have indicated interest in, all in one place.

Automatic Clearing of Events:

- **Expired Event Removal:** Events that have passed the current date are automatically cleared from the calendar.
- **Hassle-Free Management:** This feature minimizes the user's hassle in clearing expired events, keeping the calendar neat and organized.

Event Date Sorting:

- **Descending Order Sorting:** Events are sorted by date in descending order, ensuring that the most imminent events are displayed at the top for the user's convenience.

Technology Stack:

Front-End:

- **React Native:** Used for creating a responsive and user-friendly interface. The StyleSheet API is employed for styling components.

Back-End:

- **JavaScript (React Native Integration)**: Main language used to build the app, ensuring seamless integration with React Native.
- **Node.js**: Used as a runtime environment to host the app on the server.

Database:

- **Firebase**: Utilized to store all events under a separate collection, ensuring efficient data management and retrieval.

Additional Tools:

- **Moment Library**: Simplifies date and time handling, making it easier to manage event dates and times within the app.

Detailed Workflow:

1. Personal Calendar Initialization:

- Users navigate to the Calendar feature from the home screen.
- The calendar displays all the events the user has added, with details such as event title, date, time, and location.

2. Adding Events to Calendar:

- Users can add events to their personal calendar through the Event Viewing feature.
- The selected events are stored in the user's calendar and displayed with all relevant details.

3. Automatic Clearing of Events:

- The app periodically checks for events that have passed the current date.
- Expired events are automatically removed from the calendar, ensuring the user only sees upcoming events.
- This process minimizes clutter and keeps the calendar organized.

4. Event Date Sorting:

- Events in the calendar are sorted by date in descending order.
- The most imminent events are displayed at the top, making it easy for users to see what's coming up next.

5. Data Storage and Management:

- Event details are stored in Firebase under a separate collection.
- The Moment library is used to handle date and time formatting and calculations, ensuring accurate and efficient date management.

Feature 6: Sidebar -> Profile/About Us

Description:

The Sidebar feature allows users to toggle between viewing their personal profile and the "About Us" information page. This provides easy access to important personal details and information about the app, enhancing user convenience and engagement.

Features Description:

Profile Page:

- **View Profile Information:** Users can view key aspects of their profile such as their username and the email used to register.
- **Set Profile Picture:** Users can select and set any photo from their gallery as their profile picture.
- **View Points:** Users can quickly glance at their accumulated points.
- **Change Username:** Users have the ability to change their username.
- **Redeemed Rewards:** Users can view the past rewards they have redeemed.

About Us Page:

- **App Information:** Provides detailed information about the NUS GreenLobang app, its purpose, and its features.

Sign Out:

- **Convenient Sign Out:** Users can sign out of the app using the sign-out button located in the sidebar for easy access.

Technology Stack:

Front-End:

- **React Native:** Used for creating a responsive and user-friendly interface. The StyleSheet API is employed for styling components.
- **Modals:** Utilized in the creation of the sidebar to enhance user experience and ease of navigation.

Back-End:

- **JavaScript (React Native Integration):** Main language used to build the app, ensuring

seamless integration with React Native.

- **Node.js**: Used as a runtime environment to host the app on the server.

Database:

- **Firebase**: Utilized to store all usernames and profile information under a separate collection.

Detailed Workflow:

1. Accessing the Sidebar:

- Users can access the sidebar by tapping the menu icon on the home screen.
- The sidebar slides in, displaying options for the Profile and About Us pages, as well as the sign-out button.

2. Profile Page:

- **View Profile Information**: Users can see their username and registered email displayed on the profile page.
- **Set Profile Picture**: Users can tap on the profile picture section to open their gallery and select a photo. The selected photo is uploaded to Firebase Storage and set as the profile picture.
- **View Points**: A section on the profile page displays the user's accumulated points.
- **Change Username**: Users can tap on their username to edit it. The new username is updated in Firebase.
- **Redeemed Rewards**: A list of past rewards redeemed by the user is displayed for quick reference.

3. About Us Page:

- **App Information**: Users can navigate to the About Us page to read detailed information about the app, its purpose, and its features.

4. Sign Out:

- **Convenient Sign Out**: Users can sign out of the app by tapping the sign-out button located in the sidebar. This logs the user out and redirects them to the login screen.

5. Data Storage and Management:

- Profile information, including usernames and profile pictures, is stored in Firebase under a separate collection.
- Firebase Storage is used for storing profile pictures uploaded by users.

Feature 7: Interactive Map

Description:

The Interactive Map feature guides users to sustainability-related locations on campus and in Singapore, such as recycling stations, green cafes, and event venues. It also provides the ability to search for specific landmarks or locations based on keywords, offering a comprehensive and user-friendly navigation tool.

Features Description:

Keyword Search:

- **Search Functionality:** Users can search for locations using keywords. For example, searching "Salvation" will display all Salvation Army Donation Stations in Singapore.
- **Location Markers:** Search results are displayed on the map with markers, allowing users to easily locate the desired sustainability-related places.

Landmark Display in Singapore:

- **View Landmarks:** Users can view important landmarks such as MRT stations, bus stops, and prominent places of interest in Singapore.
- **Comprehensive Navigation:** The map provides a detailed and interactive view of various sustainability-related and general landmarks across Singapore.

Technology Stack:

Front-End:

- **React Native:** Used for creating a responsive and interactive map interface. It provides a seamless user experience across different devices.
- **Map Integration:** Utilizing React Native libraries to integrate map services and display interactive maps.

Back-End:

- **Node.js:** Manages location data and user interactions. It handles requests for location searches and processes the data to be displayed on the map.

APIs:

- **OneMap API:** Singapore's free-to-use API for accessing detailed map data, including locations of interest, public transportation, and other landmarks.

Additional Tools:

- **Expo:** Enhances the development process by integrating map services and providing tools for real-time testing and deployment.

Detailed Workflow:

1. **Accessing the Interactive Map:**
 - Users navigate to the Interactive Map feature from the home screen.
 - The map interface loads, displaying the default view of the campus or Singapore.
2. **Keyword Search:**
 - Users enter a keyword in the search bar (e.g., "Salvation").
 - The app sends a request to the Node.js backend, which queries the OneMap API for relevant locations.
 - Search results are displayed on the map with markers, indicating the locations of interest.
 - Users can tap on markers to view more details about each location.
3. **Viewing Landmarks:**
 - Users can explore the map to view various landmarks in Singapore, such as MRT stations, bus stops, and prominent places of interest.
 - The map provides detailed information about each landmark, enhancing the user's navigation experience.
4. **User Interaction:**
 - Users can zoom in and out, pan across the map, and interact with markers to get more information about specific locations.
 - The interface ensures a smooth and responsive experience, allowing users to easily navigate and find the information they need.
5. **Data Management:**
 - The Node.js backend manages the location data and user interactions, ensuring efficient processing and retrieval of information.
 - The OneMap API provides up-to-date and accurate map data, enhancing the reliability of the interactive map feature.

Feature 8: Rewards System

Description:

The Rewards System feature allows users to earn points for participating in green initiatives and adopting eco-friendly practices. Users can then redeem these points for rewards, such as

discounts at campus cafes or eco-friendly products. This system incentivizes sustainable behavior and enhances user engagement.

Features Description:

Earn Points:

- **Participation Rewards:** Users collect points by attending events, participating in workshops, and practicing sustainability.
- **Event-Based Points:** Points are awarded based on specific events and activities.

Claim Points:

- **Claim Process:** Users can claim points once they have participated in an event.
- **Terms and Conditions:** Users must agree to the terms and conditions before claiming points.
- **One-Time Claim:** Points can only be claimed once per event. The "Claim Points" button will be disabled after points have been claimed.

View Rewards:

- **Rewards Overview:** Users can view all available rewards at a glance, including the reward name, cost (in points), and a brief description.
- **Reward Details:** Detailed information about each reward, helping users decide how to use their points.

Redeem Rewards:

- **Exchange Points:** Users can exchange their points for rewards such as discounts at campus cafes or eco-friendly products.
- **Points Validation:** Users can only redeem rewards if they have enough points. If not, the redemption process will not proceed.

Technology Stack:

Front-End:

- **React Native:** Used for creating intuitive and responsive user interactions. Ensures a seamless experience across different devices.

Back-End:

- **Node.js:** Handles point transactions and reward redemptions. Utilizes boolean flags to

control the state of whether points have been claimed or not.

Database:

- **Firebase:** Tracks user points and rewards. Points and rewards are stored in separate collections.
 - **User Points Collection:** Manages user points and keeps track of points earned and redeemed.
 - **Rewards Collection:** Contains details of all available rewards. Users are allowed to read the collection but cannot create or modify rewards.

Detailed Workflow:

1. **Earning Points:**
 - Users participate in events or workshops related to sustainability.
 - Upon completion of the event, users are eligible to claim points.
 - Points are awarded based on the type of event and participation level.
2. **Claiming Points:**
 - Users navigate to the event page and select the "Claim Points" button.
 - A terms and conditions prompt is displayed. Users must agree to proceed.
 - Once agreed, the system checks if the points have already been claimed using boolean flags.
 - If not claimed, points are added to the user's account, and the "Claim Points" button is disabled for that event.
3. **Viewing Rewards:**
 - Users navigate to the rewards section to view available rewards.
 - The rewards overview displays the name, cost, and description of each reward.
 - Users can click on a reward for more detailed information.
4. **Redeeming Rewards:**
 - Users select a reward they wish to redeem.
 - The system checks if the user has enough points for the selected reward.
 - If the user has sufficient points, the points are deducted from their account, and the reward is marked as redeemed.
 - If the user does not have enough points, an error message is displayed, and the redemption process is halted.
5. **Data Management:**
 - The Node.js backend manages all point transactions and reward redemptions, ensuring data integrity and security.
 - Firebase stores all user points and rewards data, providing real-time updates and efficient data management.

Refinement

Feature 1: User Registration and Login

Problems Encountered:

1. **User Authentication Delays:** Initial user feedback indicated that there was a noticeable delay during the authentication process.
2. **Password Reset Issues:** Users reported difficulties in receiving password reset emails.
3. **Profile Picture Upload:** Some users experienced failures when attempting to upload their profile pictures.

Solutions Implemented:

1. **Optimized Backend Processing:** We optimized the Node.js backend to reduce authentication delays by refining the database queries and implementing efficient data handling techniques.
2. **Enhanced Email Service Integration:** Improved the integration with email services to ensure timely delivery of password reset emails. Implemented retries and fallback mechanisms to handle email failures, password visibility toggle that did not function correctly on certain devices.
3. **Profile Picture Upload Handling:** Addressed upload issues by optimizing the image compression process and improving the handling of network interruptions during uploads.

Feature 2: Home Screen

Problems Encountered:

1. **Weather Widget Inaccuracy:** Users reported that the weather updates were sometimes outdated or inaccurate.
2. **Slow Load Times:** The home screen took longer to load, especially on older devices.
3. **Navigation Issues:** Some users found it difficult to navigate to different features from the home screen.

Solutions Implemented:

1. **Improved API Integration:** Enhanced the integration with the OpenWeather API to ensure more accurate and timely weather updates.
2. **Optimized Front-End Performance:** Streamlined the React Native code and utilized lazy loading techniques to improve load times and overall performance.
3. **Enhanced Navigation:** Redesigned the user interface to make feature icons more

accessible and intuitive. Improved the sidebar functionality for smoother navigation. Implemented a dark mode for better usability in low-light conditions.

Feature 3: Event Listing Feature

Problems Encountered:

1. **Event Creation Errors:** Users faced difficulties in creating events due to validation errors.
2. **Photo Upload Limitations:** Users experienced issues with the quality and size of uploaded photos.
3. **Event Sorting Issues:** Events were not consistently sorted by date, leading to confusion.

Solutions Implemented:

1. **Enhanced Validation:** Improved the validation logic to provide clearer error messages and prevent incomplete submissions.
2. **Optimized Photo Upload:** Adjusted the compression settings to balance photo quality and file size, ensuring smoother uploads.
3. **Consistent Event Sorting:** Refined the sorting algorithm to ensure events are always displayed in chronological order.

Feature 4: Event Viewing Feature

Problems Encountered:

1. **Detailed View Load Times:** The detailed event view took too long to load, affecting user experience.
2. **Calendar Integration Issues:** Users reported problems with adding events to their personal calendars.
3. **Sharing Functionality Bugs:** The social sharing feature sometimes failed to format the shared message correctly.

Solutions Implemented:

1. **Optimized Loading:** Improved the data fetching and rendering processes to speed up the loading of detailed event views.
2. **Enhanced Calendar Integration:** Refined the integration with calendar apps to ensure seamless event additions.
3. **Fixed Sharing Bugs:** Improved the formatting logic for shared messages and ensured compatibility across different platforms.

Feature 5: Calendar

Problems Encountered:

1. **Automatic Clearing Failures:** Some expired events were not being automatically cleared from the calendar.
2. **Event Sorting Confusion:** Users found it difficult to differentiate between past and upcoming events.
3. **Data Sync Issues:** Events added to the calendar were not syncing correctly across devices.

Solutions Implemented:

1. **Improved Automatic Clearing:** Enhanced the logic for identifying and removing expired events from the calendar.
2. **Clearer Sorting and Display:** Introduced visual distinctions between past and upcoming events, making it easier for users to manage their schedules.
3. **Reliable Data Sync:** Implemented real-time data synchronization to ensure consistent event updates across all user devices.

Feature 6: Sidebar -> Profile/About Us

Problems Encountered:

1. **Profile Picture Upload Issues:** Users experienced difficulties uploading and setting profile pictures.
2. **Username Change Failures:** Some users reported that their username changes were not being saved.
3. **Sign Out Problems:** The sign-out button occasionally failed to log users out.

Solutions Implemented:

1. **Enhanced Profile Picture Upload:** Improved the upload process to handle larger images and ensure consistent performance.
2. **Reliable Username Changes:** Refined the backend processes to ensure username changes are promptly saved and reflected. This involved changing the firebase data collection structure.
3. **Fixed Sign Out Functionality:** Addressed the issues causing the sign-out button to fail, ensuring it reliably logs users out.

Feature 7: Interactive Map

Problems Encountered:

1. **Search Functionality Glitches:** Users experienced issues with the keyword search returning incomplete or incorrect results.
2. **Marker Display Issues:** Location markers sometimes failed to display or update correctly on the map.
3. **Slow Loading Times:** The interactive map took too long to load, especially on slower connections.

Solutions Implemented:

1. **Refined Search Algorithm:** Improved the keyword search algorithm to return more accurate and complete results.
2. **Enhanced Marker Handling:** Fixed issues with marker display and updating, ensuring all locations are correctly marked.
3. **Optimized Loading Performance:** Implemented caching and optimized data fetching to reduce loading times.

Feature 8: Rewards System

Problems Encountered:

1. **Point Claiming Errors:** Users faced issues where points were not correctly credited after claiming. Points could also be claimed multiple times for the same event.
2. **Redemption Failures:** Some users reported that the redemption process failed due to insufficient points, even when they had enough.
3. **Reward Display Bugs:** Rewards were not displaying correctly or updated in real-time.

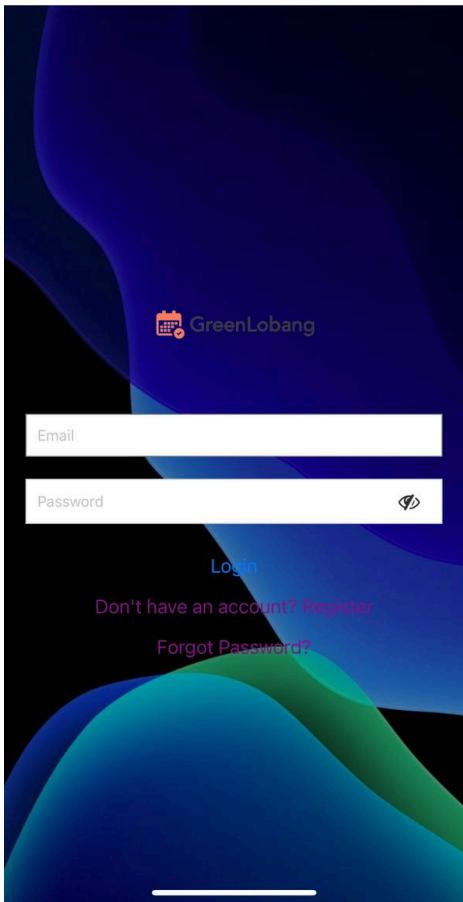
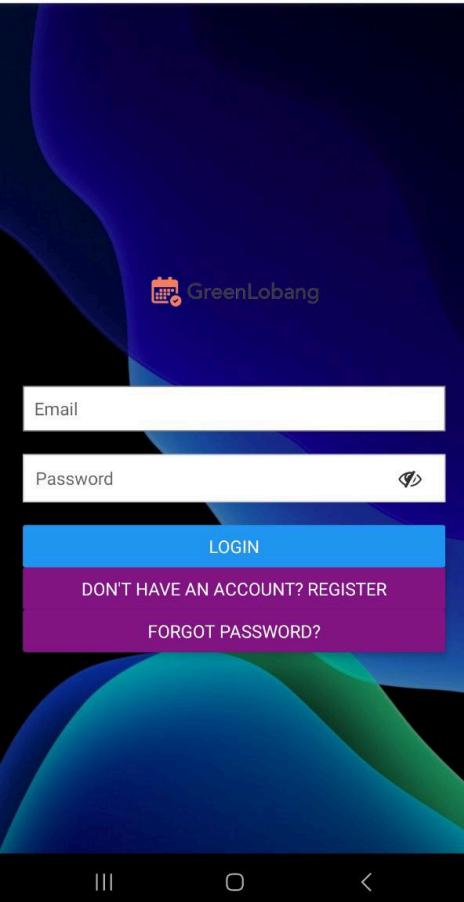
Solutions Implemented:

1. **Fixed Point Claiming Logic:** Enhanced the backend processes to ensure points are accurately credited upon claiming.
2. **Refined Redemption Validation:** Improved the validation logic to accurately check and deduct points during redemption. Made use of boolean flags and improved logical flow to ensure points are credited accurately.
3. **Real-Time Reward Updates:** Implemented real-time updates to ensure rewards are displayed correctly and promptly.

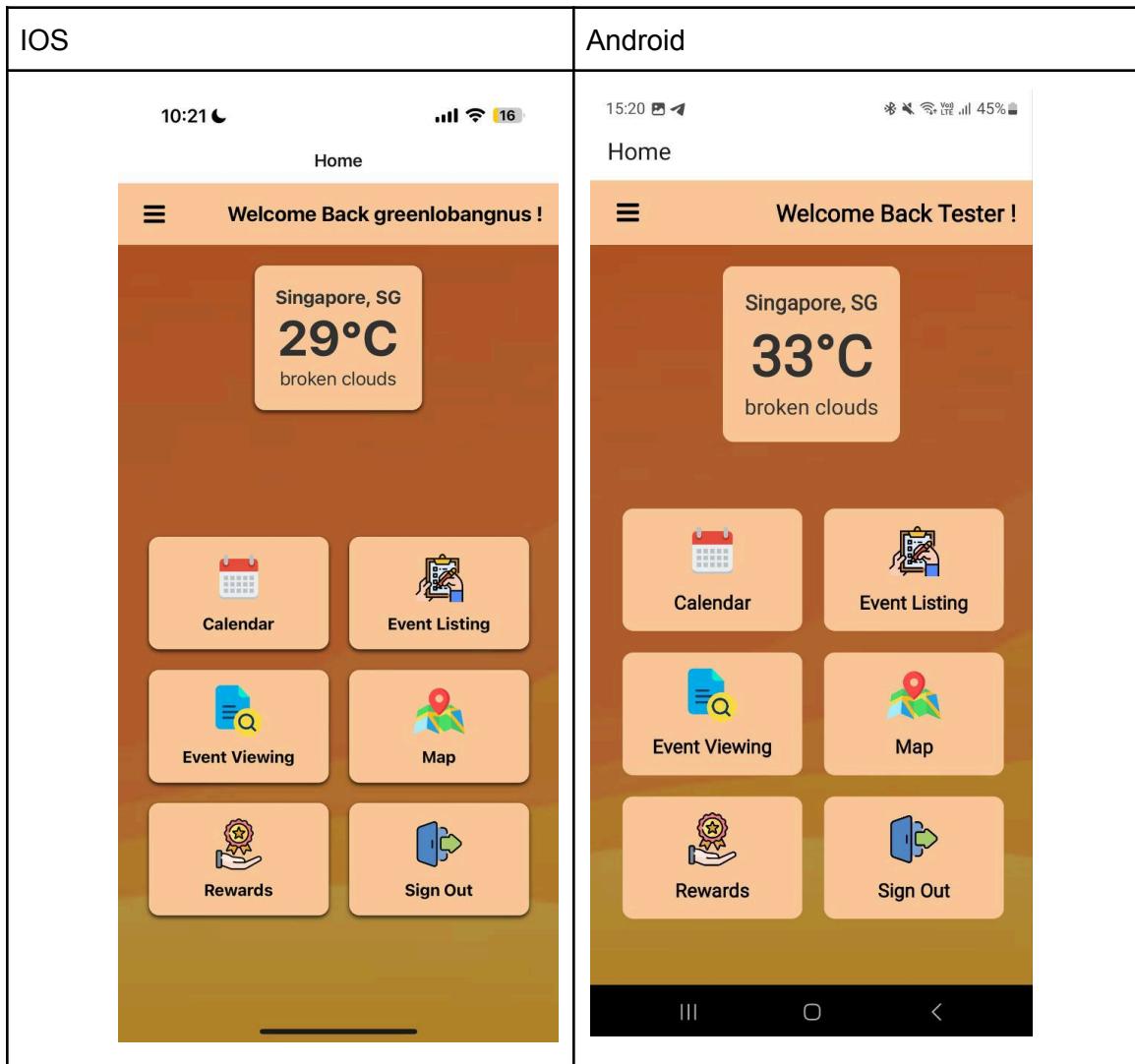
Proof-of-Concept

IOS

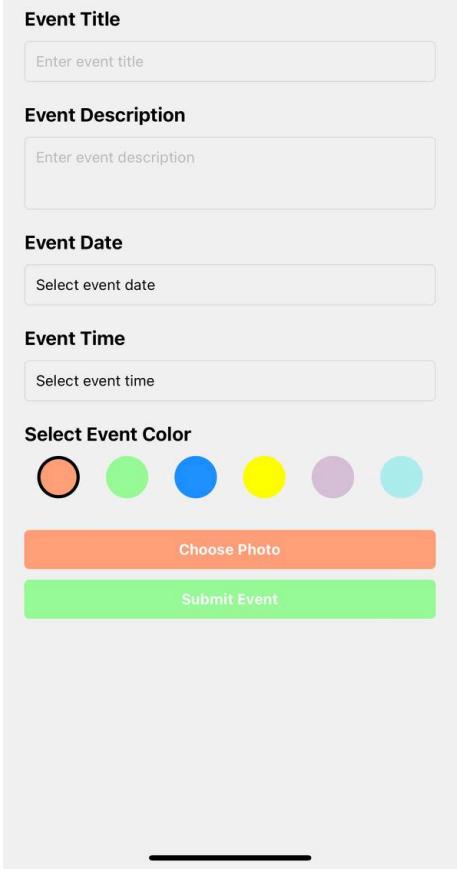
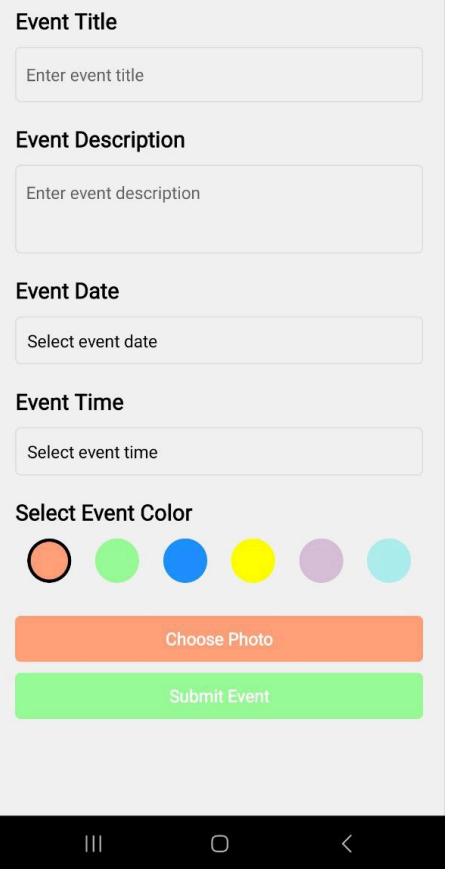
1) User Registration and Login

IOS	Android
 The image shows the login screen for a mobile application called "GreenLobang". The screen has a dark blue background with abstract blue and green wave patterns at the bottom. At the top center, there is a small "Login" button. Below it is the "GreenLobang" logo, which consists of a small orange calendar icon followed by the text "GreenLobang" in white. There are two input fields: one for "Email" and one for "Password", both with placeholder text and a clear icon. Below these fields is a large blue "Login" button with white text. Underneath the button, there are two links: "Don't have an account? Register" and "Forgot Password?".	 The image shows the login screen for the same "GreenLobang" application on an Android device. The layout is similar to the iOS version, featuring a dark blue background with abstract blue and green wave patterns. The "GreenLobang" logo is at the top. Below it are "Email" and "Password" input fields. A large blue "LOGIN" button is centered below the fields. Above the "LOGIN" button is a purple rectangular area containing the text "DON'T HAVE AN ACCOUNT? REGISTER" and "FORGOT PASSWORD?".

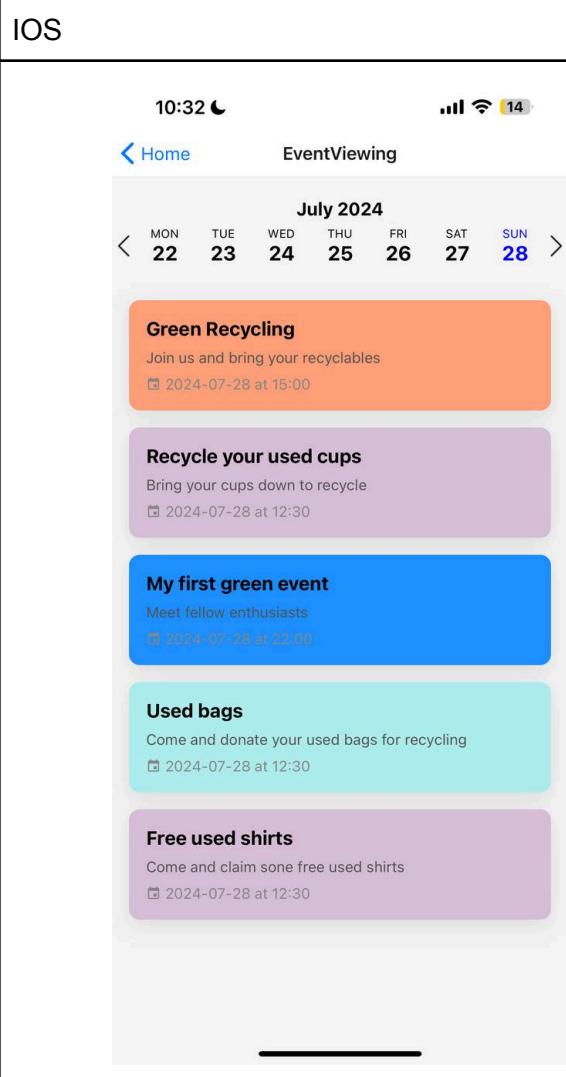
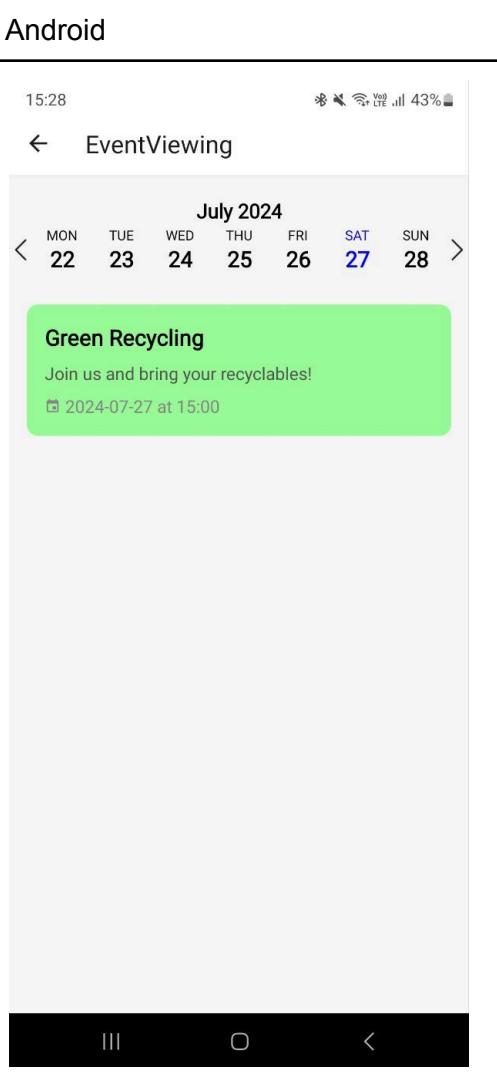
Home Screen



2) Event Listing Feature

IOS	Android
	

3) Event Viewing / Details Feature

IOS	Android
 <p>The screenshot shows the EventViewing app interface on iOS. At the top, there's a navigation bar with a back arrow, the text "EventViewing", and a search icon. Below it is a calendar header for "July 2024" with days from Monday to Sunday. The date "28" is highlighted in blue. The main content area displays five event cards:</p> <ul style="list-style-type: none">Green Recycling: Join us and bring your recyclables! (Date: 2024-07-28 at 15:00)Recycle your used cups: Bring your cups down to recycle! (Date: 2024-07-28 at 12:30)My first green event: Meet fellow enthusiasts! (Date: 2024-07-28 at 22:00)Used bags: Come and donate your used bags for recycling! (Date: 2024-07-28 at 12:30)Free used shirts: Come and claim some free used shirts! (Date: 2024-07-28 at 12:30)	 <p>The screenshot shows the EventViewing app interface on Android. At the top, there's a navigation bar with a back arrow, the text "EventViewing", and a search icon. Below it is a calendar header for "July 2024" with days from Monday to Sunday. The date "27" is highlighted in blue. The main content area displays five event cards:</p> <ul style="list-style-type: none">Green Recycling: Join us and bring your recyclables! (Date: 2024-07-27 at 15:00)(No other events are visible in this screenshot)

10:33 14

EventViewing EventDetail

Green Recycling

Join us and bring your recyclables

2024-07-28 at 15:00

I agree to the terms and conditions

[Add to My Calendar](#)

[Share Event](#)

[Points Claimed](#)

15:28 43%

← EventDetail

Green Recycling

Join us and bring your recyclables!

2024-07-27 at 15:00

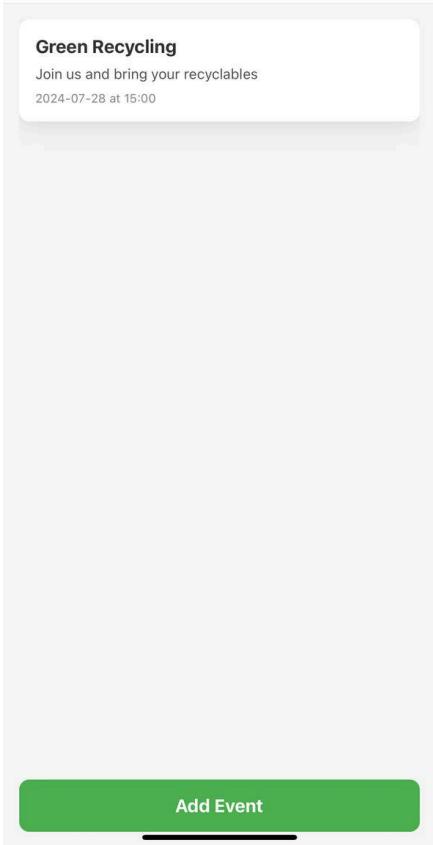
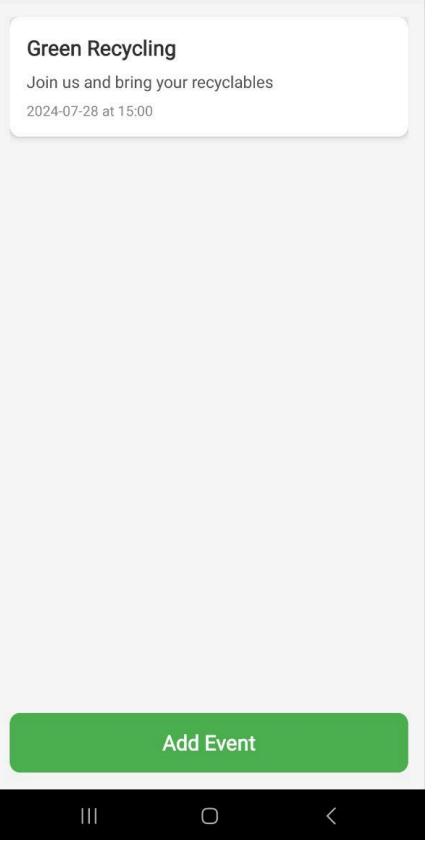
I agree to the terms and conditions

[ADD TO MY CALENDAR](#)

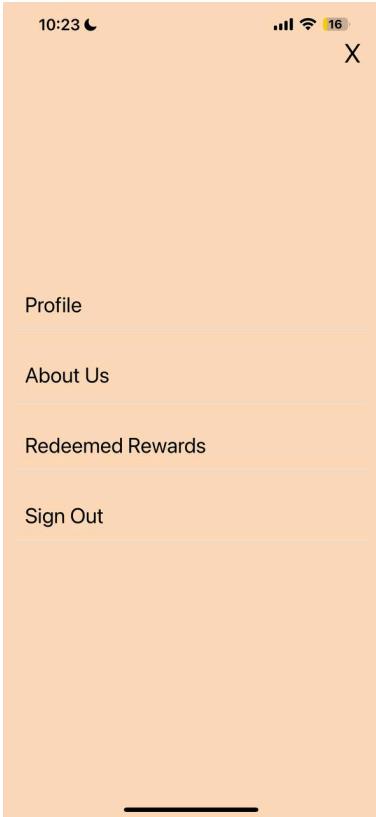
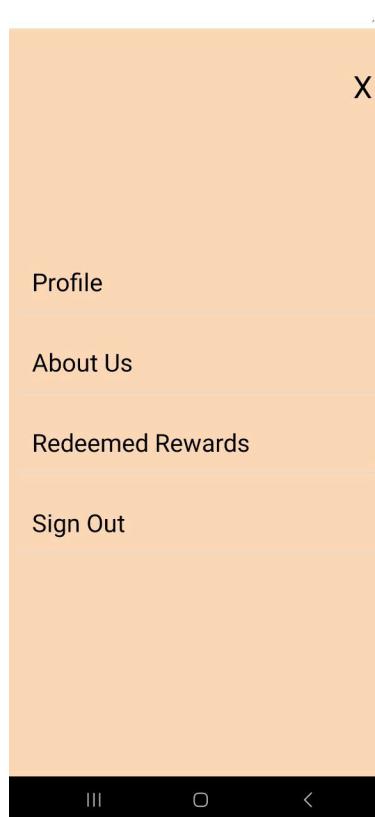
[SHARE EVENT](#)

[Claim Points](#)

4) Calendar

IOS	Android
 A screenshot of the iOS Calendar app. At the top, the status bar shows the time as 10:22 and battery level at 16%. Below the status bar, the navigation bar has a back arrow labeled "Home" and the word "Calendar". A large event card is displayed in the center. The event is titled "Green Recycling" and includes the subtitle "Join us and bring your recyclables" and the date "2024-07-28 at 15:00". At the bottom of the screen is a green "Add Event" button.	 A screenshot of the Android Calendar app. At the top, the status bar shows the time as 15:37 and battery level at 42%. Below the status bar, the navigation bar has a back arrow labeled "Calendar". A large event card is displayed in the center. The event is titled "Green Recycling" and includes the subtitle "Join us and bring your recyclables" and the date "2024-07-28 at 15:00". At the bottom of the screen is a green "Add Event" button.

5) Sidebar -> Profile/About Us Page/RedeemedRewards

IOS	Android
	

10:23 ⚡

Profile

Home



Profile

Username: greenlobangnus

Email: greenlobangnus@gmail.com

Points: 10

Enter new username

Update Username

Choose Profile Image

Upload Profile Image

—

15:24 📸

Profile

44%



Profile

Username: Tester

Email: test@gmail.com

Points: 0

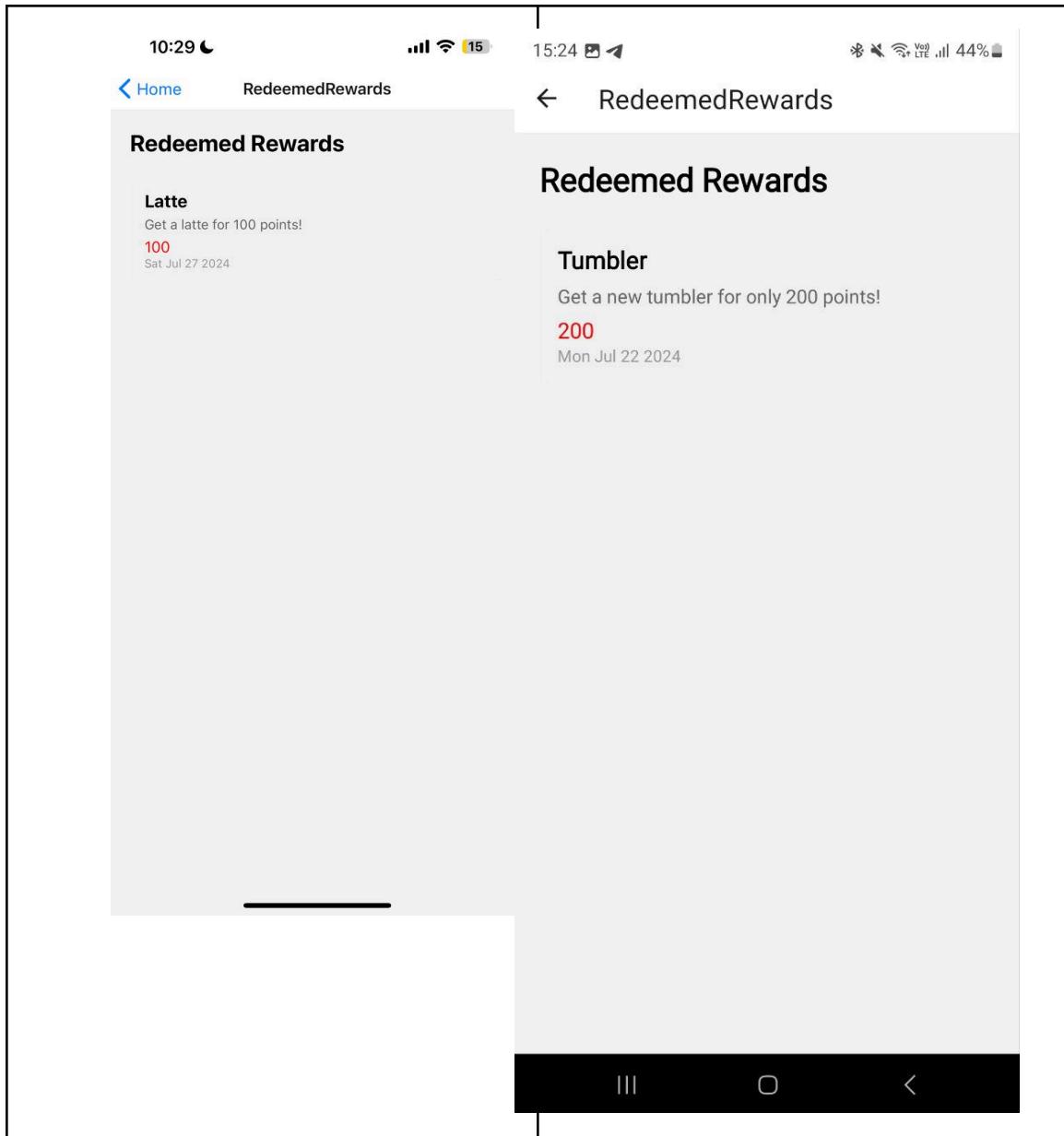
Enter new username

Update Username

Choose Profile Image

Upload Profile Image

☰ ☐ <



The image displays two side-by-side screenshots of a mobile application's 'About Us' page. Both screens have a dark orange header bar at the top.

Left Screen (10:28):

- Top status bar: 10:28, battery level 15%.
- Header: 'Home' with a back arrow icon, 'AboutUs'.
- Section title: 'About Us' with a calendar icon and 'GreenLobang' text.
- Text content:

We want to create a one-stop platform sharing sustainability practices or events in NUS. This platform will be a hub for students, faculty and staff to engage, collaborate and contribute to sustainability initiatives. By implementing a reward system, we aim to incentivise and recognise sustainable behaviours, thereby upholding and promoting a culture of sustainability across NUS.

Another side aim is the potential to bolster participation in sustainable events within the NUS community. With a point system, collaborating with various platforms and companies allows us to reward students for taking part in these sustainability events. As students strive to accrue points to earn attractive rewards, we hope to ensure a consistent influx of eager participants.

GreenLobang is proudly created by Othniel Chang and Sean Wong

Right Screen (15:24):

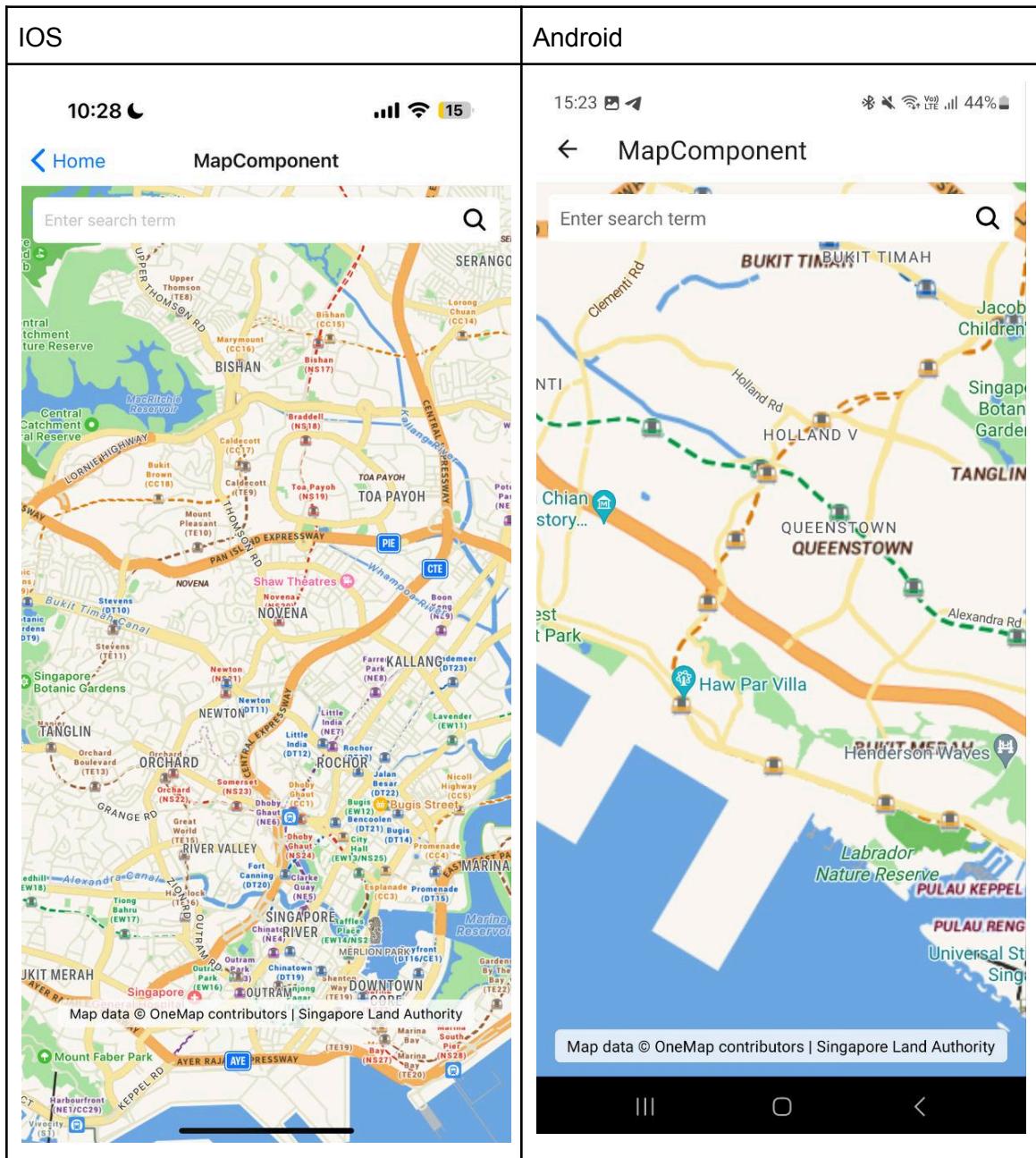
- Top status bar: 15:24, battery level 44%.
- Header: 'AboutUs' with a back arrow icon.
- Section title: 'About Us' with a calendar icon and 'GreenLobang' text.
- Text content:

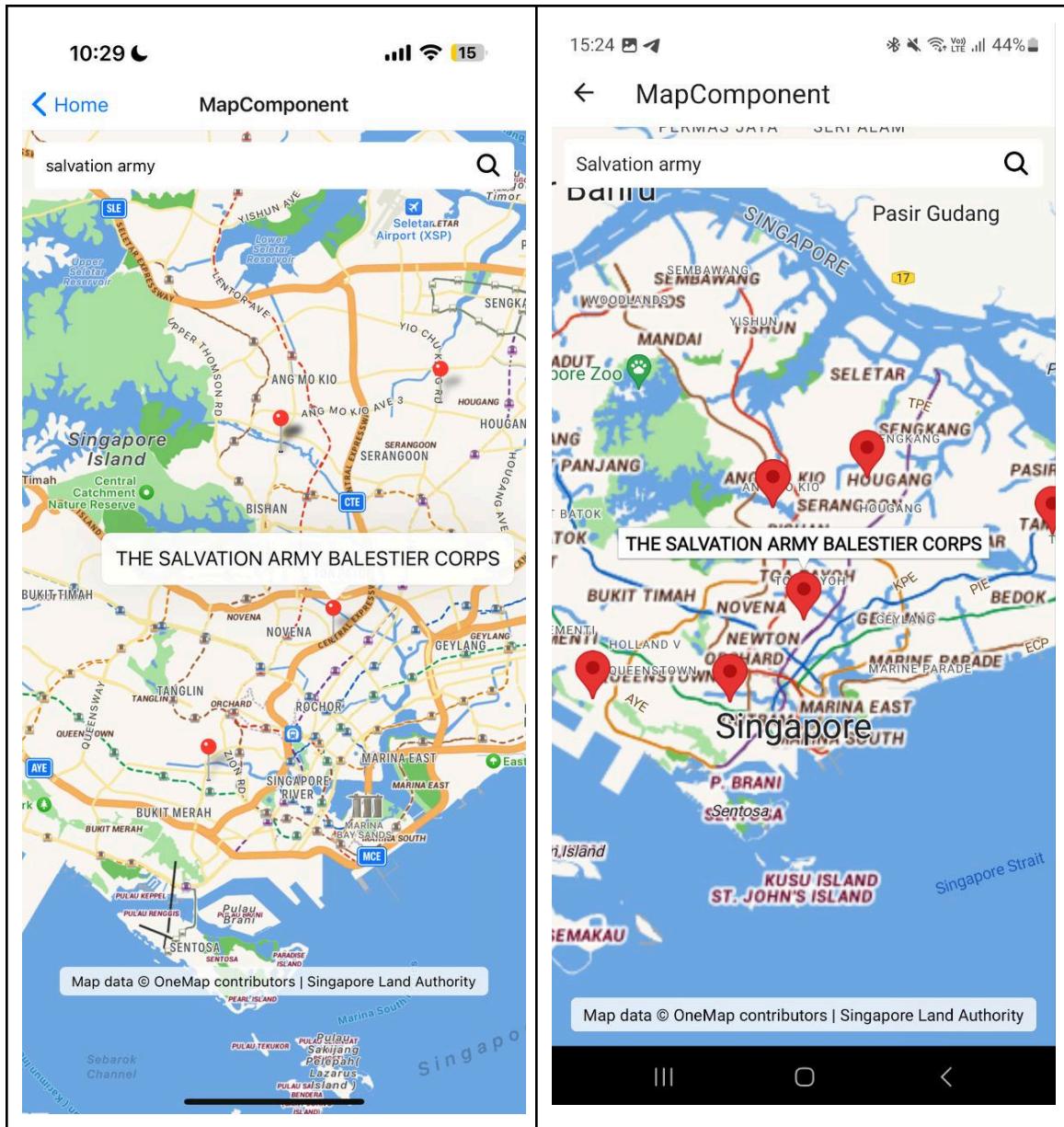
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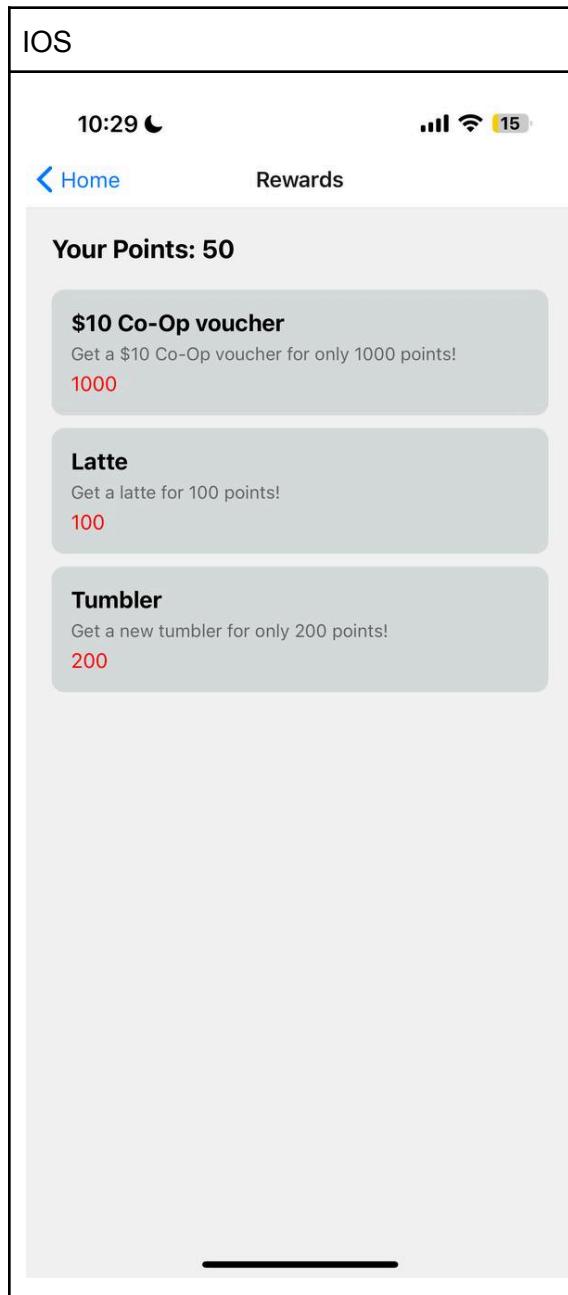
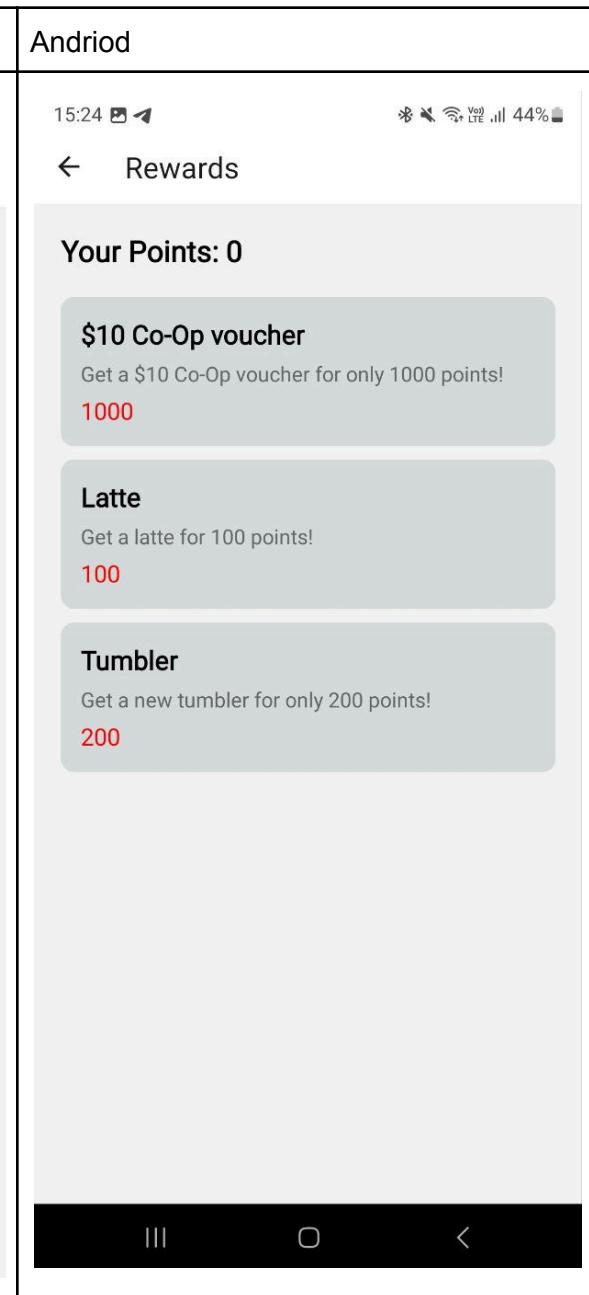
GreenLobang is proudly created by Othniel Chang and Sean Wong

6) MapComponent





7) Rewards

IOS	Andriod
 <p>10:29</p> <p>Home Rewards</p> <p>Your Points: 50</p> <p>\$10 Co-Op voucher Get a \$10 Co-Op voucher for only 1000 points! 1000</p> <p>Latte Get a latte for 100 points! 100</p> <p>Tumbler Get a new tumbler for only 200 points! 200</p>	 <p>15:24</p> <p>Rewards</p> <p>Your Points: 0</p> <p>\$10 Co-Op voucher Get a \$10 Co-Op voucher for only 1000 points! 1000</p> <p>Latte Get a latte for 100 points! 100</p> <p>Tumbler Get a new tumbler for only 200 points! 200</p>

User Testing

To ensure the robustness and usability of the NUS GreenLobang app, comprehensive user testing was conducted on both emulators and physical devices. The testing process was facilitated by the use of Expo, which allowed users to scan a QR code and test the app on the same network, ensuring consistency and ease of access during the testing phase.

Testing Process:

1. Testing Environments:

- **Emulators:** The app was tested on various emulators to simulate different devices and screen sizes. This helped in identifying any layout issues or bugs that might appear on specific device configurations.
- **Physical Devices:** Real-world testing was conducted on a range of physical devices (both iOS and Android) to ensure the app's functionality and performance across different hardware and operating system versions.

2. Expo Integration:

- **QR Code Scanning:** Users were able to easily access the app by scanning a QR code provided by Expo. This facilitated seamless testing, allowing users to quickly install and run the app on their devices.
- **Network Consistency:** Testing on the same network ensured a controlled environment, minimizing network-related variables and providing a stable testing setup.

Key Testing Focus Areas:

User Interface and Experience:

- **Navigation:** Ensured that users could navigate through different features of the app smoothly and intuitively.
- **Responsiveness:** Verified that the app's layout and elements adjusted correctly across various screen sizes and orientations.
- **Usability:** Assessed the overall user experience, including ease of use, clarity of instructions, and accessibility of features.

Functionality:

- **Event Listing:** Tested the accuracy and completeness of event information, as well as the functionality of searching and filtering events.

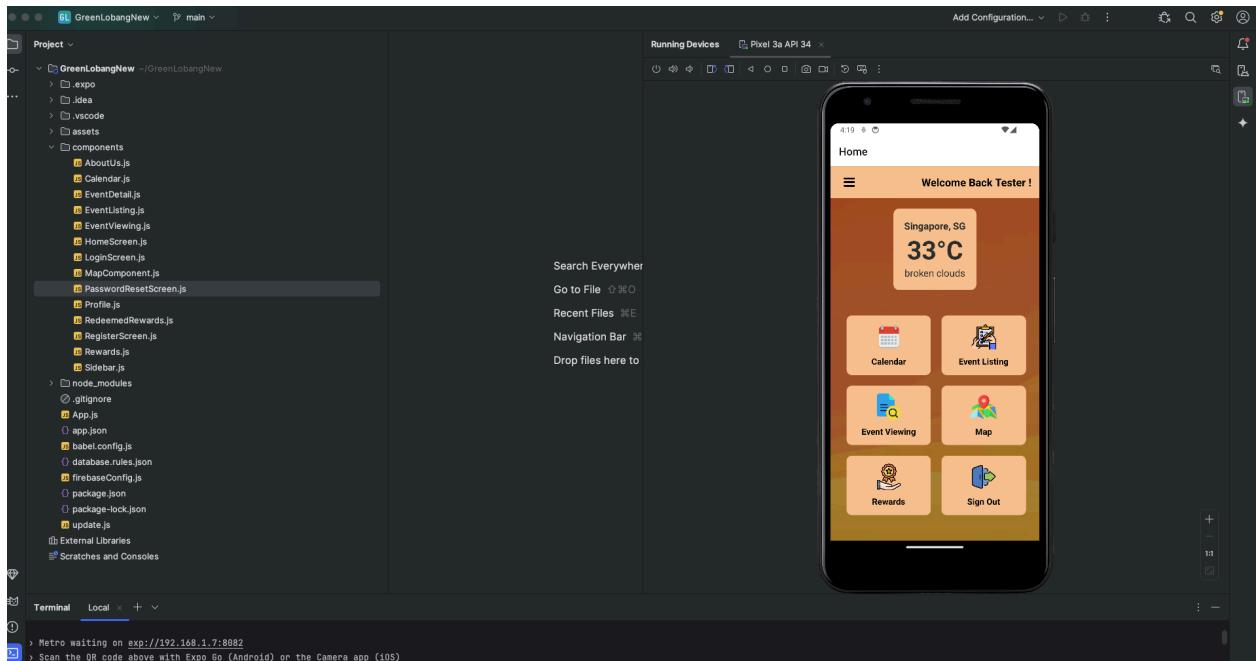
- **Real-Time Updates:** Checked that real-time updates were delivered promptly and accurately reflected changes in the event roster.
- **Profile Management:** Verified the processes for viewing and updating profile information, setting profile pictures, and viewing points and rewards.
- **Rewards System:** Ensured that users could claim and redeem points correctly, and that the reward redemption process was smooth and error-free.

Performance:

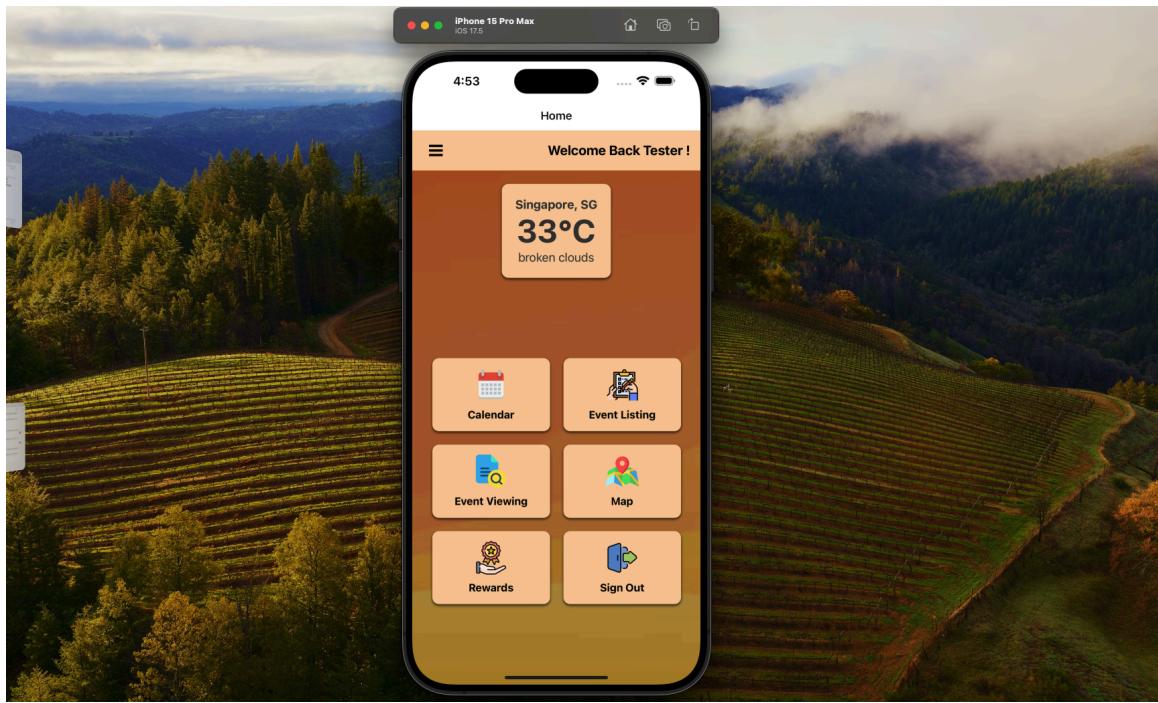
- **Load Times:** Measured the app's load times and responsiveness under various conditions, including different network speeds and device capabilities.
- **Stability:** Identified and addressed any crashes or performance issues, ensuring the app's stability across different usage scenarios.

Feedback and Iterations:

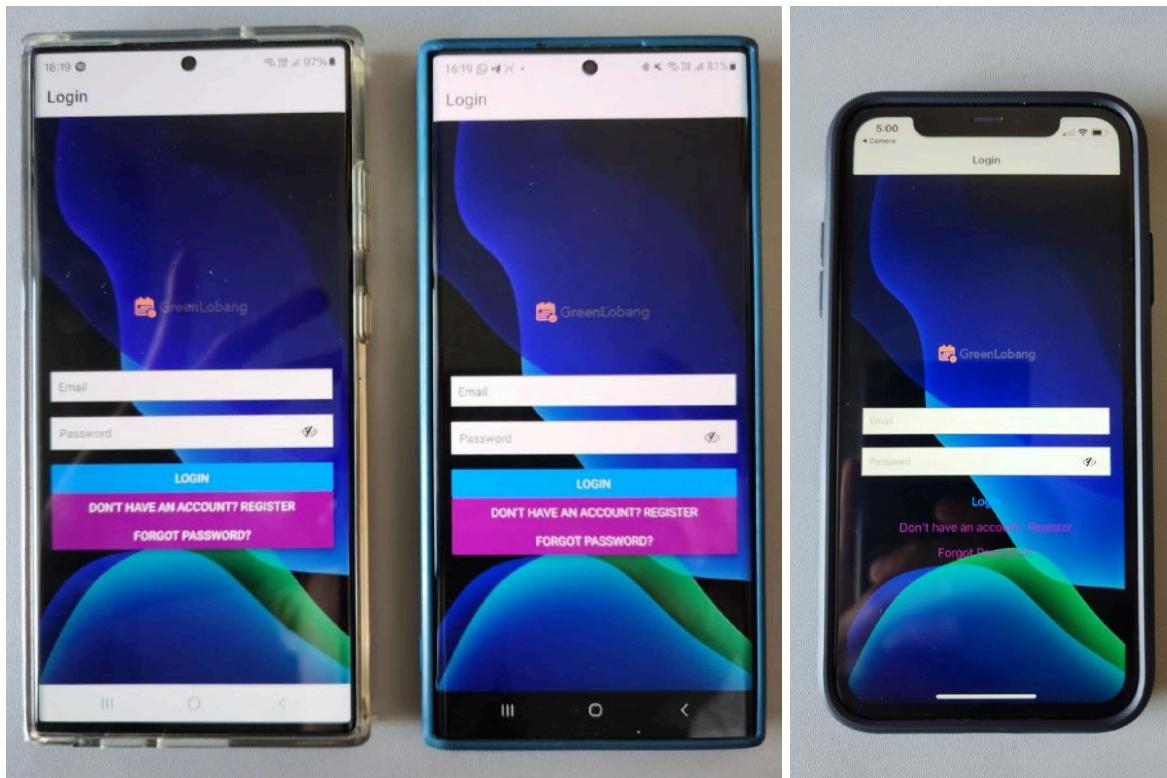
- **User Feedback:** Collected feedback from users during the testing phase to identify pain points and areas for improvement.
- **Iterative Improvements:** Implemented changes based on user feedback and repeated testing to ensure continuous improvement and refinement of the app.



To test on an Android emulator, android studio was used. All components work as described and expected.



To test on the iOS emulator, xCode iOS emulator was used. All components work as described and expected.



App was also tested physically on other users Android and Apple phones and works as expected.

Summary

The event listing feature of NUS GreenLobang is the cornerstone of sustainable community engagement on campus, providing users with a comprehensive repository of upcoming sustainability events, workshops, and initiatives. This feature allows users to access a diverse array of activities, from educational seminars to hands-on volunteering opportunities and eco-friendly initiatives. With real-time updates, users stay informed about new additions to the event roster, ensuring that no important activity goes unnoticed.

Key Aspects of the Event Listing Feature:

Detailed Event Information:

- **Comprehensive Details:** Users receive detailed information for each event, including clearly labeled titles, precise scheduling details (dates, times), and exact locations with integrated map links.
- **Event Descriptions:** Comprehensive descriptions provide insights into each event's objectives and expectations for participants.
- **Organizer Information:** Facilitates direct communication for further inquiries, promoting transparency and accessibility.

Real-Time Updates:

- **Timely Information Delivery:** Users are kept informed about new events and updates, fostering an environment where no important activity goes unnoticed.

Technology Stack:

Front-End:

- **React Native:** Powers the front end, creating a seamless user interface and experience across both iOS and Android platforms.
- **Expo:** Augments development and deployment, ensuring swift and efficient processes.

Back-End:

- **Node.js:** Forms the core of the server-side application, providing scalability and efficiency in managing user requests and data. Its event-driven architecture and asynchronous capabilities are ideal for real-time applications, guaranteeing smooth

performance even during peak loads.

Database:

- **Firebase:** Employed to store and organize dynamic and extensive event data. Its adaptable schema facilitates easy adjustments to evolving requirements, while efficient querying and indexing mechanisms ensure swift access to event information.

Future Enhancements:

- **Advanced Filtering:** Plans to implement dropdown and advanced filtering functionalities will empower users to refine their event searches with greater precision, facilitating more tailored and personalized event discovery experiences.

NUS GreenLobang's event listing feature thus ensures that the NUS community stays connected, informed, and engaged with the sustainability initiatives on campus, making it an indispensable tool for promoting and fostering a culture of sustainability.

Github repo link:

<https://github.com/OthnielChang/GreenLobangNew.git>