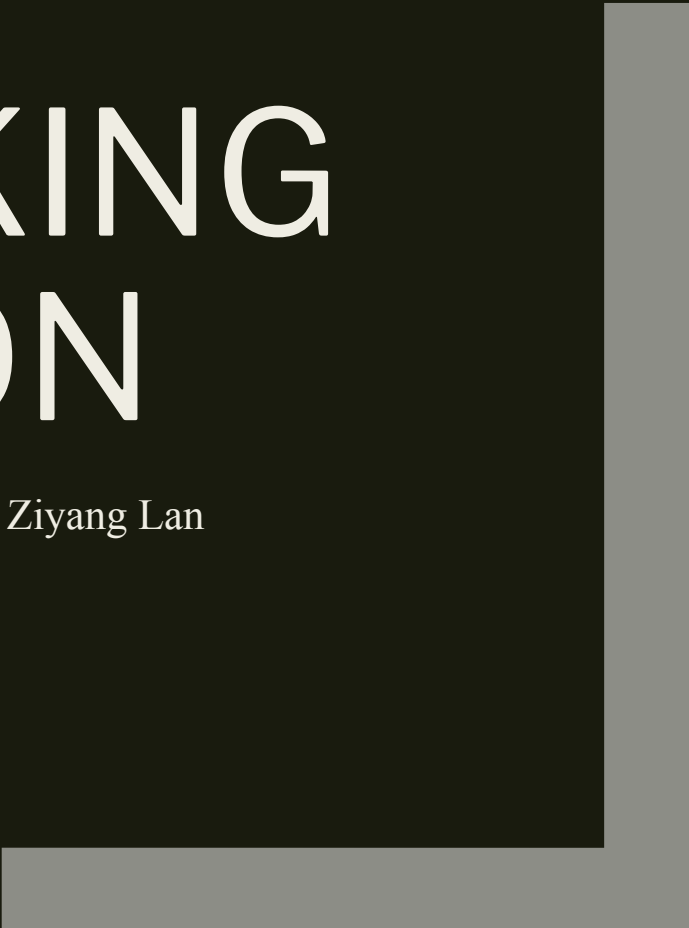




LITTER TRACKING APPLICATION

Shasvat Vyas, Daniel Chau, Jonathan Obenland, John Henrici, Ziyang Lan

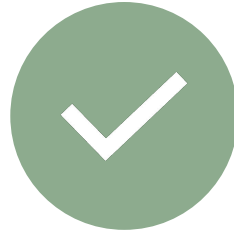




REPORT LITTER



SEE LITTER TRENDS



IDENTIFY AREAS OF
CLEANUP



ATTEND COMMUNITY
EVENTS



ENHANCE COMMUNITY
INVOLVEMENT IN LITTER
CLEAN UP EFFORTS

Main Project Objectives



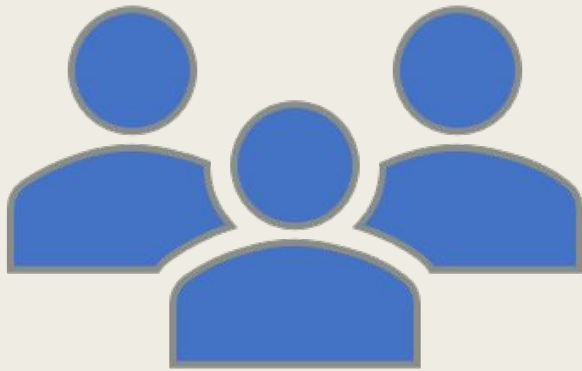
DESIGN STUDY AND NEEDS ASSESSMENT



Existing Application Research

In order to better understand needed features of a mobile application, we researched other successful organizations that accomplish similar needs. Once we completed our research, we organized our findings into a feature list that was then used to construct our wireframes.





Application Stakeholders

- Patapsco Heritage Greenway Volunteers
 - *Those who help identify and clean litter around the Patapsco river will be able to more efficiently track and clean litter*
- Patapsco Heritage Greenway and Maryland Department of Natural Resources Employees
 - *Those who oversee the volunteer activities will be able to identify trends and create events*
- General public located around the Patapsco River
 - *Those members of the general public who got on walks and hikes that can report litter they come across and attend litter clean up events*

Personas

Patapsco Heritage Greenway Volunteer



Goals

- Clean up trash he finds on his walks
- Get more people involved in litter clean up
- Wants to know places to help clean up litter

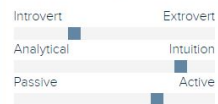
Frustrations

- Can't pick up large litter objects
- Can't find litter cleanup events on Facebook

"We should all work together to protect our natural resources"

Age: 22
Work: Student
Family: Single
Location: Rockville

Personality



Bio

My name is James, and I am a student at the University of Maryland College Park. Since I spend a lot of time on the computer, I often go for walks outside around the local park. During my walks, I often come across litter and trash located along my walking path, and I usually pick it up and bring it back to my apartment building dumpster to keep the local environment clean.

DNR and PHG Employees



Goals

- Wants to help clean up litter in the environment
- Get more people involved in litter clean up
- Wants to know places that are most impacted by litter

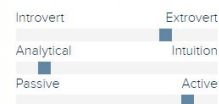
Frustrations

- Can't easily track and identify litter trends
- Finds it hard to get people excited about litter clean up

"We want to eliminate litter and trash in our environment"

Age: 35
Work: DNR Employee
Family: Married
Location: Baltimore

Personality



Bio

My name is Katherine, and I am a DNR employee that works with community outreach and data analytics. I often deal with many litter reporting and data analytics sources and find it hard to complete the other tasks that I need to complete. I love to create Facebook events and gather community members together to clean up trash.

General Public



Goals

- Wants to get free T-Shirts and Hats for completing tasks
- Enjoys meeting new people
- Seeks opportunities to be outside

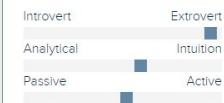
Frustrations

- Sometimes it's hard to find events to attend
- Wants to earn rewards for something he already does
- Doesn't like to look at litter around the places he hangs around

"I love to hangout outside and meet new people"

Age: 25
Work: Accounting
Family: Single
Location: Ellicott City

Personality



Bio

My name is Louis, and I am a recent graduate from California who moved to Ellicott City for my job in Baltimore. Since I just moved out to Maryland, I am looking for ways to meet people outside in the nice weather. I also like to attend events that give our free stuff and enjoy working towards prizes that organizations give out to participants.

Main Application Features

Ability for users to report litter they find



Ability for users to join litter clean up events

Ability for users to view statistics about their reports

Ability for users to tag the type of litter they find, and mark as picked up

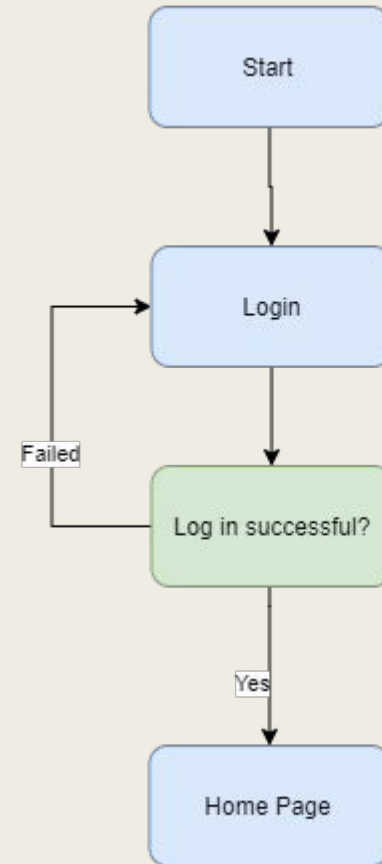
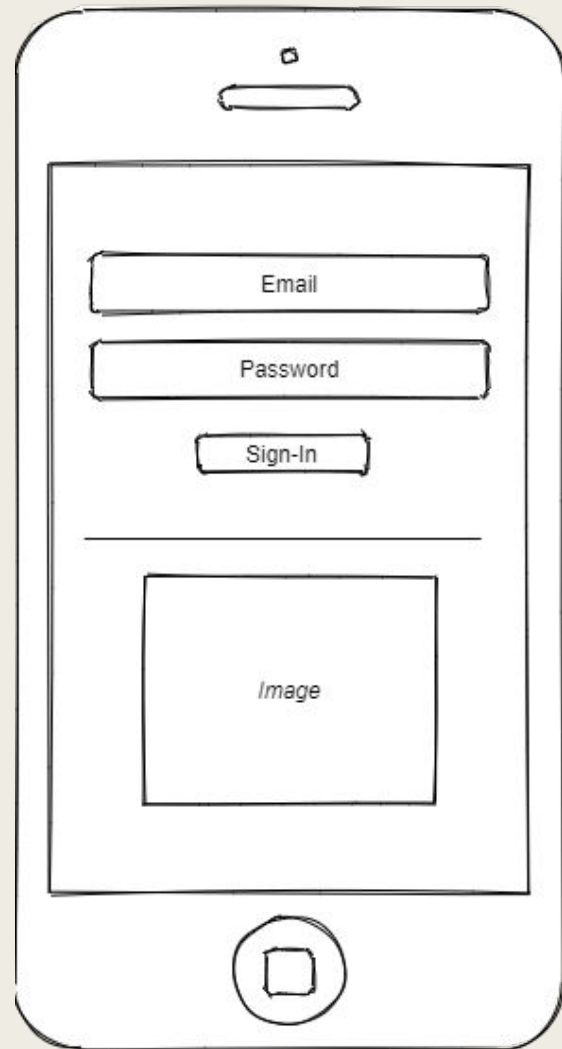
Ability to change information about their accounts

Ability to gain incentives for cleaning up and reporting litter

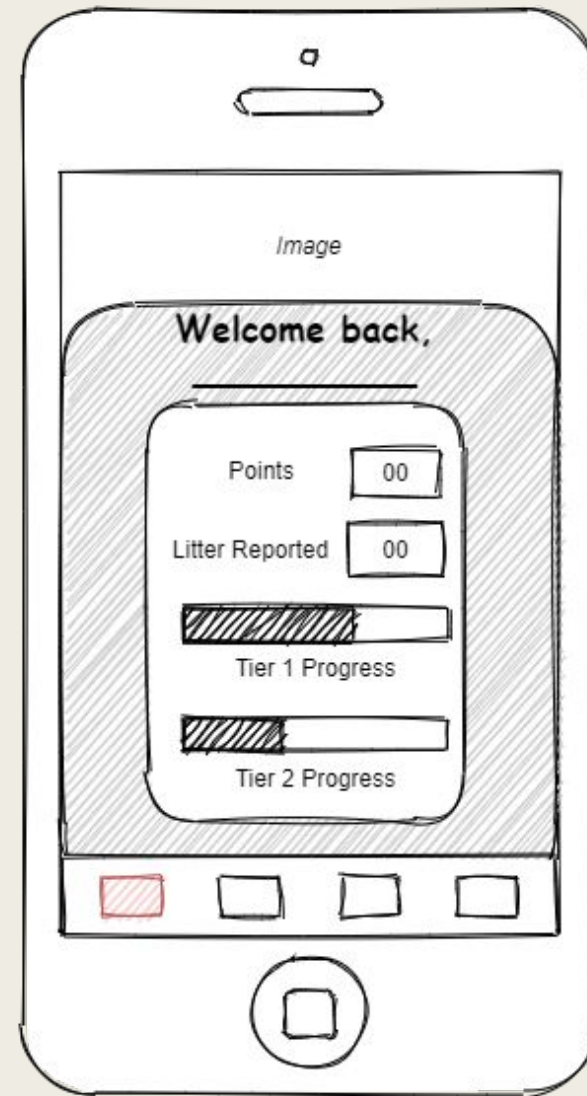


INITIAL LOW-FI WIREFRAMES AND FLOW DIAGRAMS

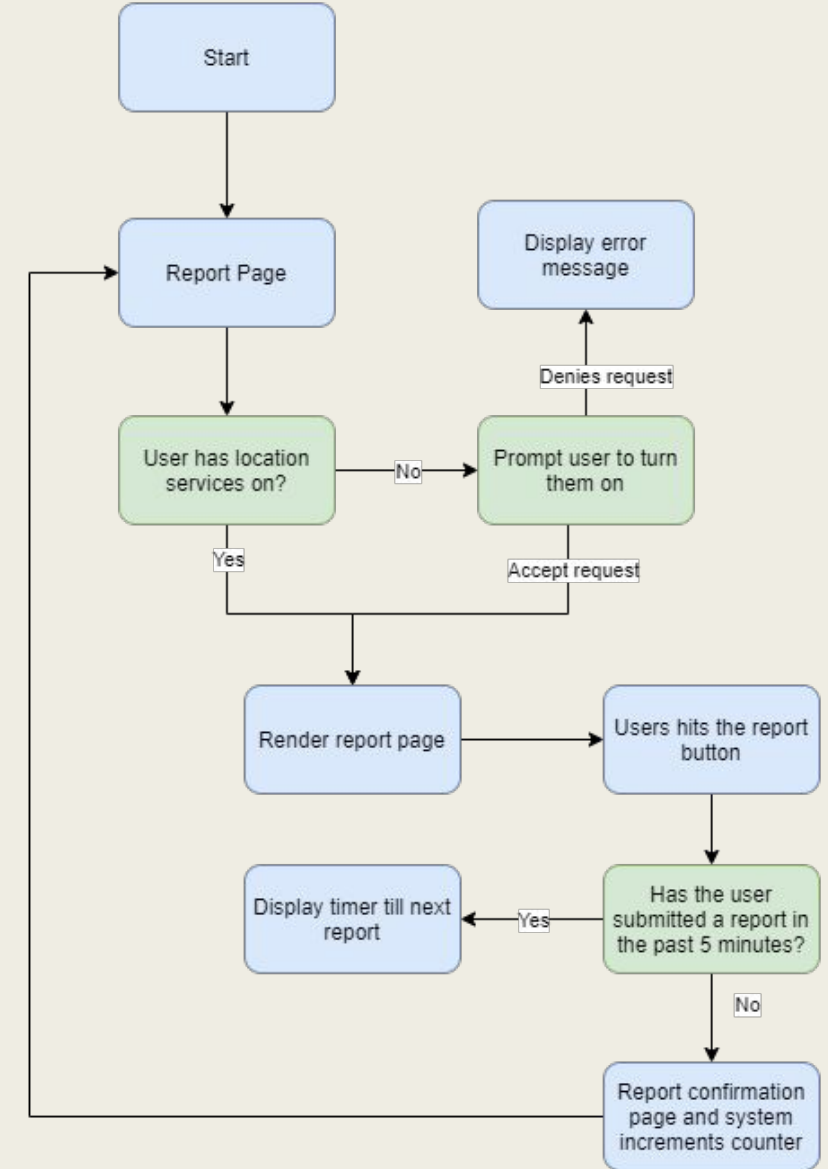
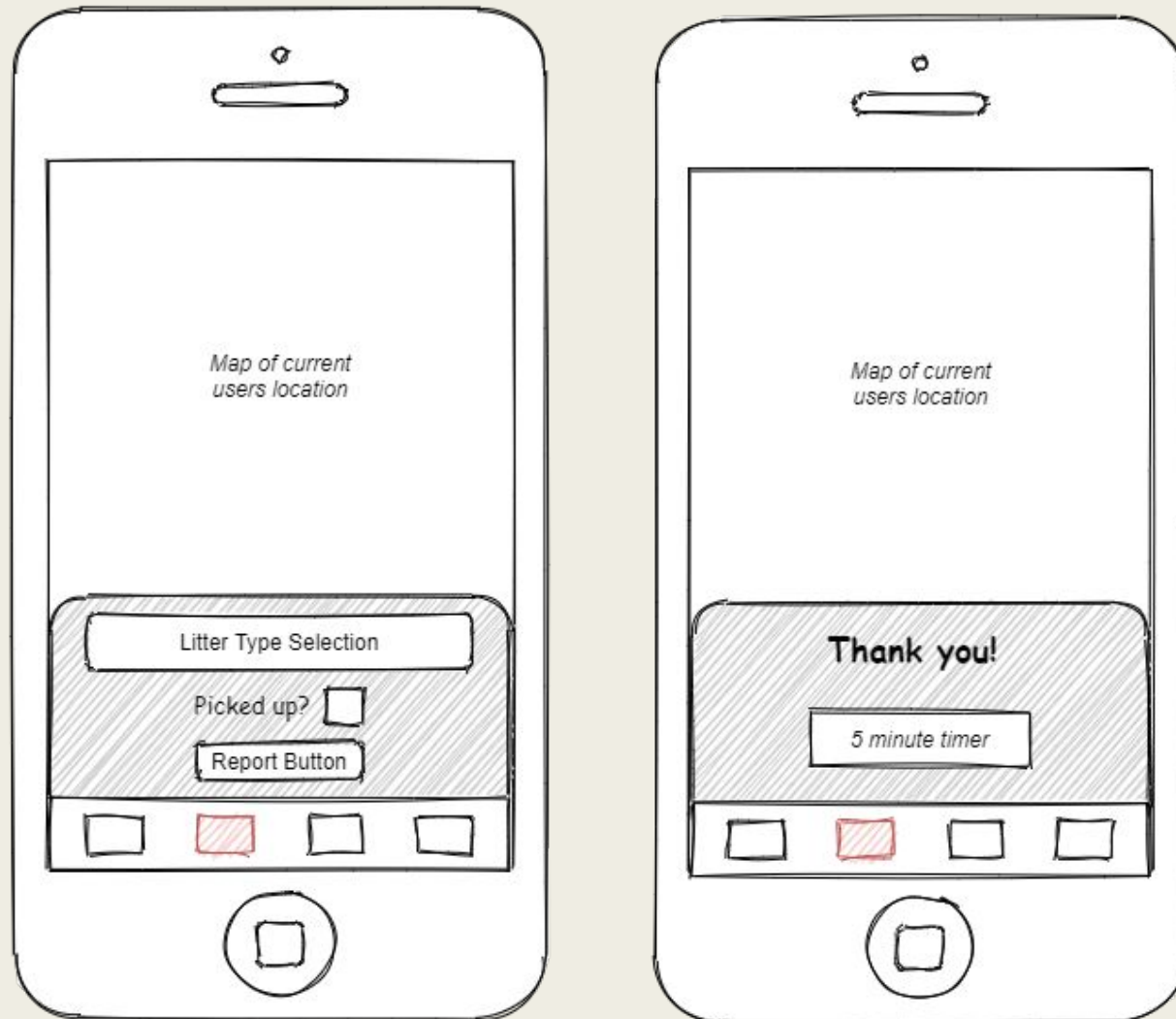
Login and Registration Page



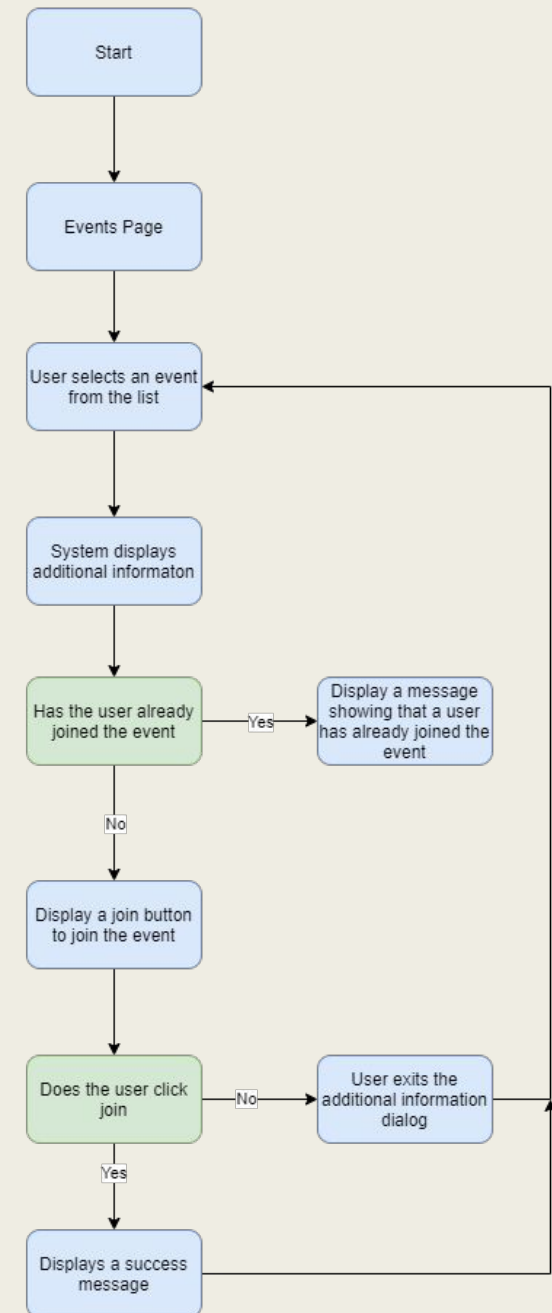
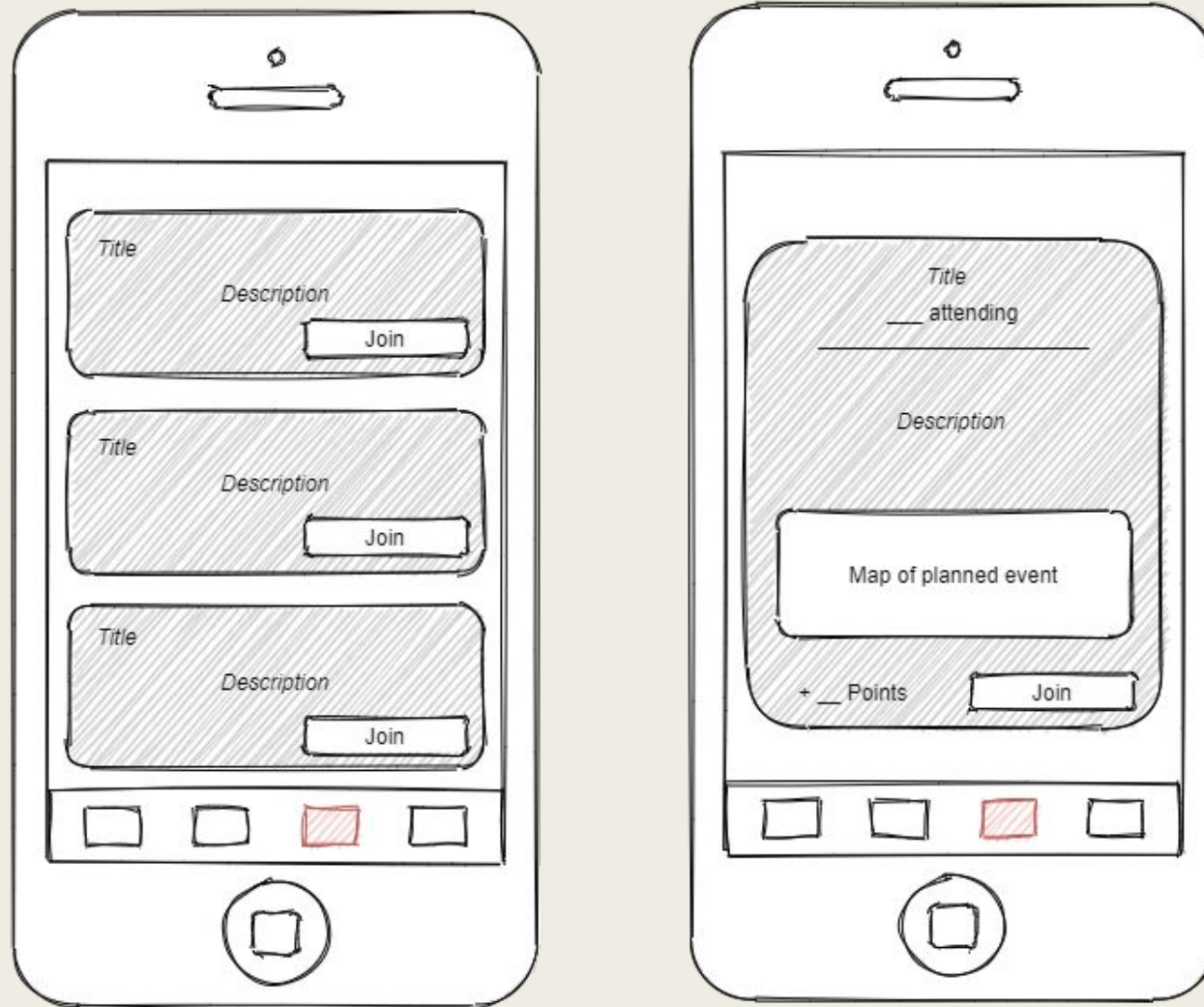
Home Page



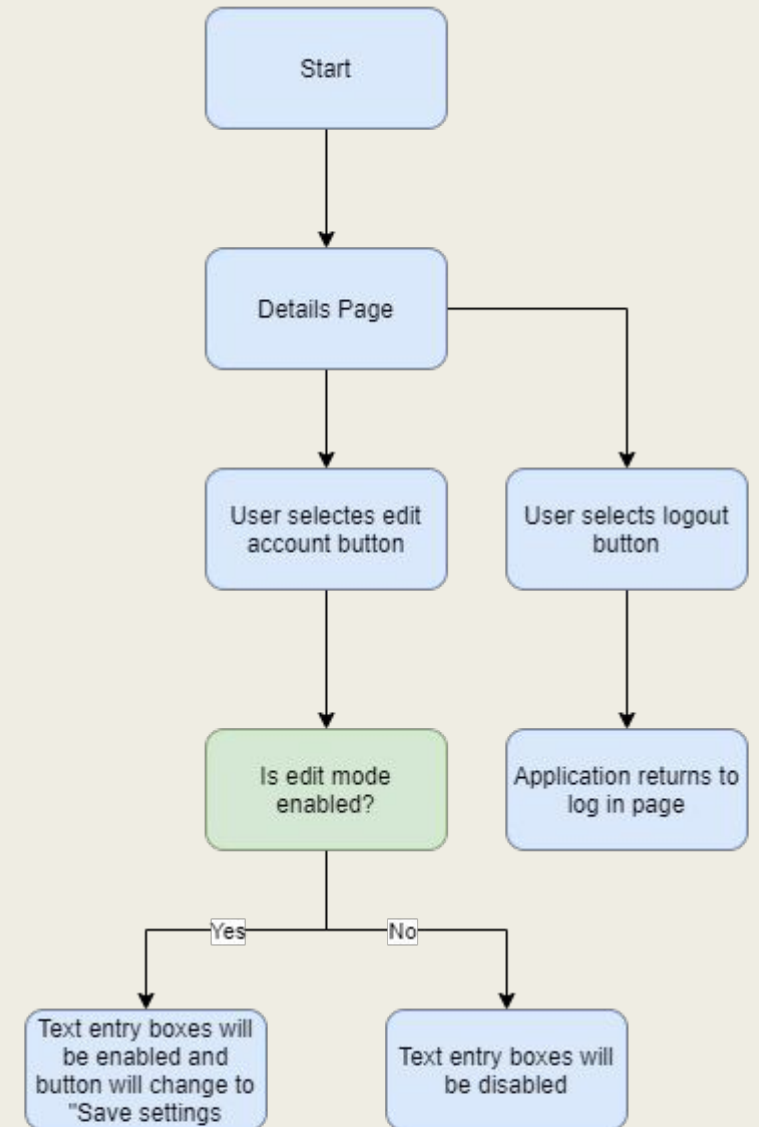
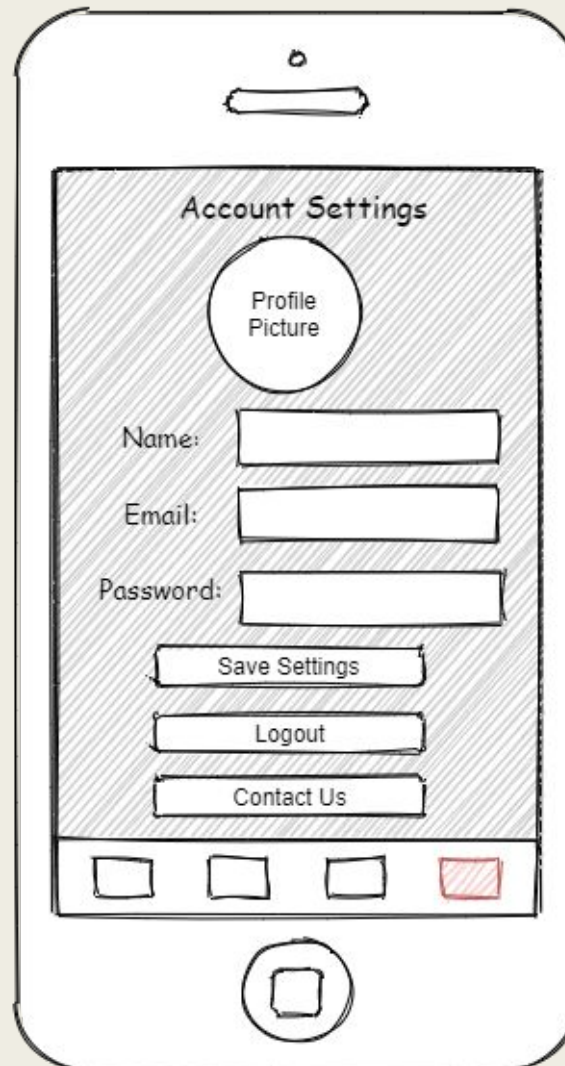
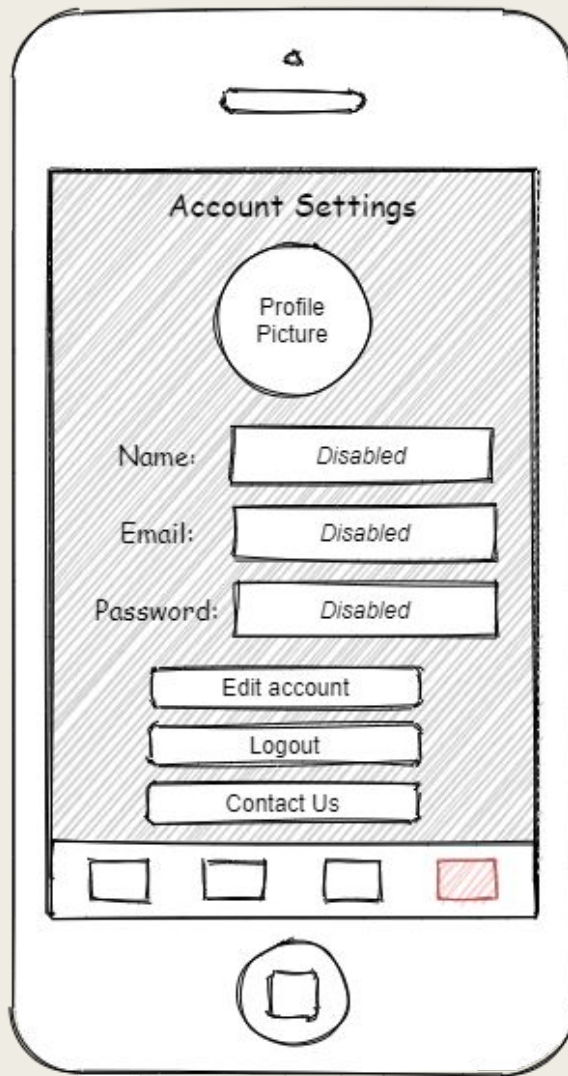
Report Page



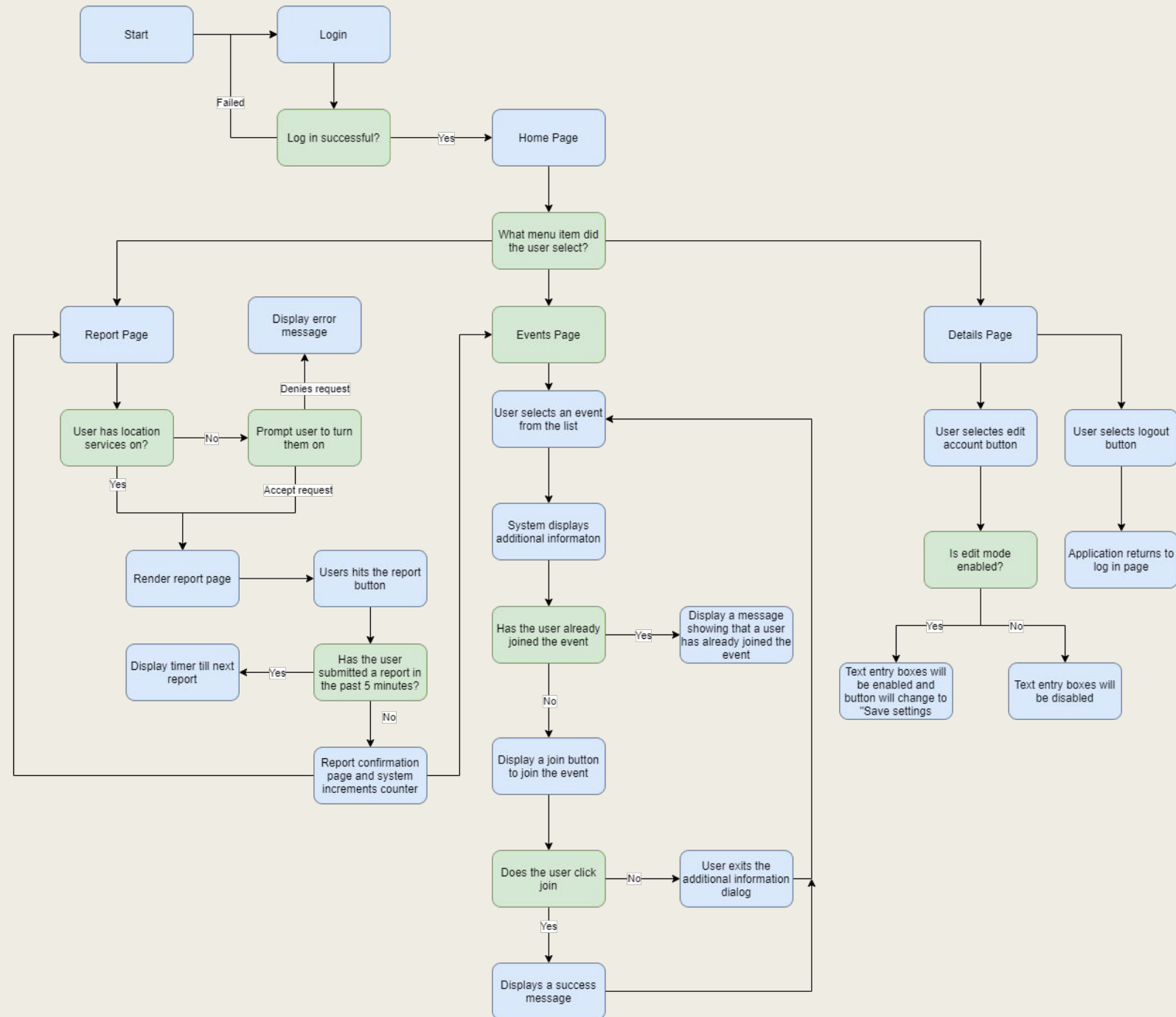
Events Page



Account Detail Page



Application Flow Diagram Overview





FINAL HIGH-FIDELITY WIREFRAMES

Login and Registration Page

Member Login

Email

Password 

Forgot Password? Press wrench above

LOGIN REGISTER

**PA
TAPS
CO** 

Registration


Email

Name

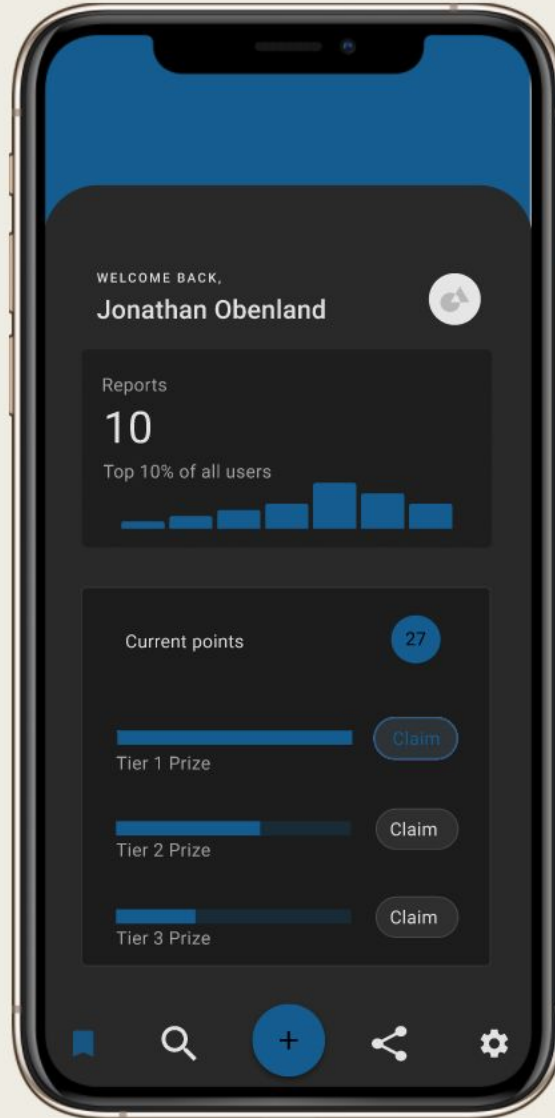
Password

Confirm Password

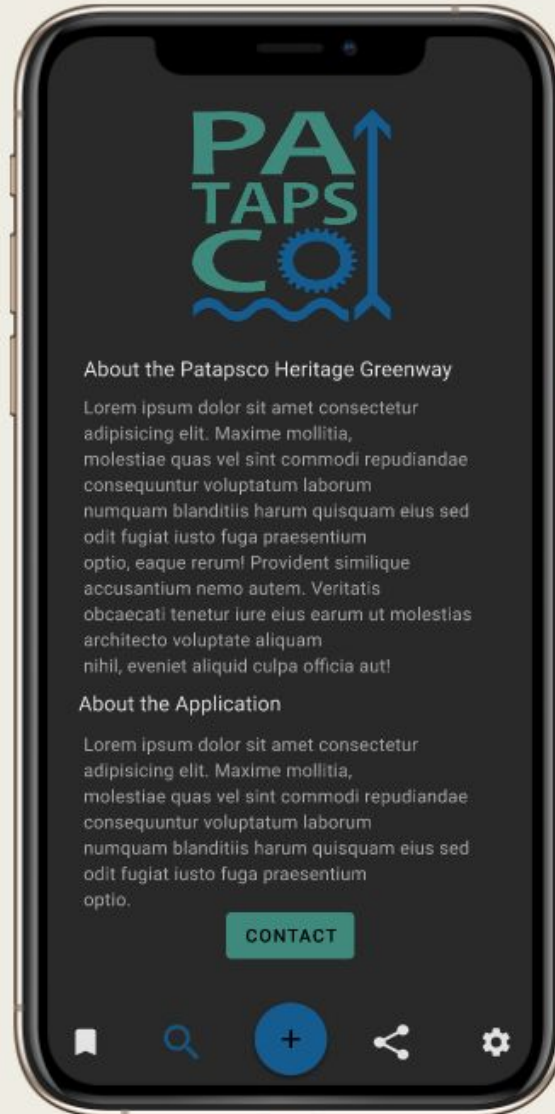
REGISTER

**PA
TAPS
CO** 

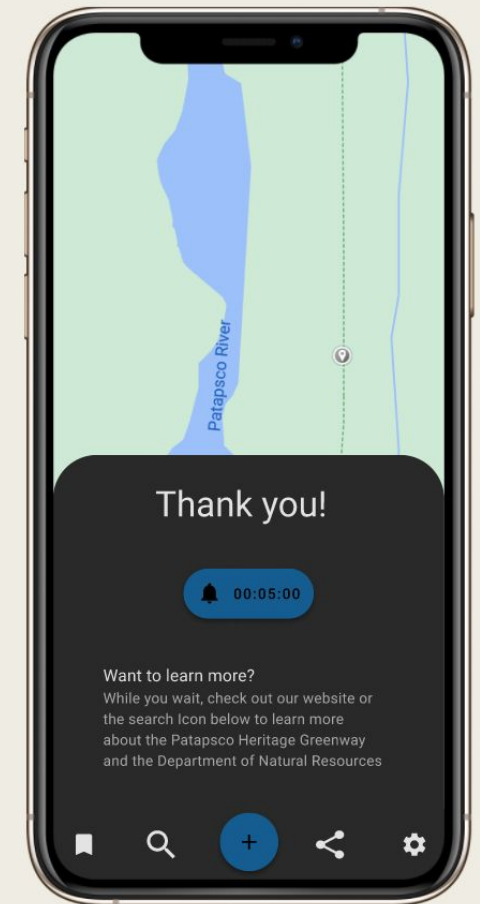
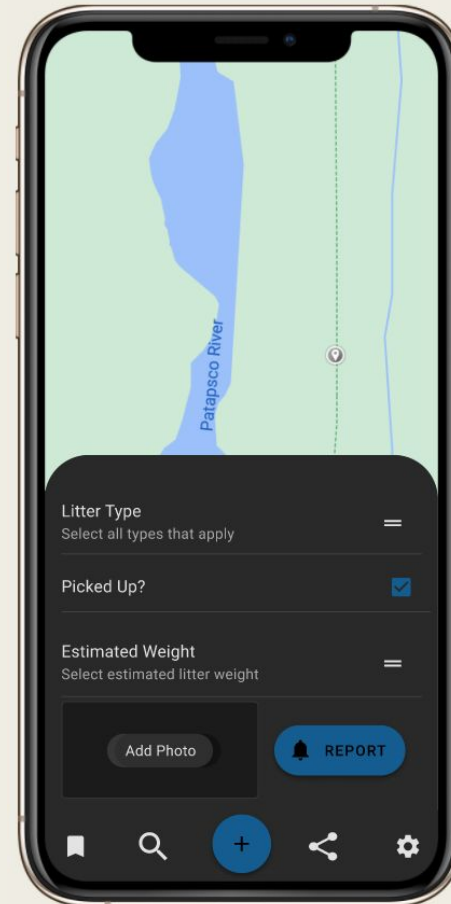
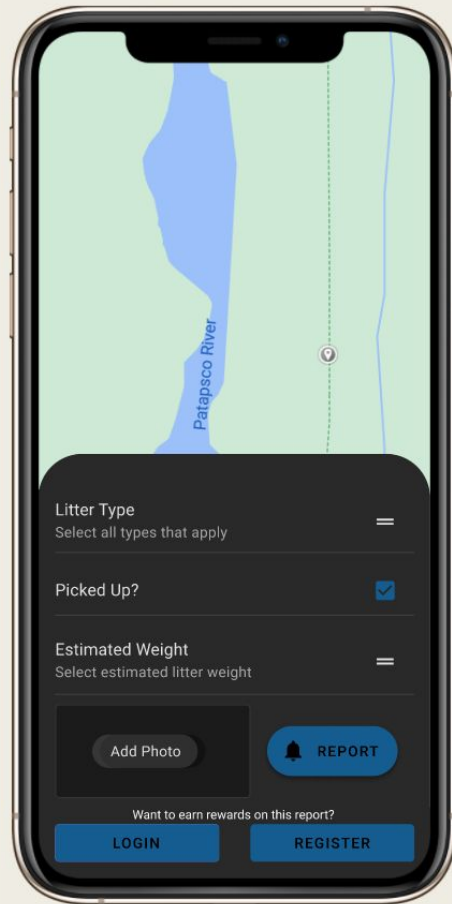
Home Page



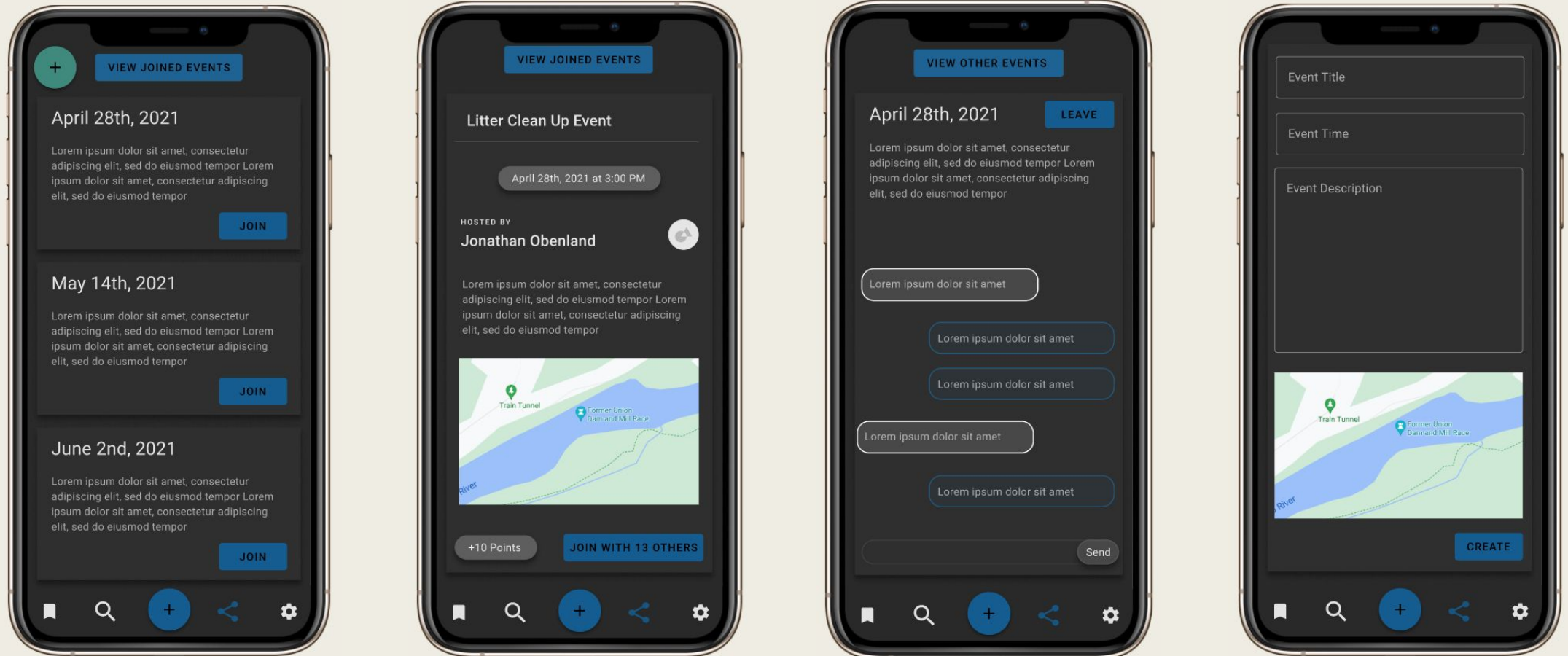
About Page



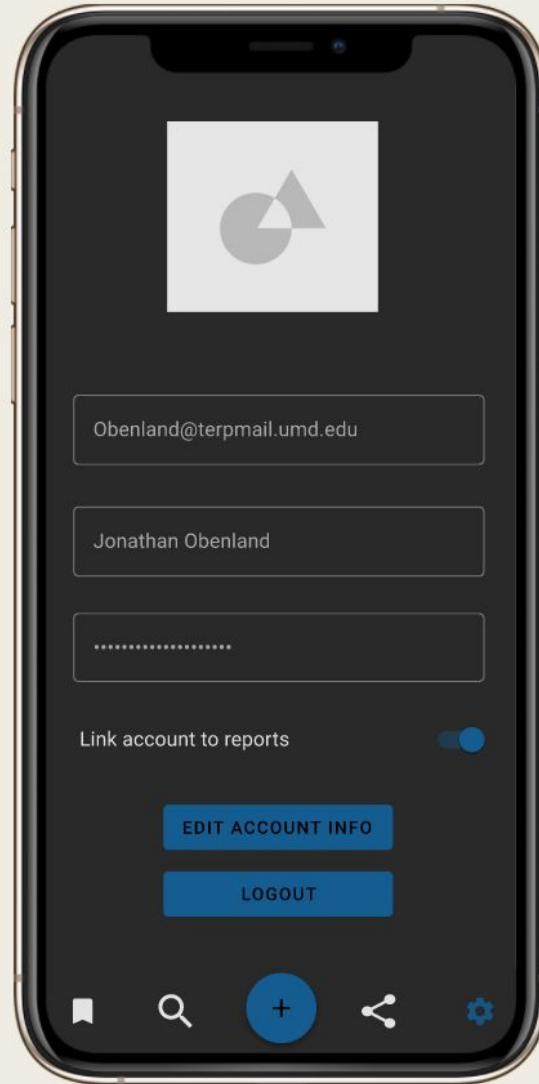
Report Page



Events Page



Account Detail Page





DATA ELEMENT RESEARCH

Data storage and hosting options

After speaking with the client to better understand data storage and hosting needs, we determined that a **non-relational** database hosted on a **cloud-based environment** would be the best option for our application. Depending on additional information, a full **IaaS** system such as Google Firebase could host both the front-end application, server, and database.

Pricing and payment of these solutions are one of the main limitations of our project.

	Spreadsheets	Cloud Hosted DB	Locally Hosted DB	Full IaaS
Maintenance	Low	Low	High	Low
Price	Low	Medium	High	Medium
Scalability	Low	High	Medium	High
Usability	Low	High	High	High

Data structure

Data storage will be split into two separate collections in the non-relational database. One collection will represent the user accounts that are signed up for the app and the other will represent the reports that are created.

User record snapshot

```
email: "Jobenland1@gmail.com"
lastReport: April 8, 2021 at 6:57:45 PM UTC-4
name: "Jonathan"
reports: 43
```

Report record snapshot

```
creation: March 27, 2021 at 8:51:25 PM UTC-4
latitude: 39.00284788476316
longitude: -76.94173847241635
▼ type
  0 3
  1 4
user: "IJojiyH0echBzoEcwQnDSBC7IWg1"
```




SAMPLE DATA ANALYSIS

Data Analysis Platform

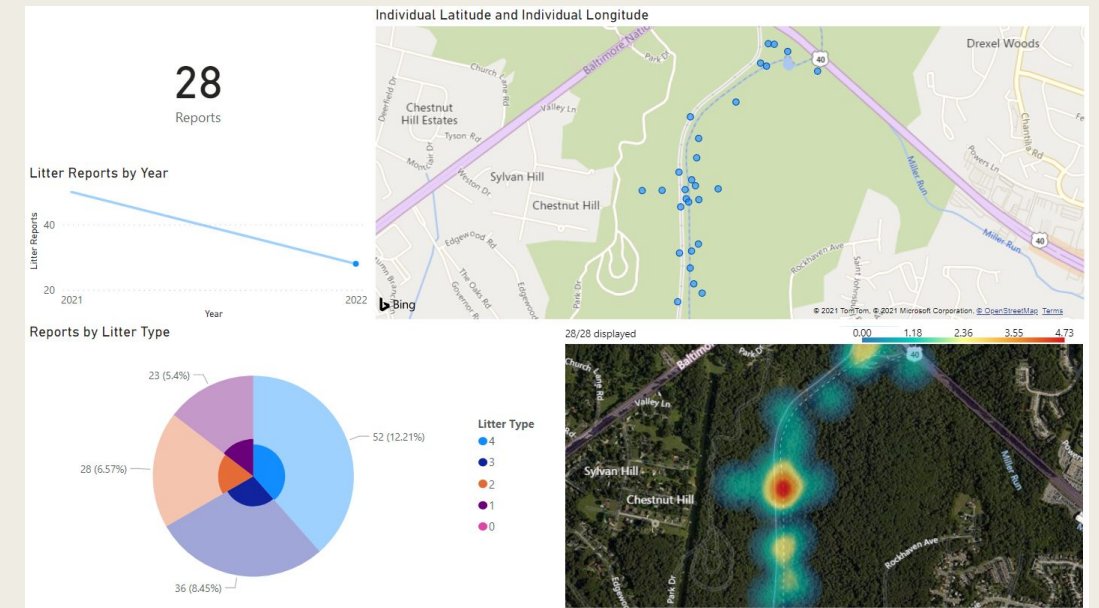
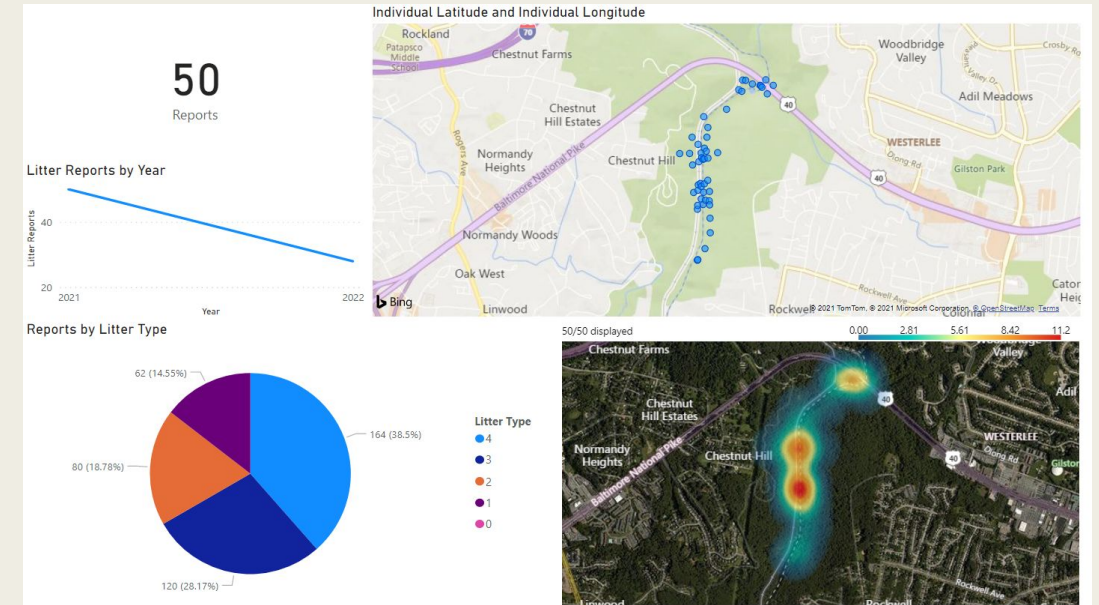
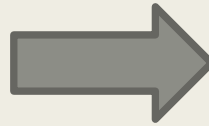
Microsoft Power BI allows for users to interact with the data that is collected by our application. Dashboards can be created to view, manipulate, and share trends and themes found in the data across all internet connected devices.



Power BI Sample Dashboard View

```
{
  "creation": "1/1/2021",
  "latitude": 39.28558028840878,
  "longitude": -76.78442459759583,
  "type": [3,4]
},
{
  "creation": "1/1/2021",
  "latitude": 39.28338796785941,
  "longitude": -76.78436022458199,
  "type": [3,4]
},
{
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  "latitude": 39.284533962161085,
  "longitude": -76.78438168225327,
  "type": [3,4,1]
},
{
  "creation": "1/1/2021",
  "latitude": 39.28214230061259,
  "longitude": -76.78489666636393,
  "type": [3]
},

```



Power BI Filter Demonstration



APPLICATION PROTOTYPE

Figma Prototype Presentation



THANK YOU!