UnAvi

Come with us on a fun ride

Our Goal

To develop a GIS application that assists UofT commuters to travel to and from campus

Usability:

A user must achieve a certain goal in the least amount of work possible [1]

Responsiveness:

The speed at which an application responds to an input [2]

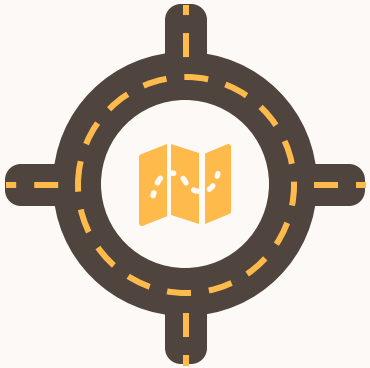
Problems Chad – A Commuter - Faces

Relevant Locations

Too much around to figure out what's significant

Losing Locations

Cant find places you have been before

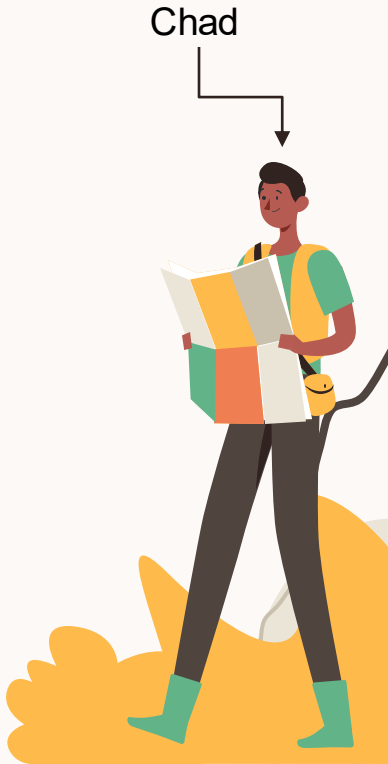


Train Timing

Arriving to the train at the ideal time

Community

Minimal connection to UofT community



Road of Contents

1 Unavi's Goal

12:00 PM
2 Icons

6:00 PM
3 Live Events

8:30 PM
4 Train Schedule

9:00 PM
5 Pins

6 Path Finding

7 Responsiveness

8 Planning Tomorrow

Unavi's Future

12:00PM

Icons

Relevant Places:

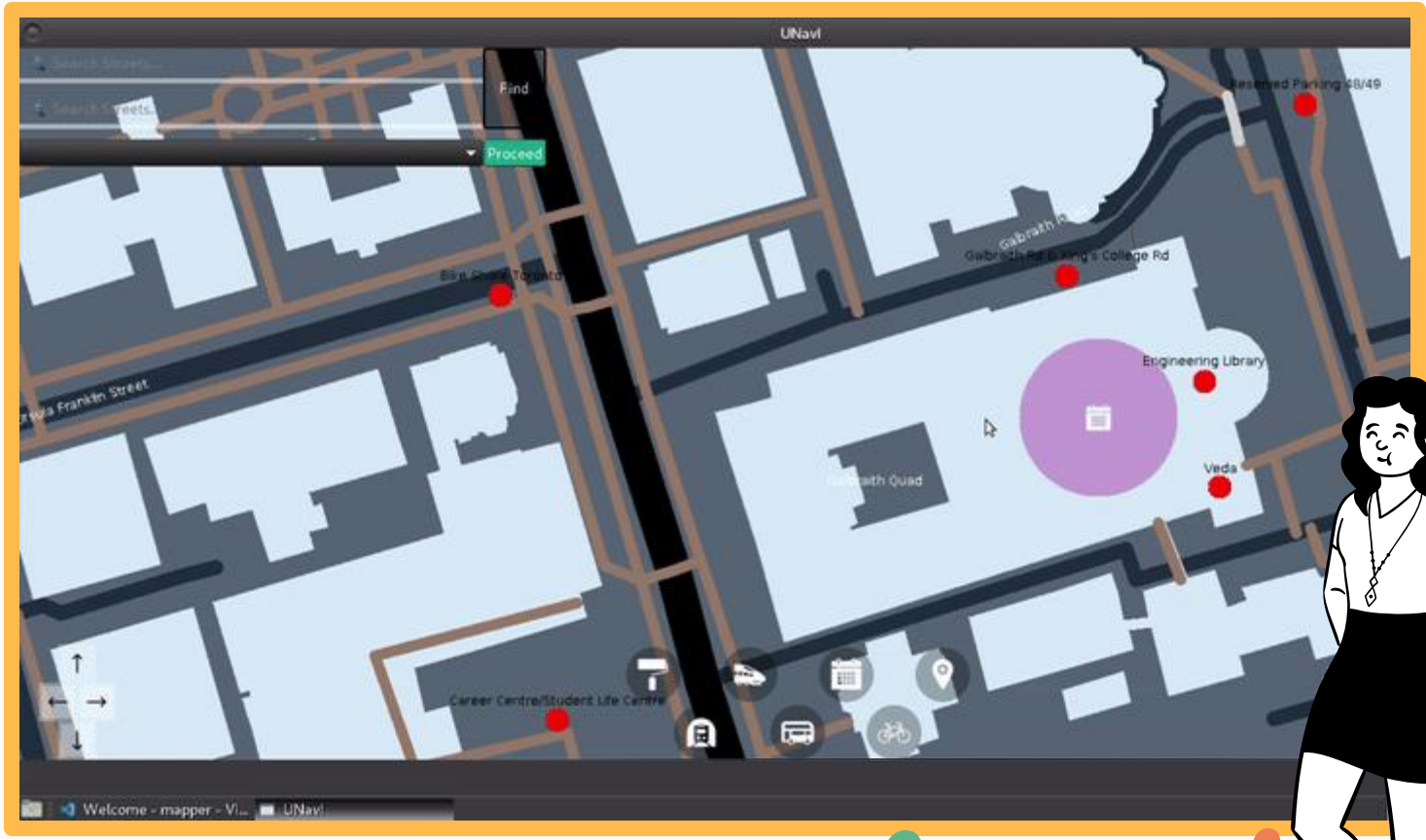
- Libraries
- Fast food/Restaurants
- Cafes
- Medical Services

6:00PM

Live Events

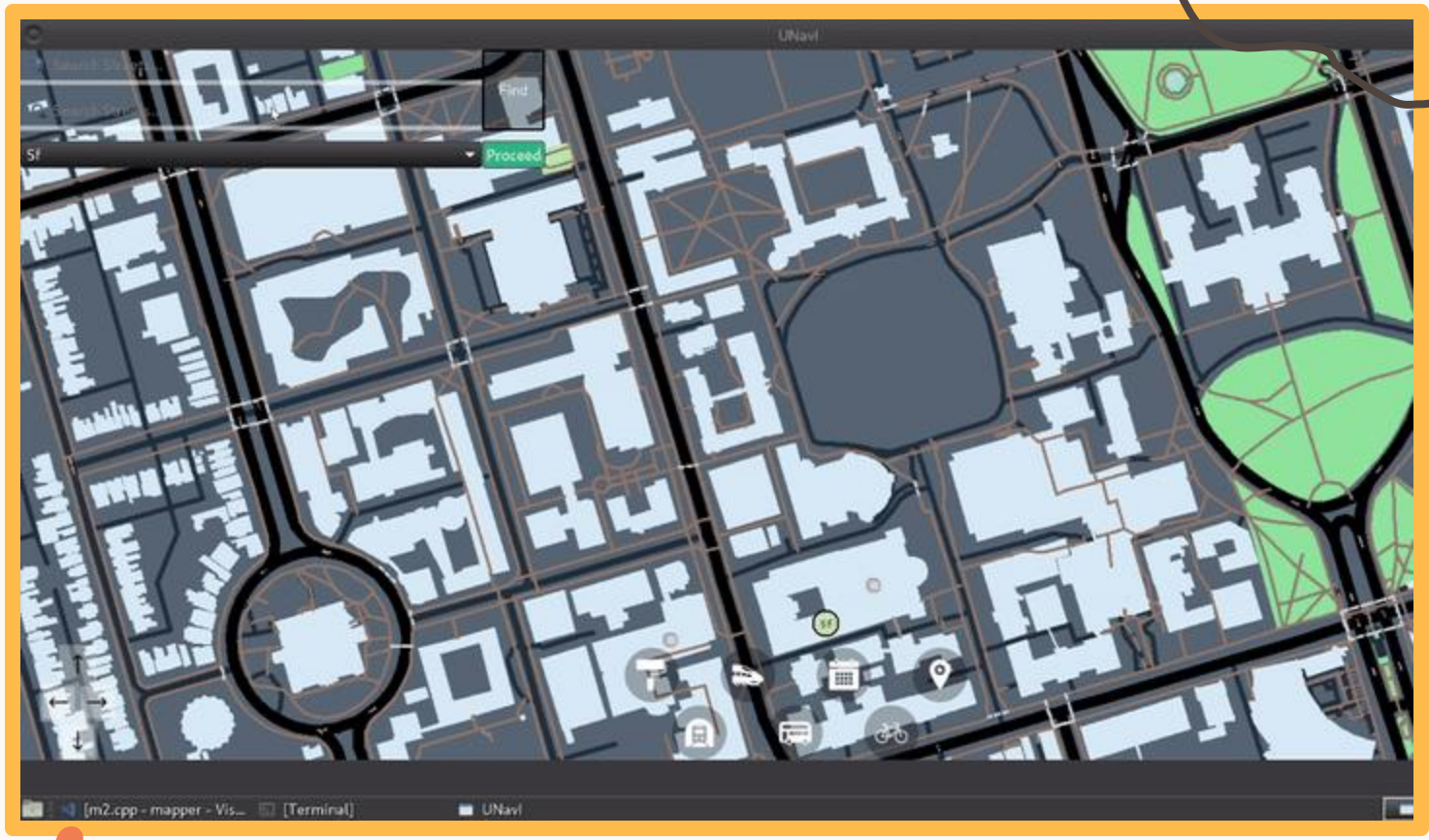
Finding

Adding

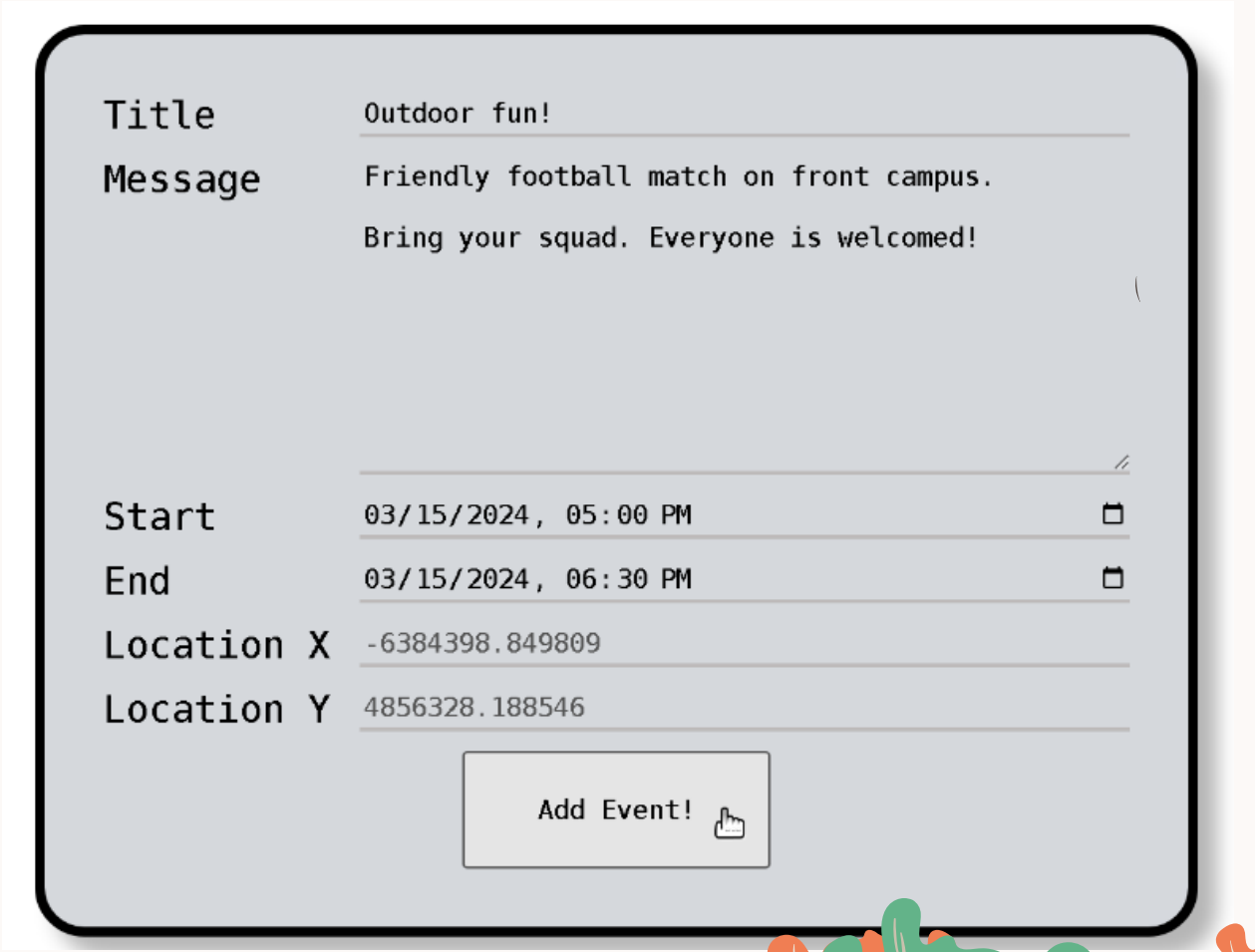


Finding

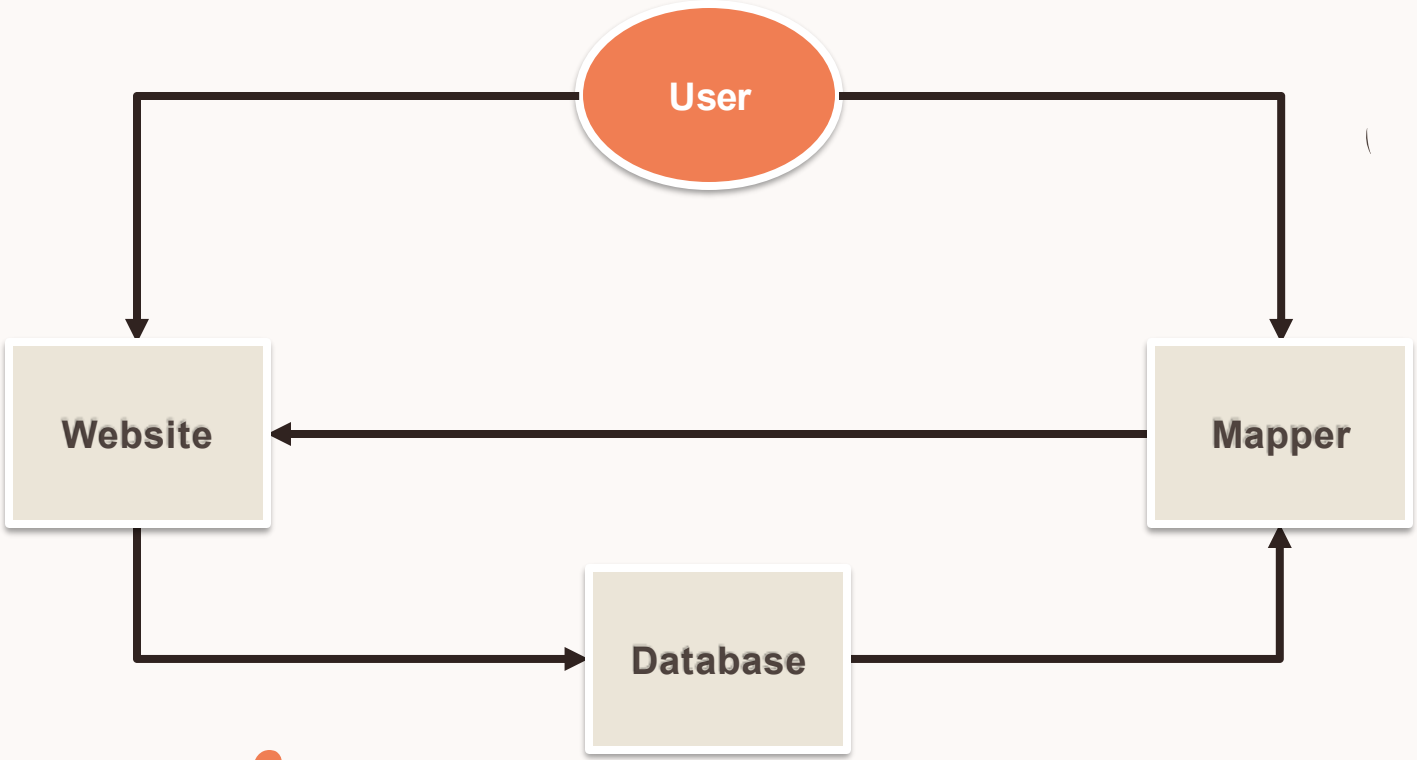
Adding



Finding
Adding



Under the hood



8:30PM

Departing campus

Train shedule

Issue: Too many steps to determine train time!

1

Website

First you have to go to metrolinx' website

2

Enter station

Then enter the station you are departing from and arriving to

3

Filter by time

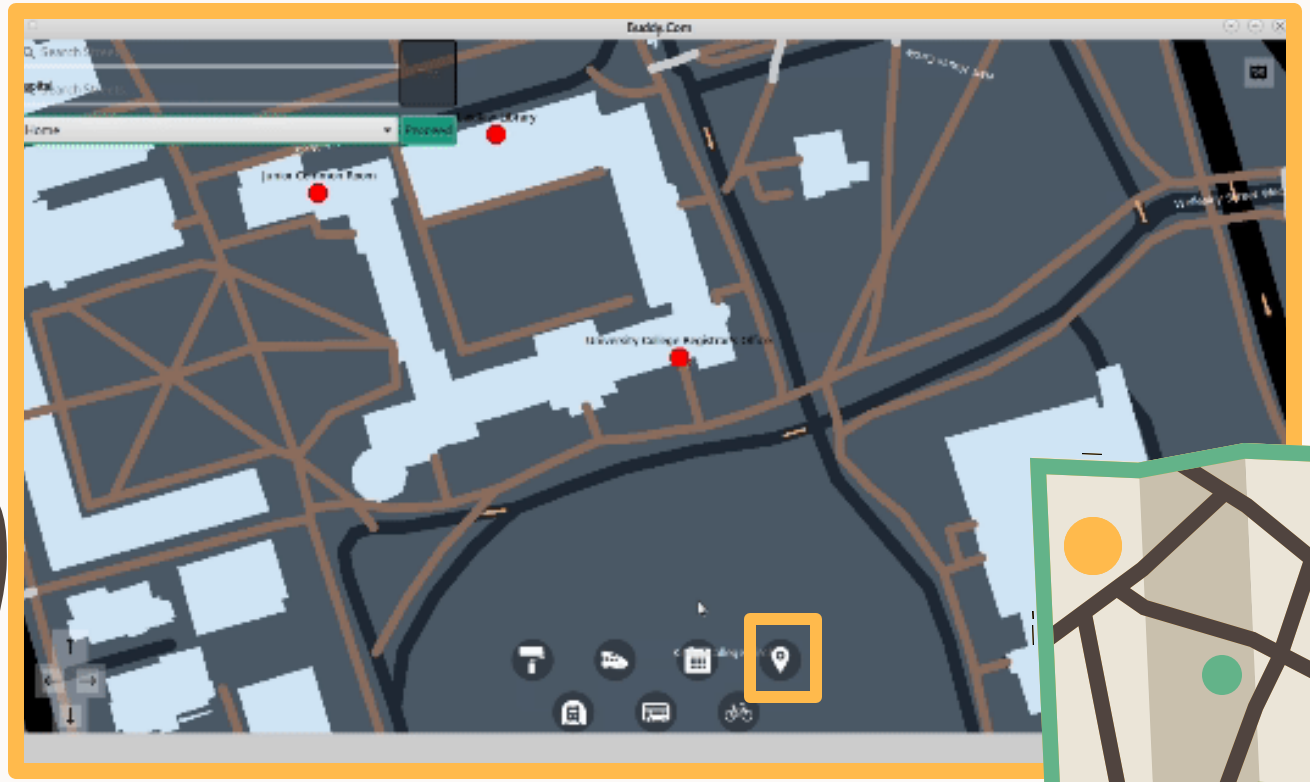
Finally you enter the time and receive the departing trains

Our approach

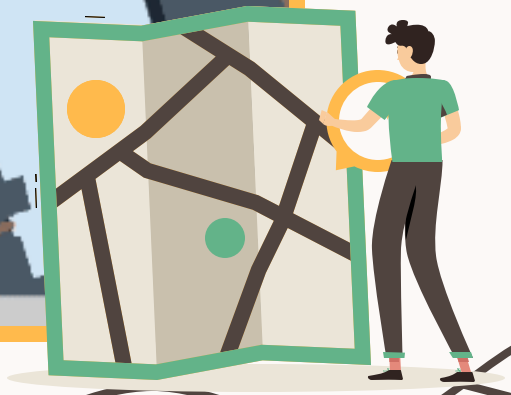
- 2 click effort!
- No external tools needed.
- Only relevant times displayed
- Next available train highlighted

9:00PM
Pinning Locations on the Map

Pinning your favorite spots

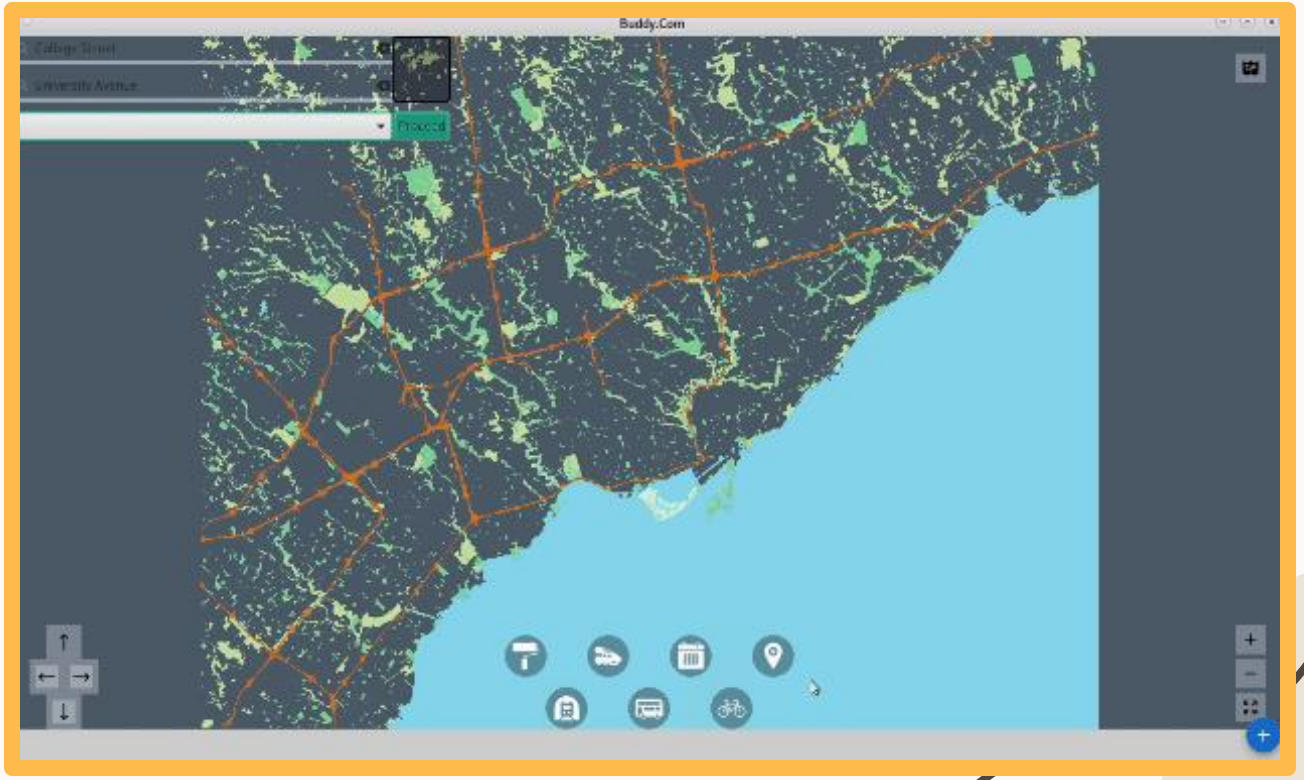


Create and place a pjn to anyplace on the map by using the pin button and click anywhere on the map to place the pin on that position.



Pinning your favorite spots

- Find your pre-saved pin to **Go** to your pin
- **Edit** your saved pins
- **Delete** any unused pins



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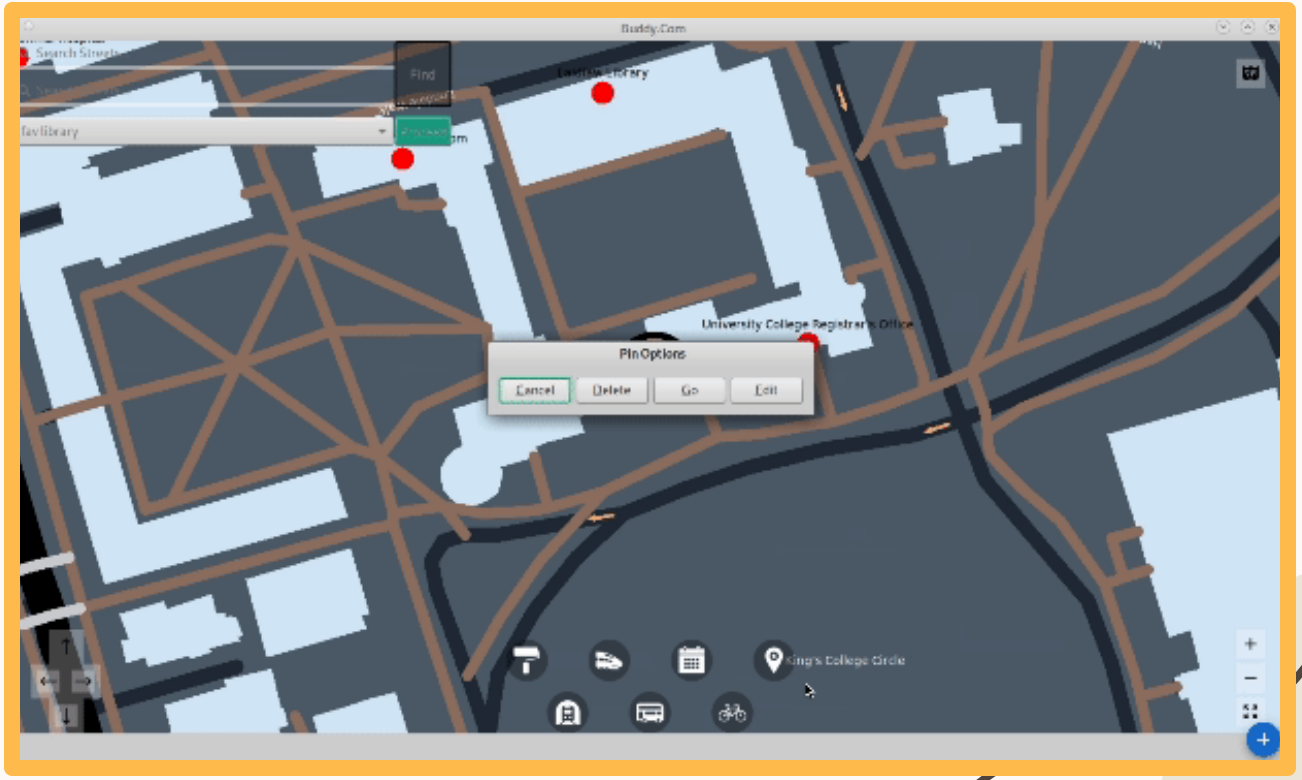

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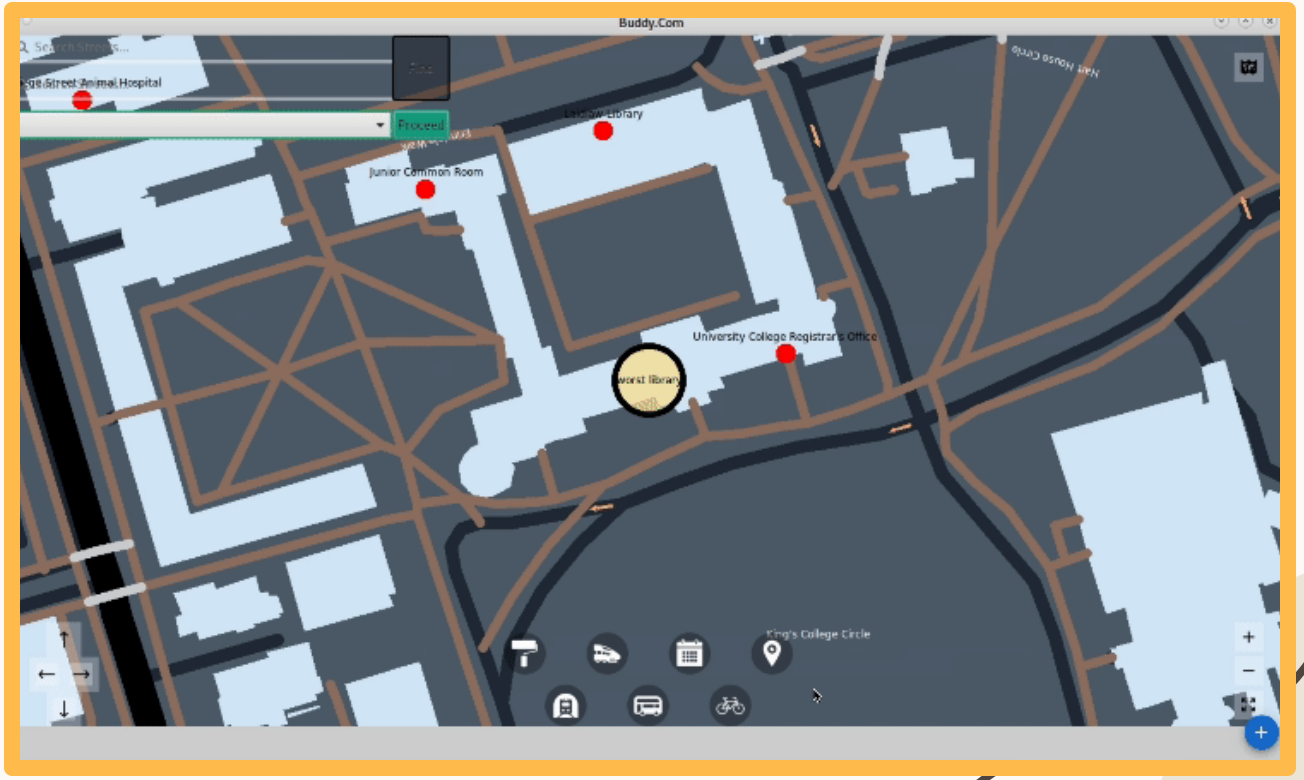
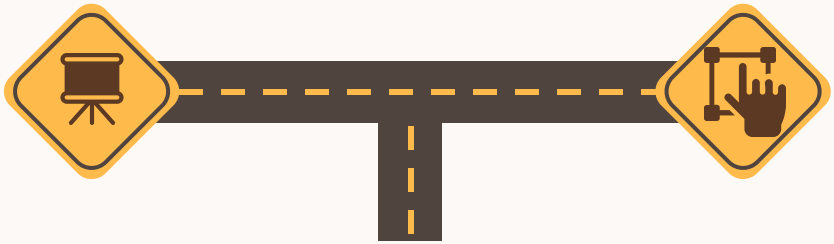


User Responsiveness

Increasing Speed [3]

Threading

Making the initial Map load faster



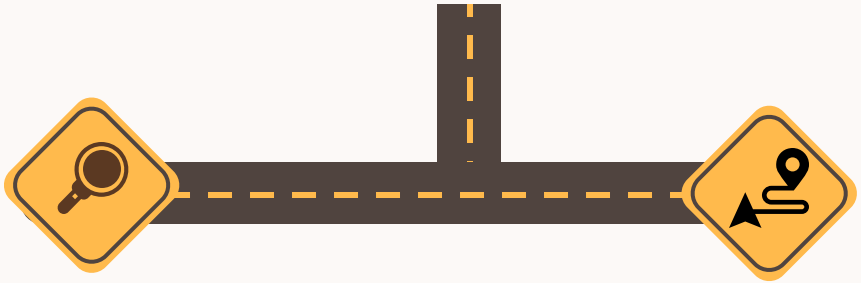
Clipping

Filtering what's on screen to make sure only what's needed is seen

Faster Response time

Render on Zoom

Only draw certain details of the map on zoom



Quick Search

Navigate to any portion of the map quickly

Search Bar

Search for any Intersection on the map using the autocomplete search bar which works even if you don't know the exact full name of what you're looking for

Path Finding Algorithms

A* Algorithm

Node Set

- Represents each Structure on the map as a Node. Each node has an id, cost from starting point, and cost with the heuristic

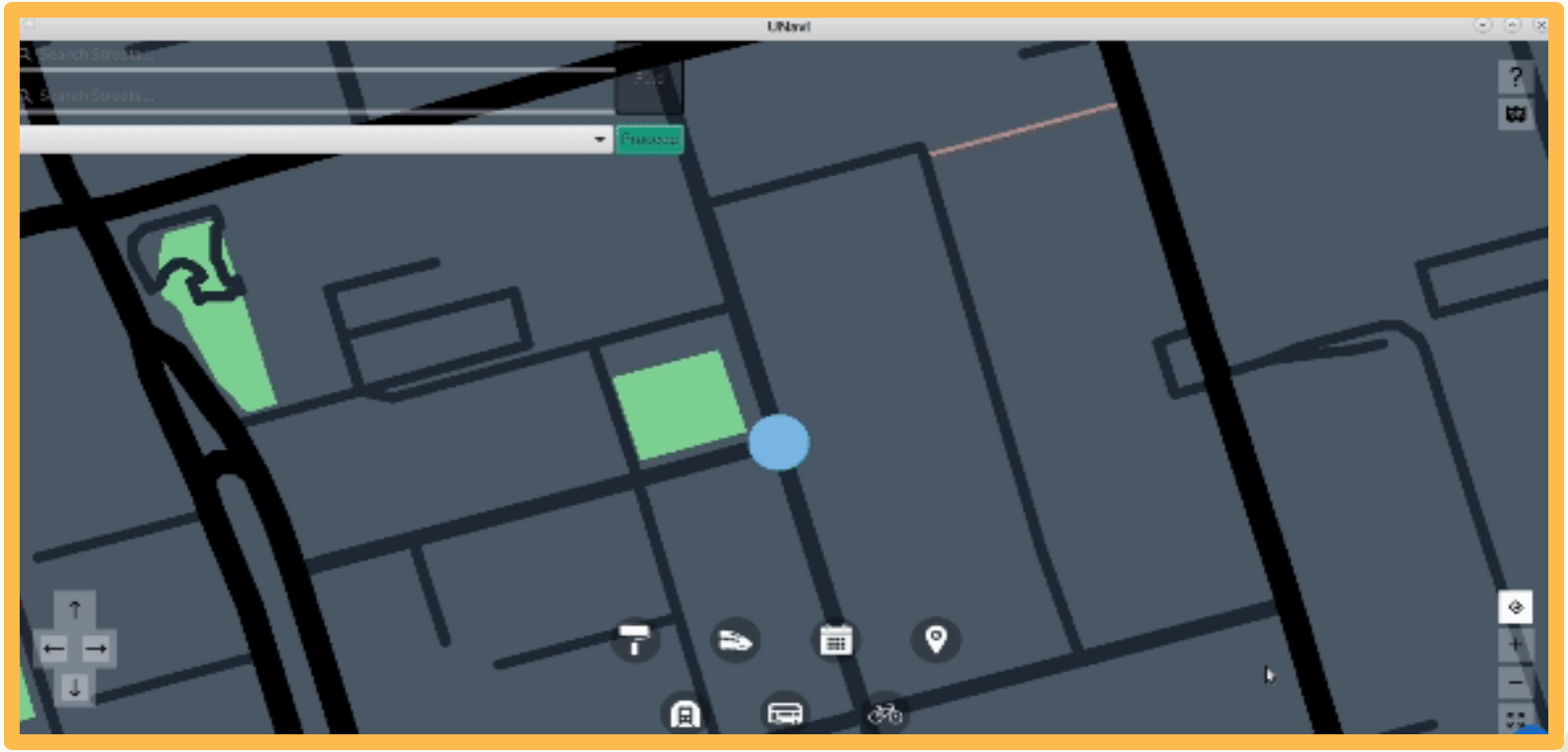
Priority Queue

- Manages the open set of nodes and orders them so that all the intersections are ordered based on the cost

Heuristic

Uses a time-based heuristic approximating the straight-line distance and using the average speed of a vehicle to create the time approximation of the cost

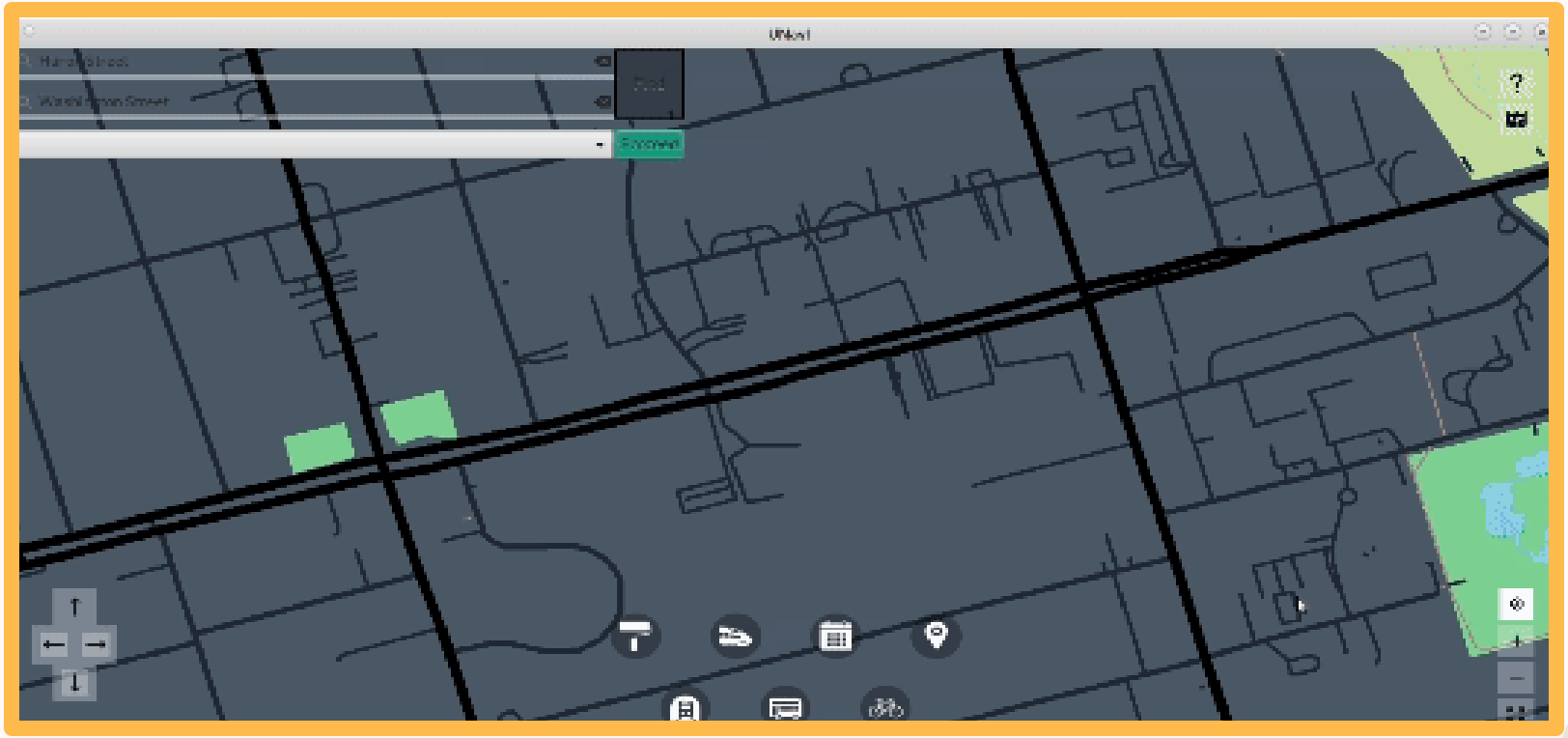
Heuristic A: Walking



Stricter heuristic

More turns

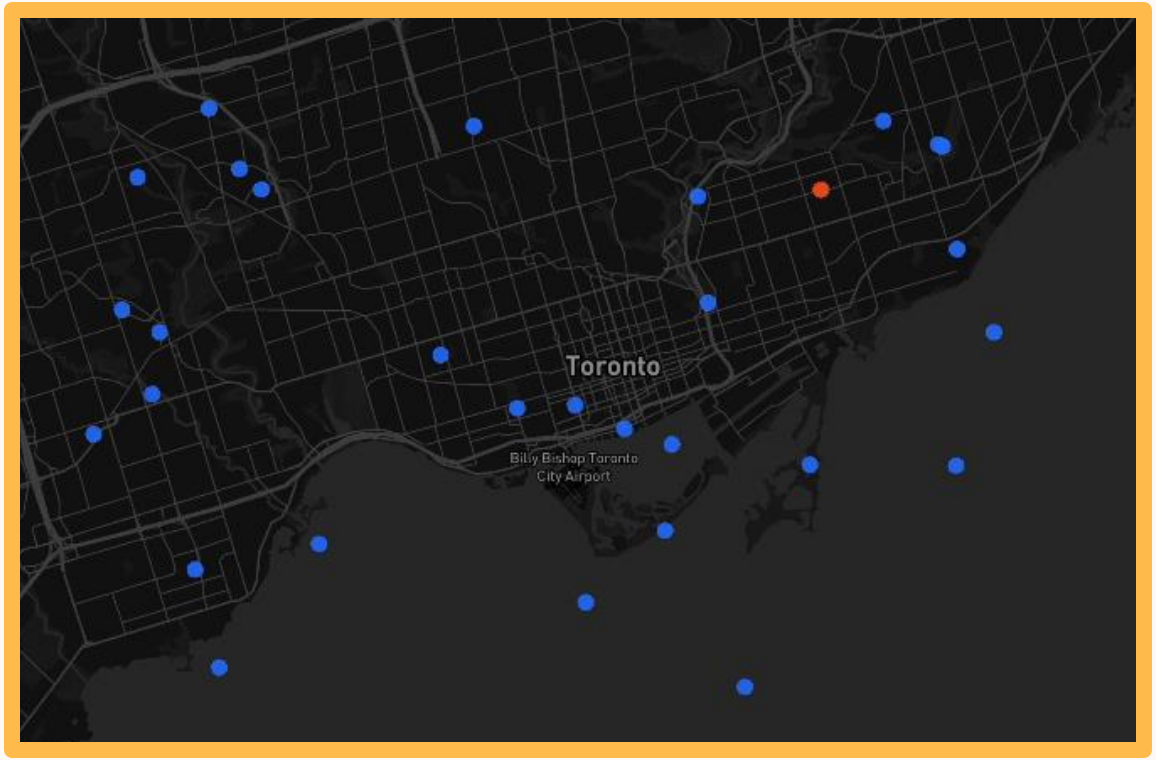
Heuristic B: Driving



Wider Search Area

Fewer Turns

Travelling Courier Problem: Greedy Approach



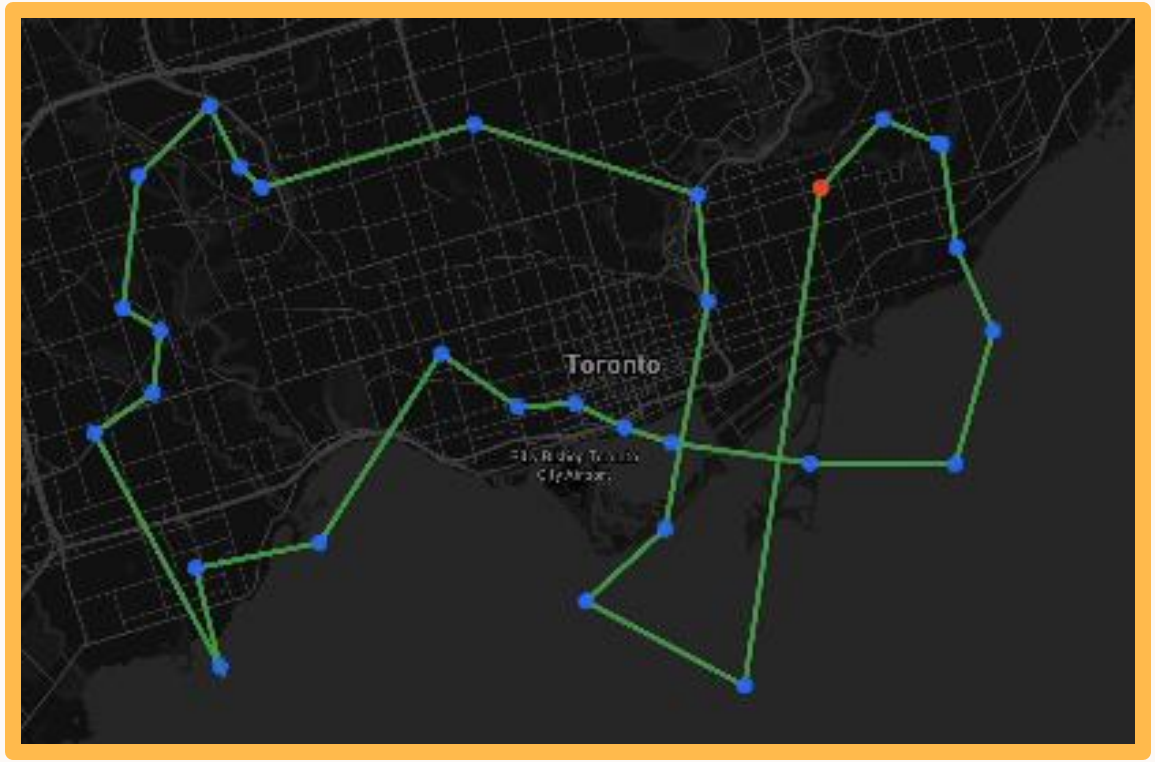
[4]

1. Reuse A* Algorithm to navigate between two points

2. Uses a Greedy Approach to find the nearest valid node

3. Remove heuristic to convert into a multi-dijkstras so that it can populate an adjacency matrix with the distance of every point to each other

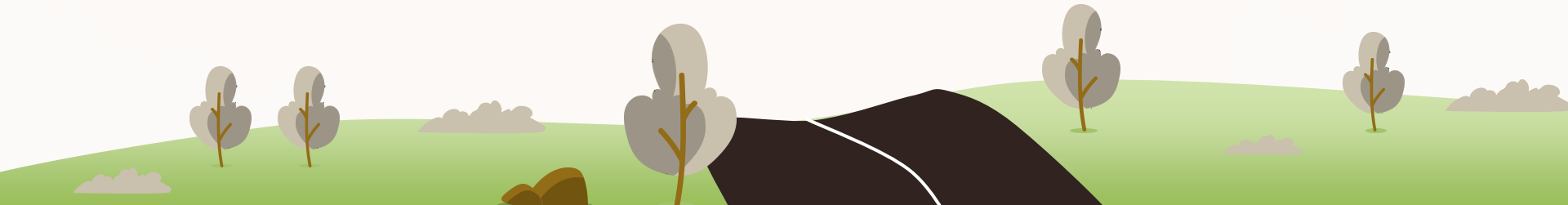
Travelling Courier Problem: Simulated Annealing



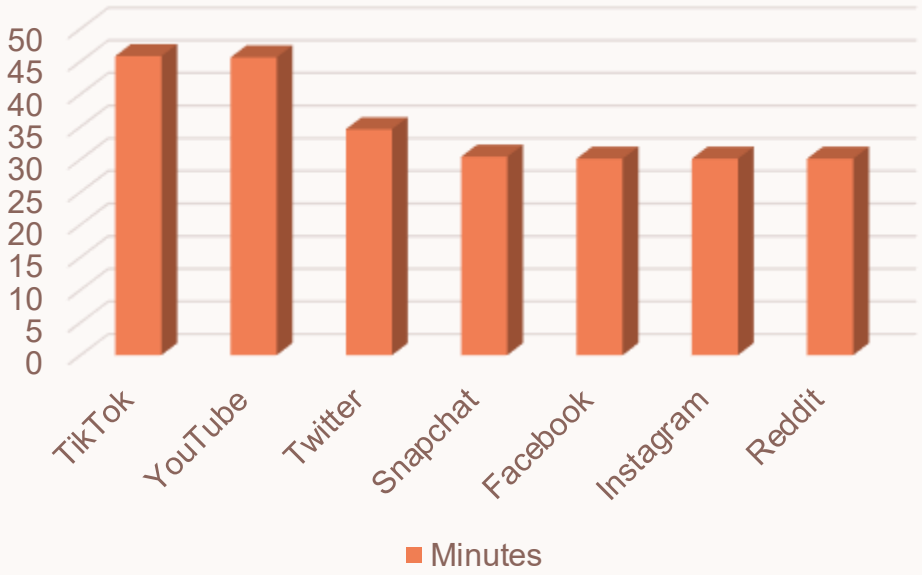
[4]

1. Take best greedy path after running multiple times
2. Run perturbations until timeout or difference in paths is negligible
3. Multiple perturbations:
   - Shifting
   - Reverse
   - Swaps

Capturing the GIS Market Shares



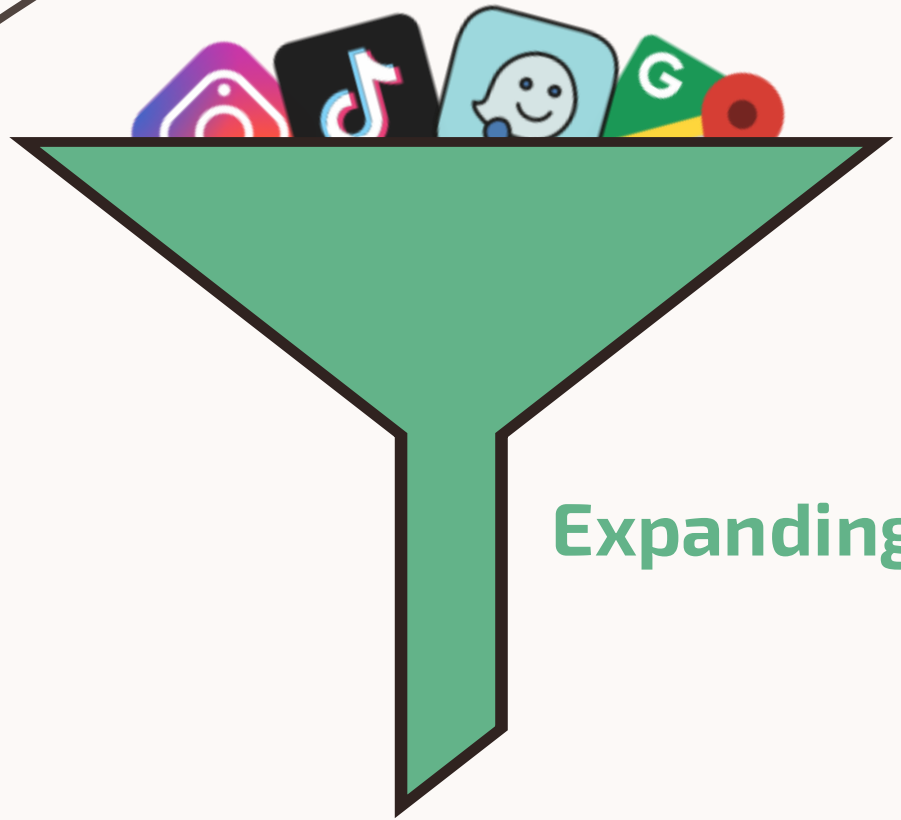
Identifying The Gap



No GIS applications!

Problem:

GIS Software are on average single use [6]



Expanding Market to Fill Gap

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3 Future Features

Update Live Events

Introduce a feed

Create Communities

1. Adding more Flexibility to Live Events

Title

Message

Start yyyy-mm-dd --:-- --

End yyyy-mm-dd --:-- --

Location X

Location Y

Add Event!

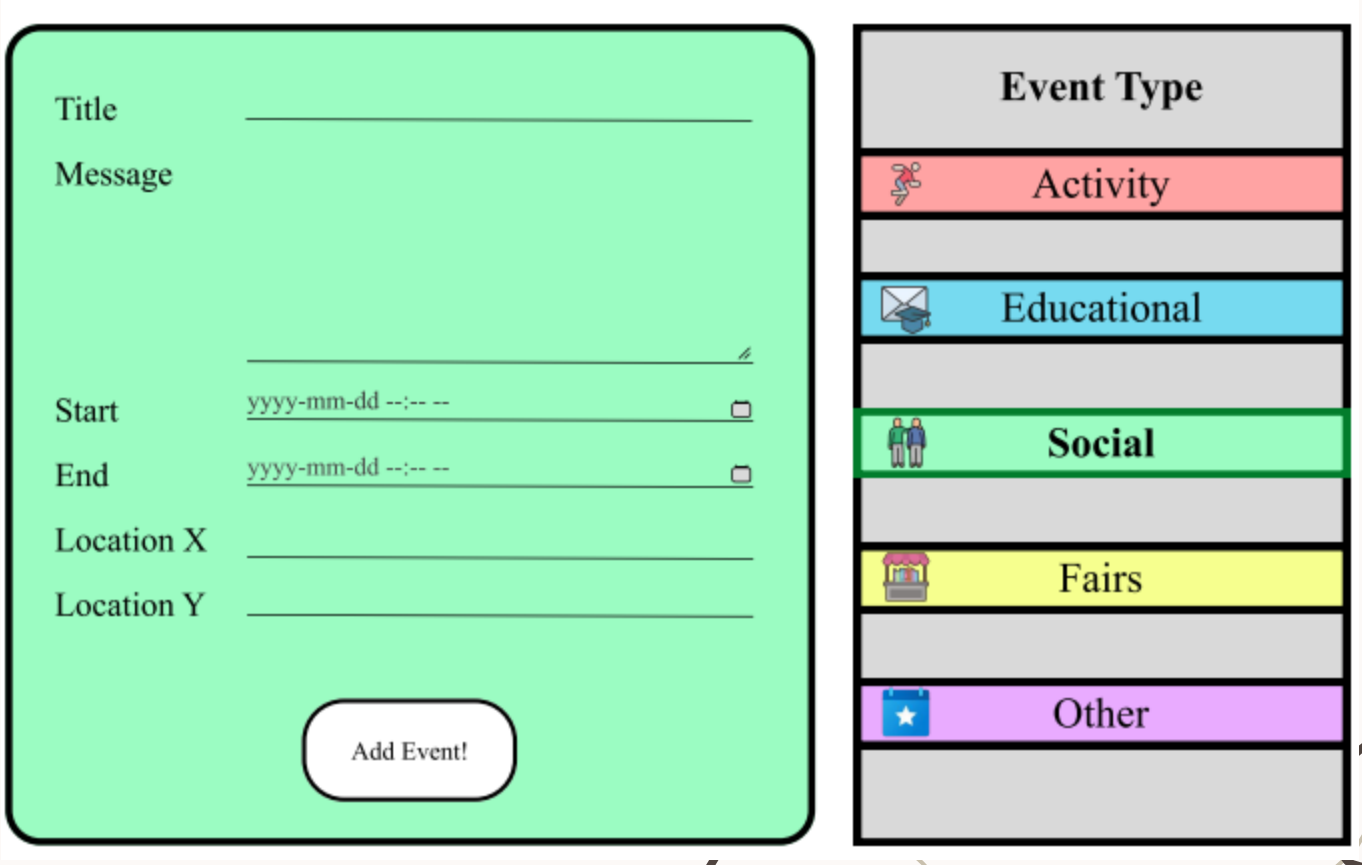
01
Event types

02
Pathfinding

03
Scheduling

01

Adding More Event Options



02

Navigating to multiple events

03

Scheduling events!

Title

Message

Start yyyy-mm-dd --:-- --

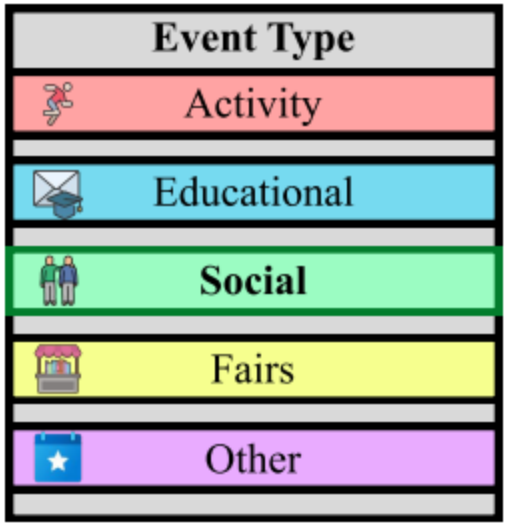
End yyyy-mm-dd --:-- --

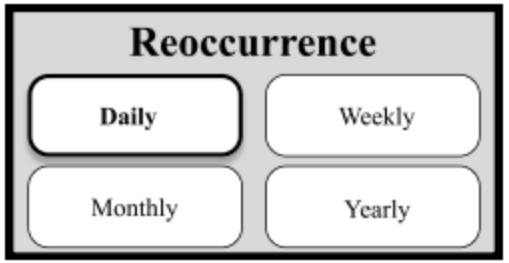
Location X

Location Y

Reoccurring ☑

Add Event!





2. Implementing Social Media Concepts

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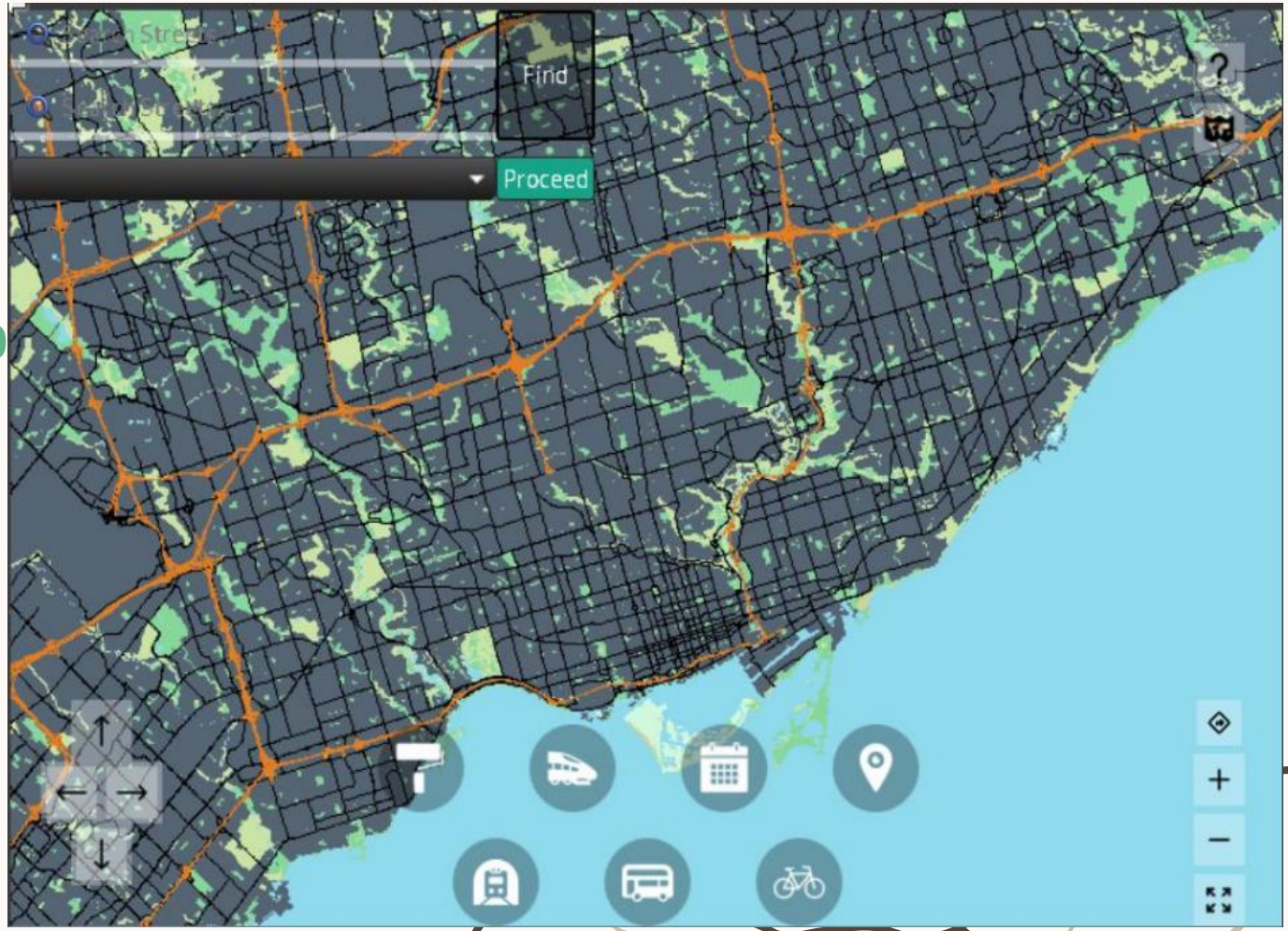
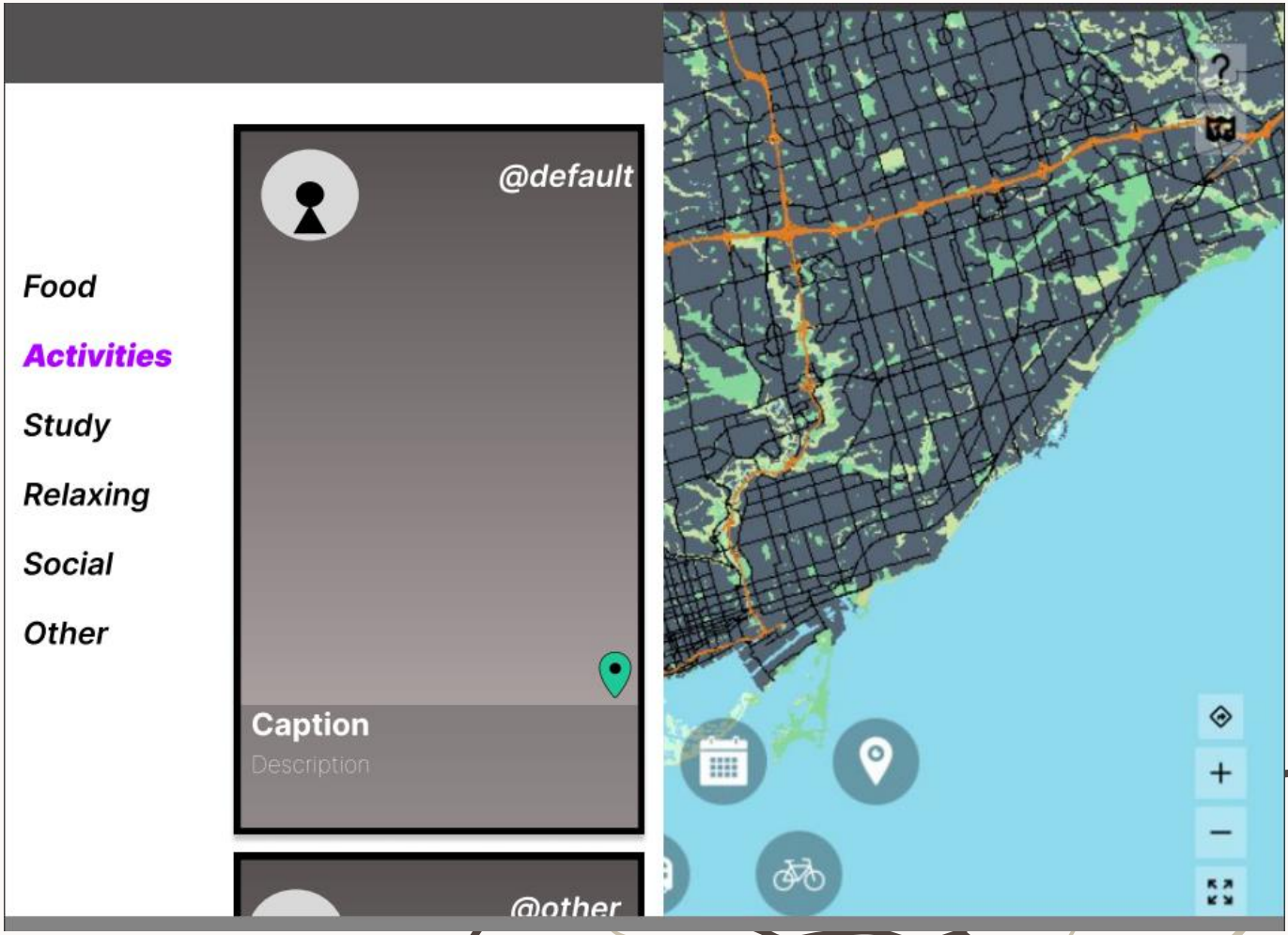
Swipe Right to See What's Hot



On Demand Feed



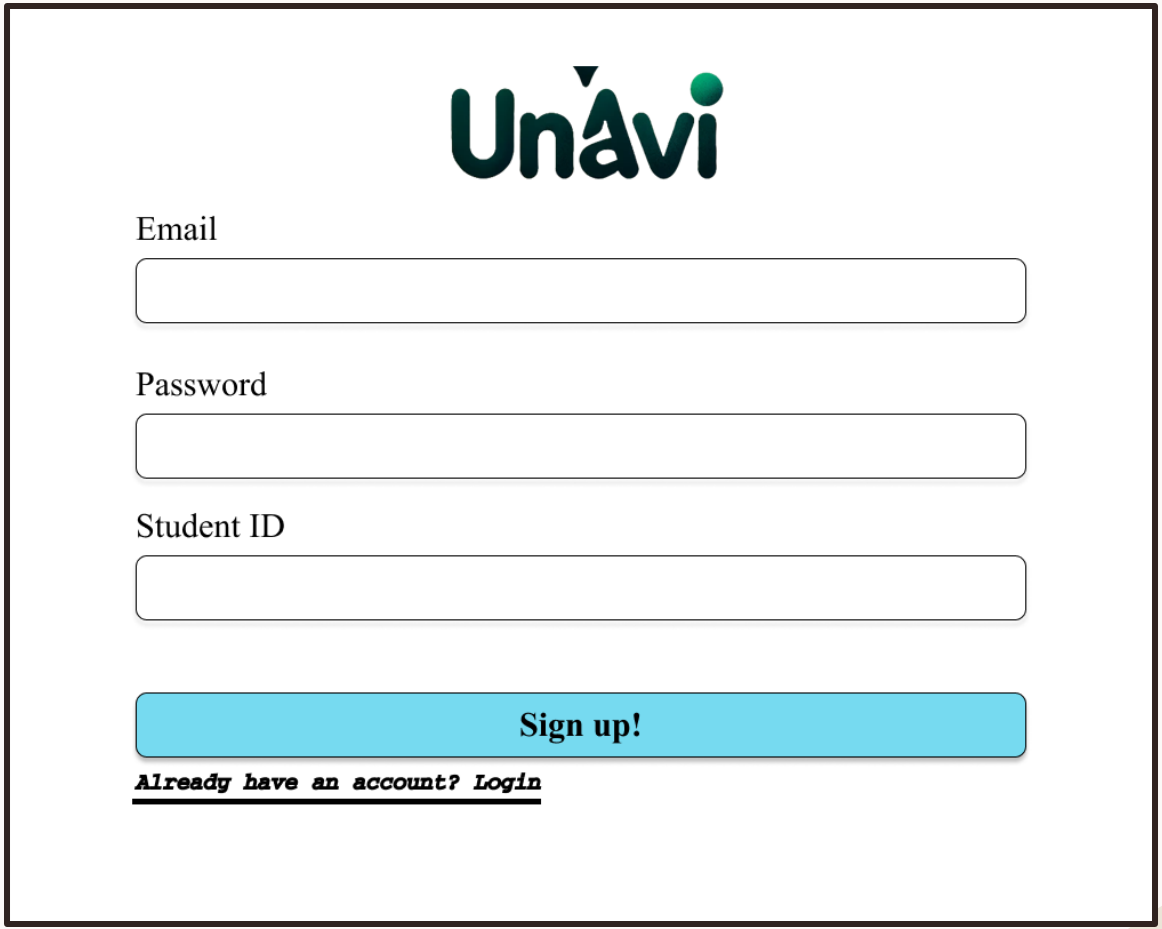
3. Joining Communities

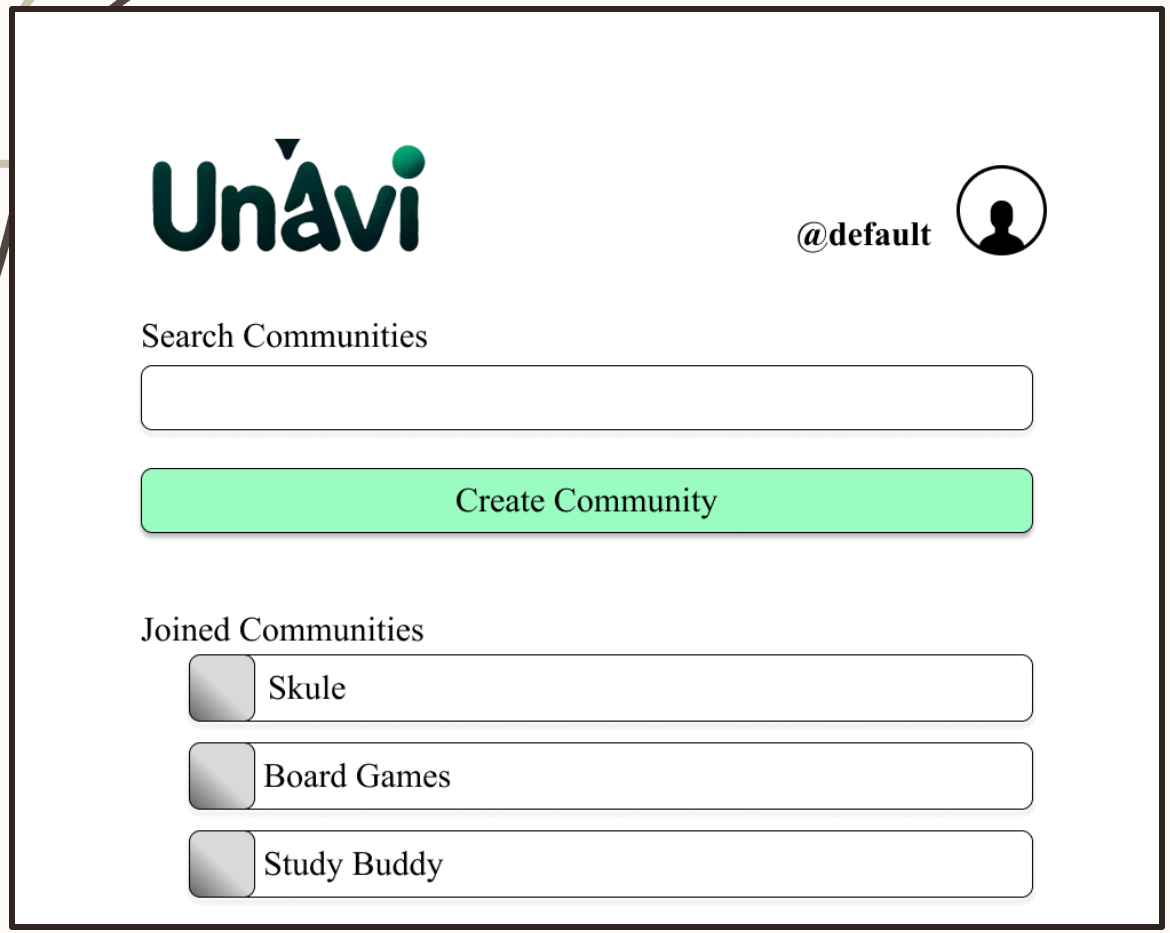
Creating an Account

Joining / Shaping Communities

Private Events & Live Locations

Landing Page





Creating and Joining Communities

Interacting with Community Members

Summarizing: Looking back

Community Engagement

Ability to interact with other users using the app

Responsive UI

Quick and fast response times from the app

Accurate Pathfinding

Ability to locate things on the map

Distinct Iconography

Scannable icons

Pinning Locations

Being able to find previously saved locations

Looking Ahead

More Live Event Features

New Event Types, Integration with Pathfinding, Scheduled Events

Communities

Join new communities in the area

Private Events

Implement a security system to ensure only certain users get access to certain features

Live Feed

New Feed for users to post about their day at different locations

THANKS!

Do you have any questions?

CREDITS: This presentation template was created by **Slidesgo**, including icons by **Flaticon**, infographics & images by Freepik and illustrations by **Storyset**

Q&A!

Sources

[1] *Ergonomics of human-system interaction — Part 11: Usability: Definitions and concepts*, ISO 9241- 11, 2018. [Accessed: Feb 28, 2024.]

[2] M. Chauhan and R. Agarwal, “Impact of screens on how users think,” *2023 3rd International Conference on Intelligent Technologies (CONIT)*, pp. 1–5, Jun. 2023. [Accessed: Feb 20, 2024.] doi:10.1109/conit59222.2023.10205565

[3] J. Nielsen, "Response Times: The 3 Important Limits," Nielsen Norman Group, 01-Jan-1993. [Online]. Available: https://www.nngroup.com/articles/response-times-3-important-limits/. [Accessed: Feb 29, 2024].

[4] TSPVIS, 'TSP Visualizer,' [Online]. Available: https://tspvis.com/. [Accessed: Apr 28, 2024].

[5] J. Lindner, “Must-know google maps usage statistics,” GITNUX, https://gitnux.org/google-maps-usage-statistics/ [Accessed Apr. 27, 2024].

[6] “30+ average screen time statistics for 2024,” SlickText, https://www.slicktext.com/blog/2023/01/30-key-screen-time-statistics-for-2022-2023/ (accessed Apr. 27, 2024).

Image Attributes

https://icons8.com/icon/16890/exercise
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https://icons8.com/icon/LpE4Hrg048jI/educational
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