CRANCSTORM

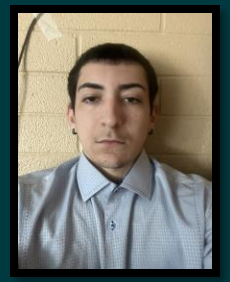
Project:
Cyclist Routing Algorithm for Network Connectivity

Client: Dr. Steven Gehrke

Team Mentor: Bailey Hall

Focus Area:
Bicycle network connectivity, routing optimization, and mobile navigation for urban planning.

Team Lead	Architect	Recorder	Release Manager
Braydon Lamoreaux	Kristopher Thomas	Noelia Canela	Ethan Ferguson

PROBLEM STATEMENT

Current System Limitations

- Large OpenStreetMap(OSM) files cause processing inefficiencies
- Isochrone map lacks contextual Points of Interest(POI) insight
- No user accounts or personalization
- No mobile-based routing visualization
- Limited integration between routing and Isochrone tools

Why It Matters

Urban planners need:

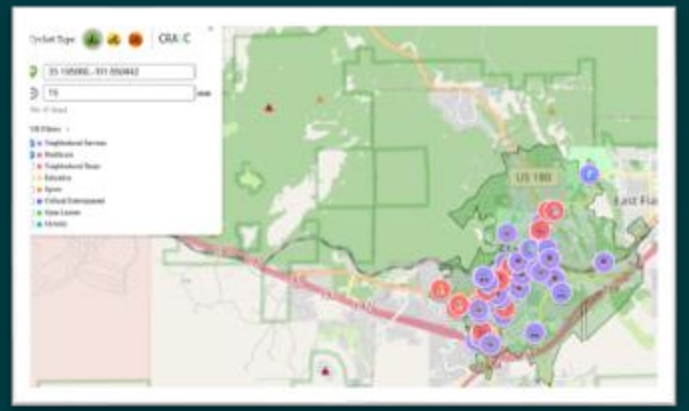
- Accurate routing analysis
- Visualized accessibility (schools, jobs, groceries)
- Scalable, multi-state support
- User data insights

SOLUTION VISION

Build a Scalable Web & Mobile Ecosystem:

- Uses optimized network datasets from the **General Modeling Network Specification**(GMNS) file format rather than OSM
- Displays POIs within the generated polygon from the isochrone tool
- POI's have a "Get Directions" button that will map out their path using the CRANC page
- Allows for account creation and personalization
- Integrates routing with accessibility tools such as **Graph-Hopper routing with Flutter** accessibility features and accessible route preferences.
- Enables mobile GPS logging

Impact

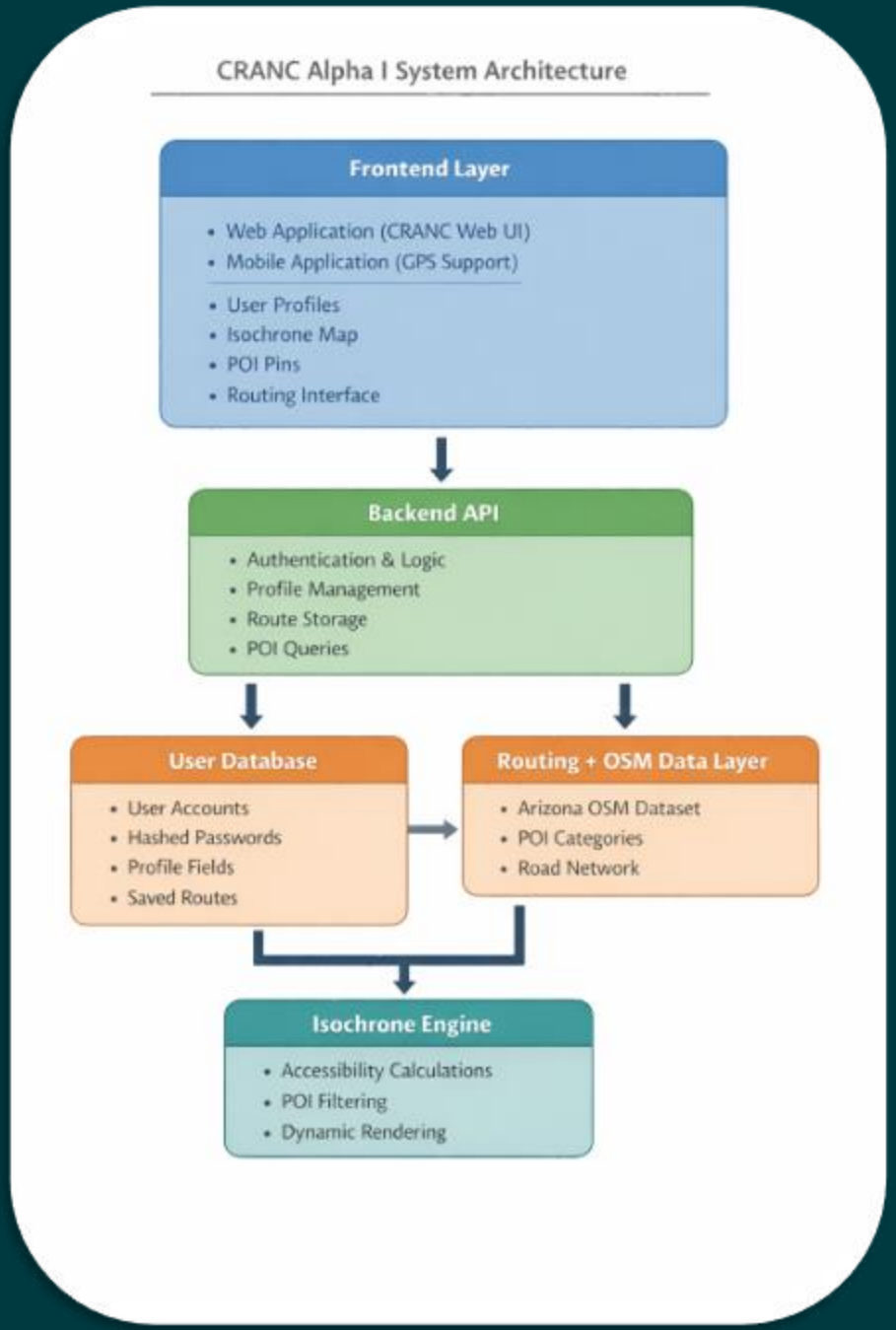


- Support cities infrastructure investment decisions
- Improves safety and accessibility planning
- Modernizes CRANC for long-term scalability

SOFTWARE ARCHITECTURE

Languages/Frameworks Used:

- HTML/CSS – Isochrone POIs
- TypeScript/React – Isochrone POIs
- SQL – Account Database
- Flutter/Dart - Mobile App
- Java – Backend Routing Calculations
- Graphhopper – Web/Mobile Mapping



TESTING PLAN

Unit Tests

Each software module is tested individually to ensure that it performs its intended function correctly. These tests validate internal logic, input/output handling, and error conditions.

Integration Tests

After unit testing, modules are combined to verify that they work together seamlessly. For example, the backend server is tested with the database to confirm proper data retrieval and storage.

Acceptance Testing

The complete system is tested against project requirements to confirm it meets the sponsor's expectations. This includes end-to-end scenarios such as submitting user input, retrieving results, and displaying accurate responses.

Failed tests identify bugs early, reducing downstream issues.

Passing unit and integration tests assures that modules and their interactions are robust.

Acceptance testing confirms the software meets functional expectations.

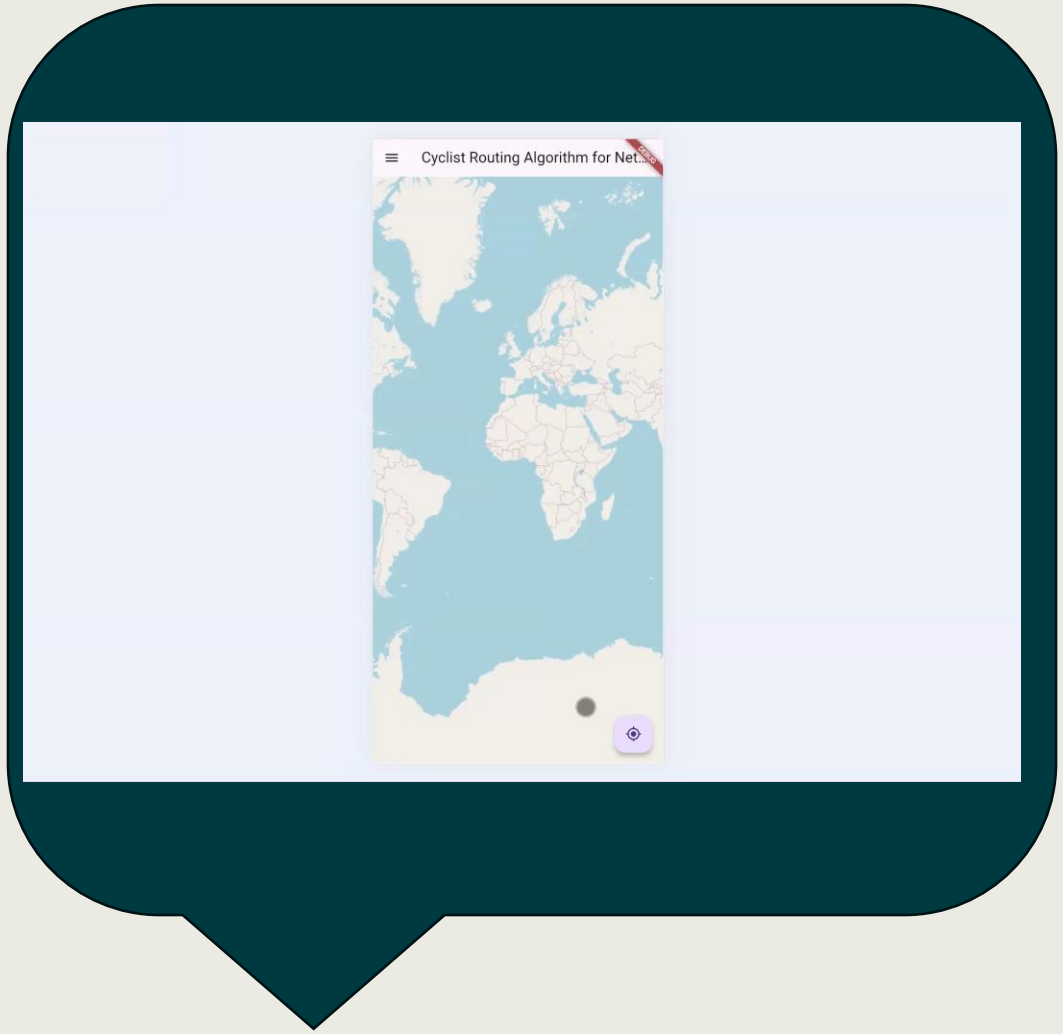
Test results guide code refactoring and performance tuning to improve overall software quality.

ALPHA DEMO

CRANC APP

This is the fully functional version of our mobile app version of the original webpage.

This app offers the same elements of the CRANC web app in the mobile app. Along with the ability to have a GPS tracking feature that can be toggled on and off.



CHALLENGES & RESOLUTIONS

Major Challenges	Solutions
Mobile app routing line visualization features with colors like the web app	Resolved by using the algorithm to decide where roads are more difficult
User Database integration into the Web Application	Postgresql Server hosted inside the same container as the CRANC container
OSM Dataset Size & Filtering	Convert Graphhopper to be able to read and use the GMNS files instead of OSM to improve loading speed

Roadmap

1. User Account Creation & Personalization
2. Isochrone POIs
3. App Face Loading & Basic Mapping
4. Cranc App Fully Working
5. Live GPS Tracking
6. GMNS Conversion from OSM
7. Navigation Narration

CURRENT STATUS

Completed	In Progress
Users can now create and personalize an account	A GMNS conversion pipeline from OSM
POIs appear on the Isochrone tool with direct routing from location	Live Narration on the mobile app's navigation
The Cranc app face is loading with Point A to B navigation	
A fully working app that is a mirrored image of the CRANC website	
A live GPS tracking on the mobile application	

Completed

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2. Isochrone POIs
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In Progress

6. GMNS Conversion from OSM
   ETA-Mid Q2 2026
7. Navigation Narration
   ETA-Mid Q2 2026

THANK YOU

Questions?