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
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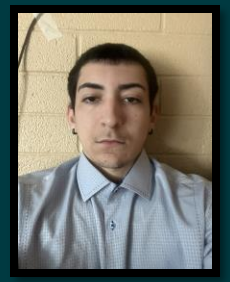


PROBLEM STATEMENT

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 future mobile GPS logging

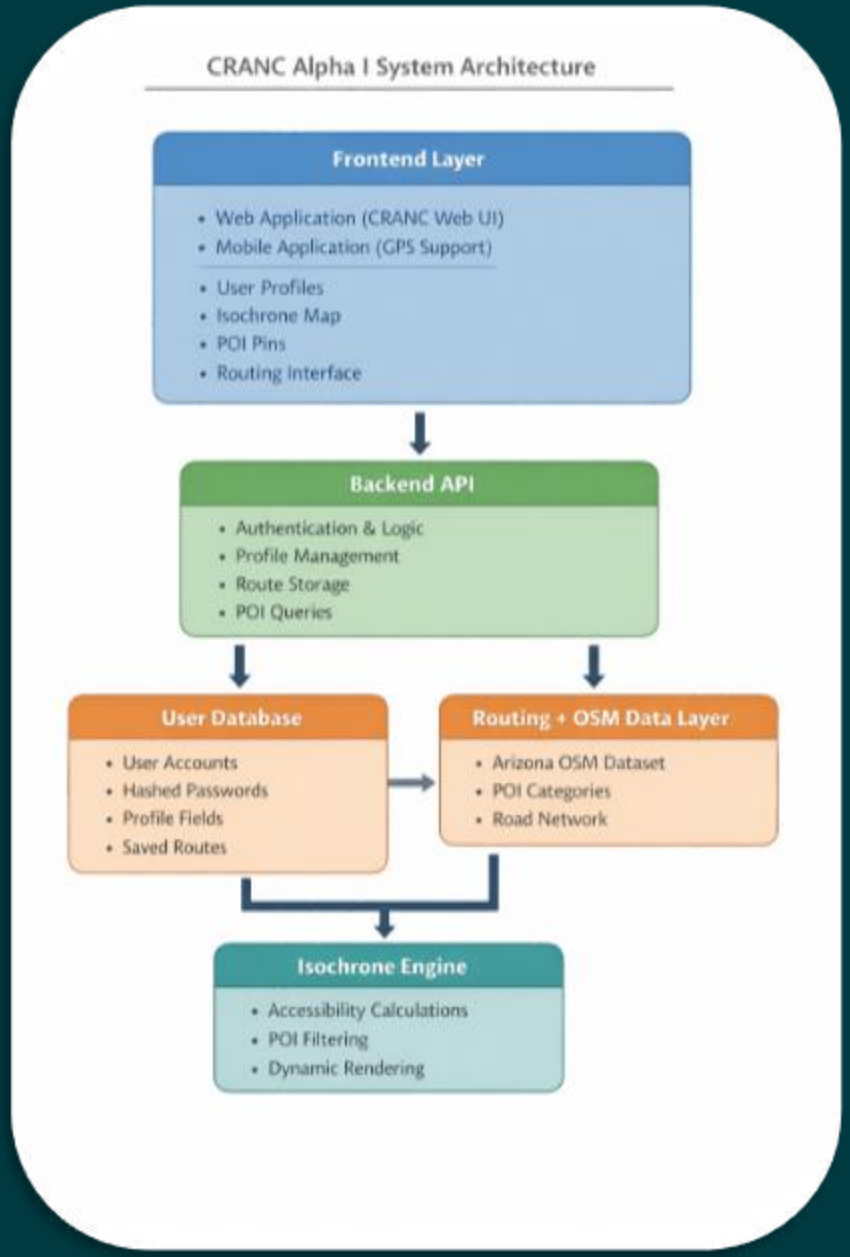
Impact

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

SOFTWARE ARCHITECTURE

Languages/Frameworks Used:

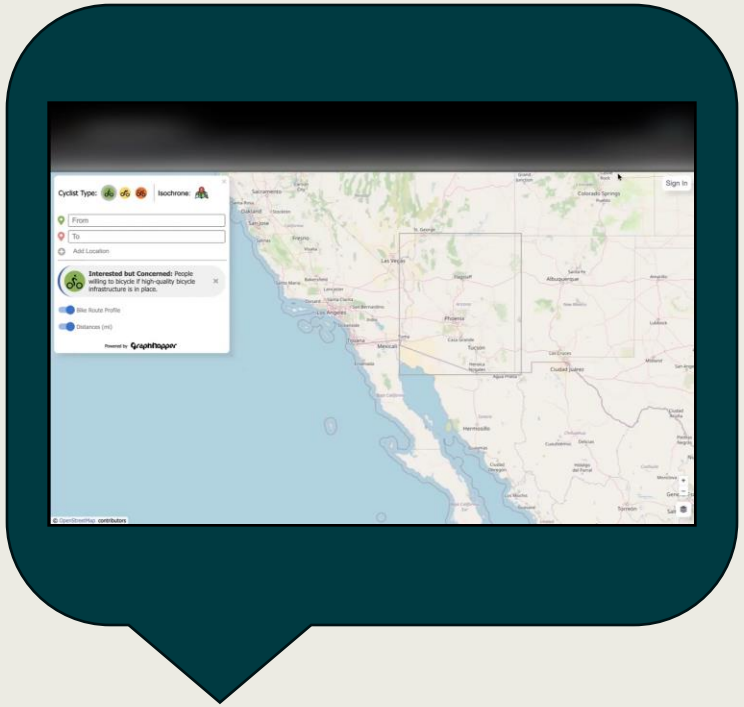
- HTML/CSS – Isochrone POIs
- TypeScript/React – Isochrone POIs
- SQL – Account Database
- Flutter/Dart - Mobile App
- Java – Backend Routing Calculations
- Graphhopper – Web/Mobile Mapping



ALPHA DEMO

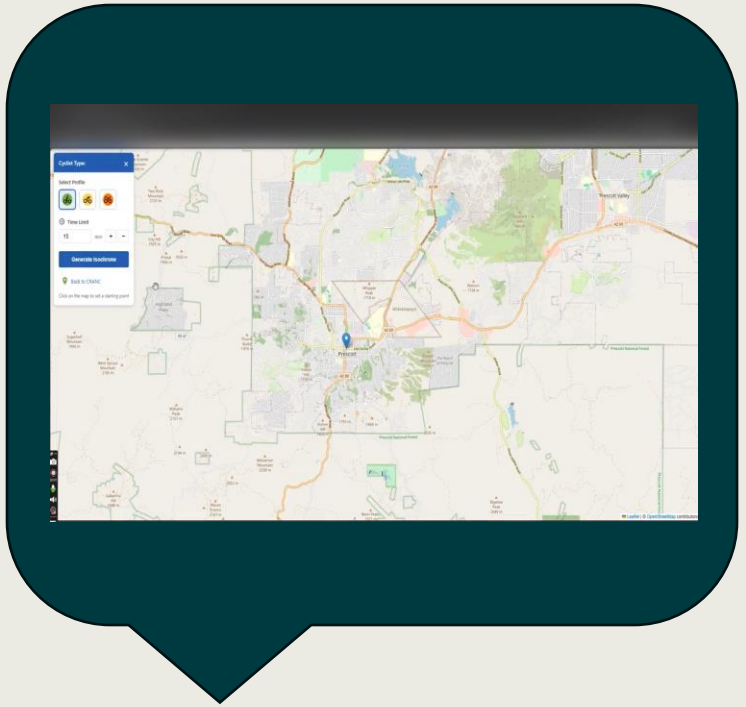
Account Creation & Personalization

This feature allows the user to create an account and personalize their account.



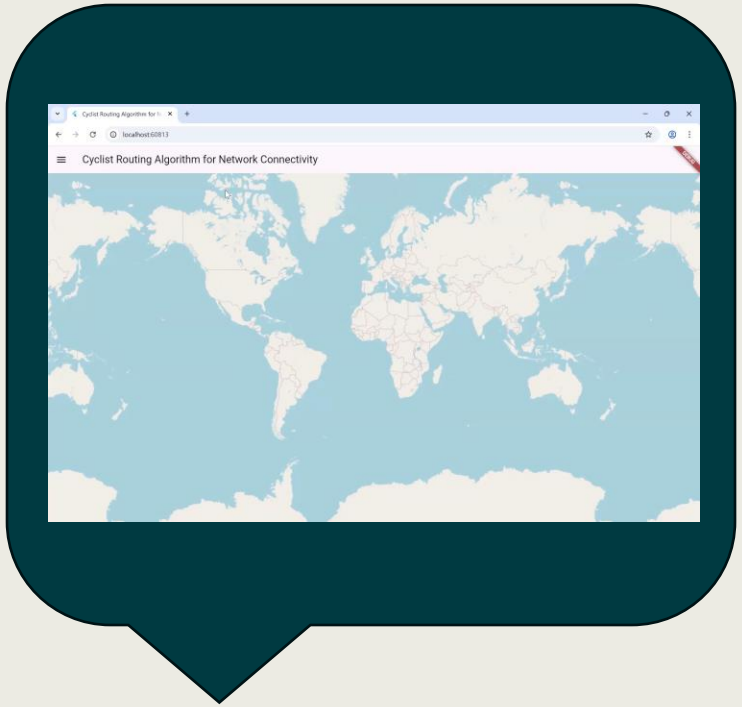
Isochrone POIs

This feature will generate POI pins showing the user what is in reach within their time radius.



CRANC APP

This is a prototype of what a mobile version of the CRANC tool.



CHALLENGES & RESOLUTIONS

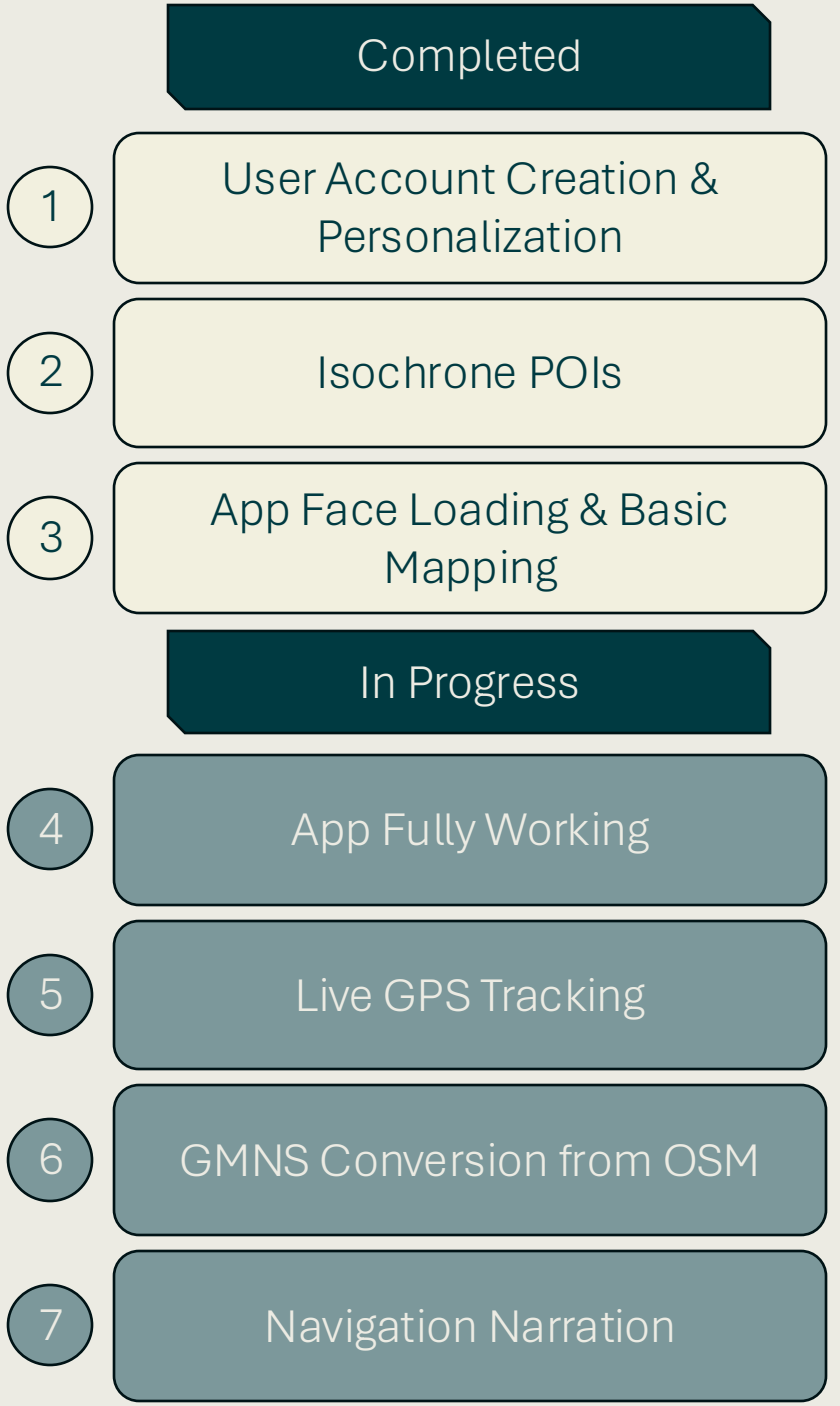
Major Challenges	Solutions
Mobile app routing line visualization not rendering	Java has a 32-bit integer limit, and the earlier math had surpassed that, so we switch to regular math expressions instead
User API Integration with ITS Container	Investigating deployment structure of the container
OSM Dataset Size & Filtering	Using an Arizona specific OSM file instead of all the continental US and planning a dynamic filtering setup.

Roadmap

1. User Account Creation & Personalization
2. Isochrone POIs
3. App Face Loading & Basic Mapping
4. 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 fully working app that is a mirrored image of the CRANC website
POIs appear on the Isochrone tool with direct routing from location	A live GPS tracking on the mobile application
The app face is loading with Point A to B navigation	A GMNS conversion pipeline from OSM
	Live Narration on the mobile app's navigation



THANK YOU

Questions?