CRANCStorm Introduction

Project: Cyclist Routing Algorithm for Network Connectivity
Client: Dr. Steven Gehrke
Faculty Mentor: Dr. Ana Paula Chavez
Team:

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

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

Problem Statement

Importance of the Market

- Bicycling reduces **air pollution**, **health risks**, and **transportation costs**.
- Adoption in the U.S. remains low due to **safety concerns** and **poor bike network connectivity**.
- Urban planners need **accurate**, **data-driven tools** to identify unsafe or inefficient routes.

Client Background

- **Dr. Steven:** Assistant Professor Geography, Planning, and Recreation, Northern Arizona University.
- Client specializes in **bike accessibility research**, using routing tools to guide infrastructure investments.

Problem Statement

Current Pains

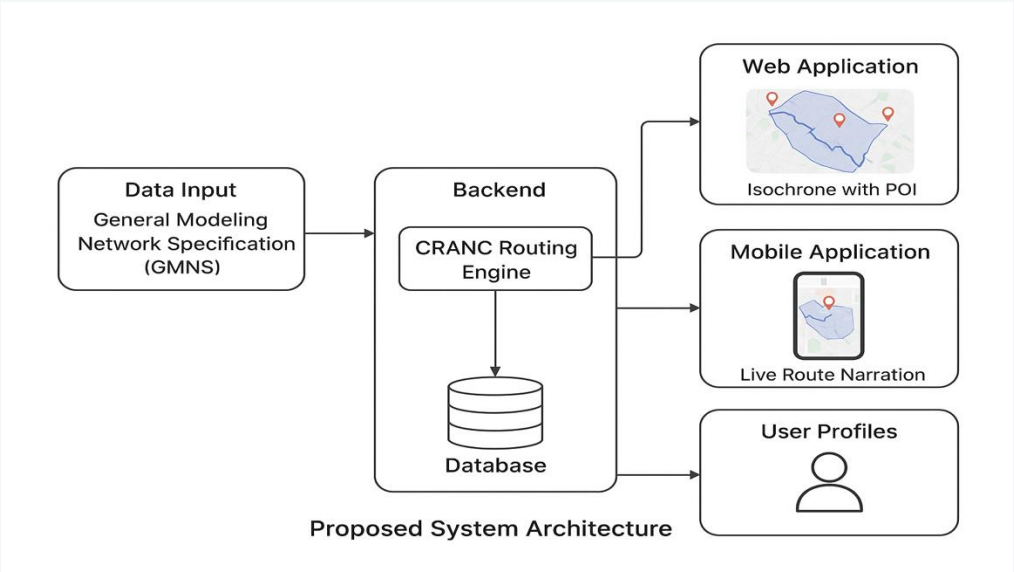
- **OSM Data File Bloat:** Large, unfiltered datasets slow processing and limit scaling to more states.
- **Limited Context:** Current Isochrone map shows a reachable radius, but not specific locations.
- **No Mobile Support:** Field data collection and route logging are not possible.
- **No Personalization:** Users cannot save routes or view ride history.

Motivation

Improving CRANC will give transportation planners and cyclists a **powerful**, **scalable**, and **interactive tool** for understanding bike accessibility, identifying safety barriers, and potentially guiding multimillion-dollar infrastructure decisions.

Solution Overview

- A redesigned **web + mobile ecosystem** that improves routing performance, enhances visualizations, and supports real-time cyclist navigation and data collection.



Solution Overview

GMNS - File Conversion

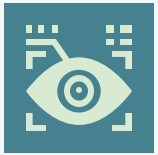
Faster, Cleaner network data to support multi-state scalability

Mobile App Development

Web-feature parity plus GPS logging, turn-by-turn narration, and offline routing.

Enhance Isochrone

POI overlays showing reachable schools, jobs, grocery stores, etc.



User Profiles

Save routes, track ride data, view analytics across devices.

Key Requirements

How Requirements Were Gathered

1. Bi-Weekly meetings with Dr. Steven (client).
2. Review of existing CRANC system + datasets (OSM and GMNS).
3. Analysis of past CRANC research publications and project documentation.
4. Brainstorming sessions and feasibility discussions with mentor.

High-Level Requirement: *User Profiles*

1	Users can create and log into accounts.
2	Routes can be saved to a personal account.
3	Ride history is synced between web and mobile.
4	User preferences stored for personalized Isochrone queries.

Key Requirements

Most Important Functional (MVP) Requirements

MUST	Display Isochrone maps with integrated POI pins.
MUST	Enable user profiles for route saving and ride analytics.
SHOULD	Import and process GMNS datasets
SHOULD	Mobile app with feature parity and responsive UI.
SHOULD	GPS ride tracking and metric calculation.

Closing Note

These requirements form the **baseline**, and refinement will continue as development progresses and client feedback evolves.

Risks & Feasibility

Major Risks & Mitigations

- GMNS Conversion Errors: Validate outputs using known OSM samples.
- POI Overload Slowing Maps: Implement clustering + dynamic loading.
- GPS Inaccuracy: Apply filtering and correction algorithms.
- Cross-Platform Sync Issues: Centralized backend API handling sessions + data.

Feasibility Findings

- GMNS significantly reduces processing overhead → scalable solution is feasible.
- Mobile mapping and voice navigation feasible using Mapbox SDK.
- Existing CRANC backend can support new endpoints with moderate refactoring.

Schedule

Weeks 1–4

Mobile foundation + GMNS conversion pipeline

Weeks 5–8

Routing integration + POI-enhanced Isochrones

Current Status

- GMNS pipeline in progress.
- Mobile baseline UI started
- On track with planned milestones.

Weeks 9–12

Mobile UI, GPS tracking, narration.

Weeks 13–16

User profiles, integration testing, final polishing.

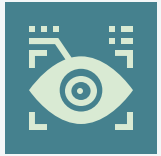
Key Takeaways

Urban Cycling

The project addresses critical challenges in urban cycling accessibility, supporting healthier and safer transportation planning.

Better Data

Our solution modernizes CRANC with better data, richer visualizations, mobile navigation, and user personalization.



Clear Requirements

Clear requirements and validated feasibility make the project well-positioned for success.

Next Steps

GMNS

Continue GMNS(General Modeling Network Specification) integration and mobile feature development.

POI

Begin POI visualization implementation and backend syncronization.

Social

Prepare for end-semester client demo

Conclusion

Our team is confident and committed to delivering a functional, impactful CRANC tool for bikers to use.