Project Proposal

Basic Info

Project Title: Salt Lake City Mobility Explorer: Visualizing Urban Traffic and Transit Patterns
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Repository: https://github.com/dataviscourse2025/SLC_Mobility_Explorer

Background and Motivation

Salt Lake City is the economic and cultural hub of Utah, with a growing population and unique mobility challenges. It features a combination of vehicle-heavy interstate corridors (I-15, I-80, I-215) and a dense public transit system (UTA bus network and TRAX light rail).

By focusing on Salt Lake City, we can study the interaction between road congestion and transit ridership in a compact metropolitan area. This choice is motivated by the city's role in the region and the availability of open data.

Project Objectives

The visualization aims to answer:

- Traffic Hotspots: Where are the busiest roads in Salt Lake City, and how do traffic volumes change by time of day?
- Transit Ridership: Which TRAX stations and bus stops experience the most activity?
- Comparisons: Do transit ridership peaks align with or reduce road congestion during rush hours?

Benefits:

- Useful insights for SLC city planners and UTA.
- Interactive dashboard for identifying congestion/transit relationships.
- Scalable design for other Utah cities.

Data

1. UDOT Continuous Count Stations (SLC area)
   - Hourly traffic counts, speeds, classifications.
   - [UDOT Traffic Data](#)
2. UDOT AADT for Salt Lake County segments
   - Roadway-level annual averages.
   - [UDOT AADT](#)
3. UTA Transit Ridership
   - Stop-level and route-level ridership for TRAX, FrontRunner, and buses in Salt Lake City.
   - [UTA Stops and Most Recent Ridership](#)

Data Processing

- Filter UDOT data to Salt Lake County / City sensors only.
- Aggregate 5-min intervals → hourly and daily averages.
- Extract ridership for Salt Lake City stops and stations.
- Merge road and transit datasets by geographic proximity (corridors near transit hubs)

Visualization Design

Prototype 1: Traffic Heatmap (SLC Roads)

- Map of Salt Lake City with traffic sensor points → heatmap overlay.
- Time slider: hourly variation across a day.
- Tooltip: road name, average vehicles/hour.

Prototype 2: Transit Ridership (UTA SLC Stops)

- Circles = TRAX stations and bus stops.
- Circle size = ridership volume.
- Color = mode (bus, TRAX, FrontRunner).
- Side chart: ridership trend (weekdays vs weekends).

Prototype 3: Comparative Dashboard

- Split map: traffic vs transit.
- Linked selection: clicking on a busy highway highlights nearby stops.
- Line chart: rush hour road traffic vs transit ridership.

Final Hybrid Design

- Unified interactive SLC map with road + transit overlays.
- Filters: weekday/weekend toggle, mode selection (car, TRAX, bus).
- Linked time-series charts for road vs transit demand

Must-Have Features

- Interactive map of SLC showing traffic and transit.
- Time slider for daily changes.
- Ridership visualization for TRAX stations + key bus stops.
- Road congestion hotspots.

Optional Features

- Animation of rush-hour traffic flow.
- Demographic overlays (population density, employment centers).
- Export/download selected data.
- Predictive "what-if" feature.

Project Schedule

Week 1 – Data Acquisition & Cleaning

- Filter UDOT + UTA datasets for SLC.
- Clean hourly traffic + stop-level ridership.
- GitHub repo + initial preprocessing.

Week 2 – Prototype Maps

- Heatmap of road traffic.
- Proportional-symbol map for transit stops.
- Simple time charts.
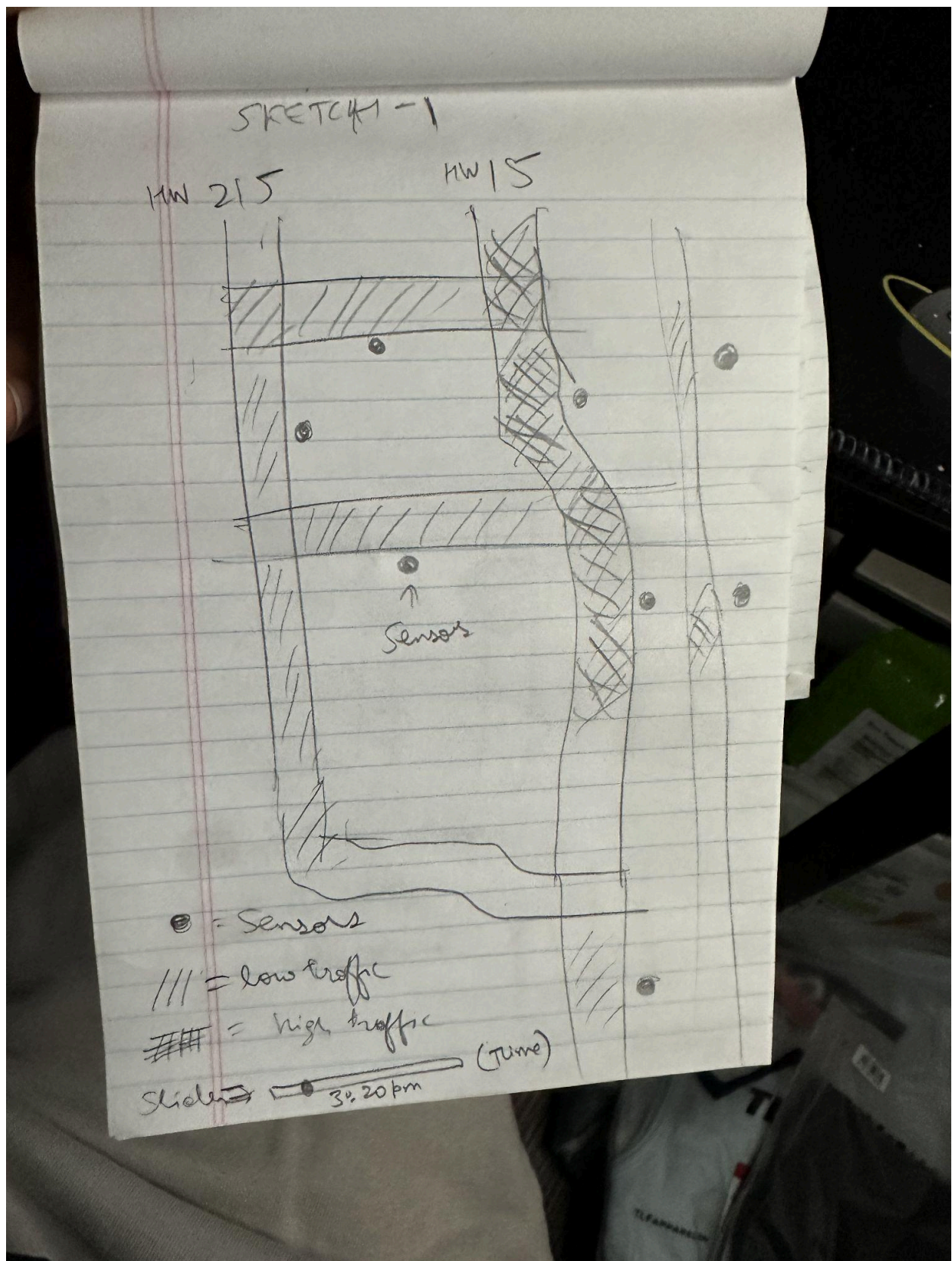
Week 3 – Dashboard Integration

- Combine road + transit on one map.
- Add linked time-series charts.
- Implement filters + time slider.

Week 4 – Refinement & Evaluation

- Add optional features + polish design.
- Conduct peer evaluation.
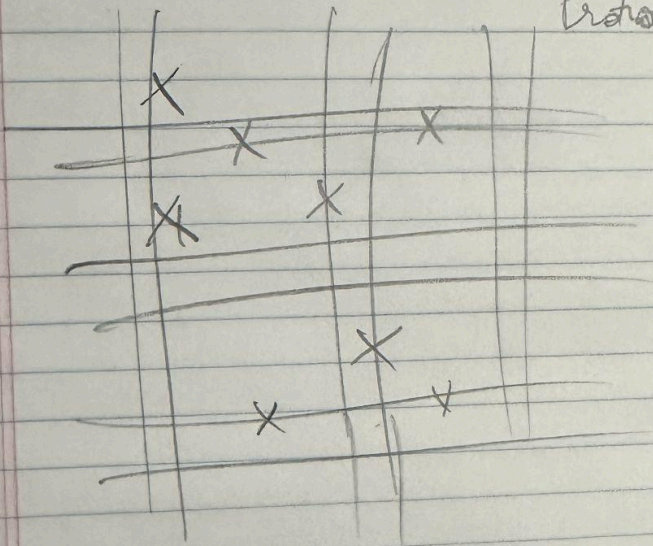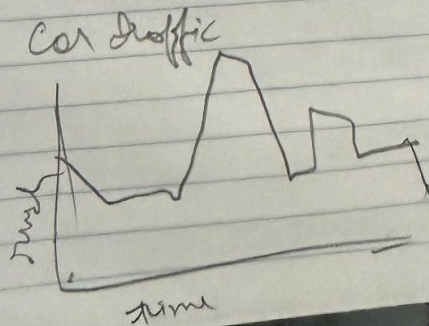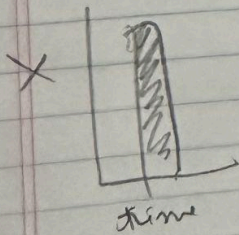- Finalize for submission

SKETCHES:

Proto 1:

SKETCH - 1

HW 215   HW 15

↑
Sensors

⊙ = Sensors

/// = low traffic

⟋⟋⟋ = high traffic

Slider → ⊙_____ (time)
              3:20 pm

Proto 4:

weekday ☐   mode = car, train, bus
weekend ☑

Proto 4

X = transit stops

Car traffic

time
time

Prototype - 2
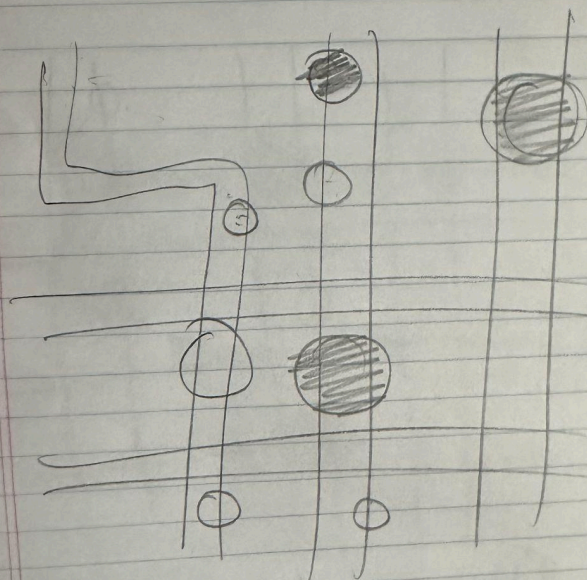
⬤ = Train stop
○ = Bus stop
Size = Rider volume

weekend weekday
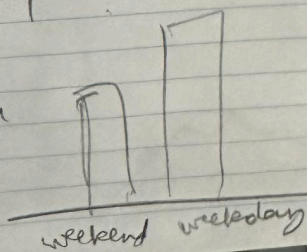
Proto 2

Prototype - 3
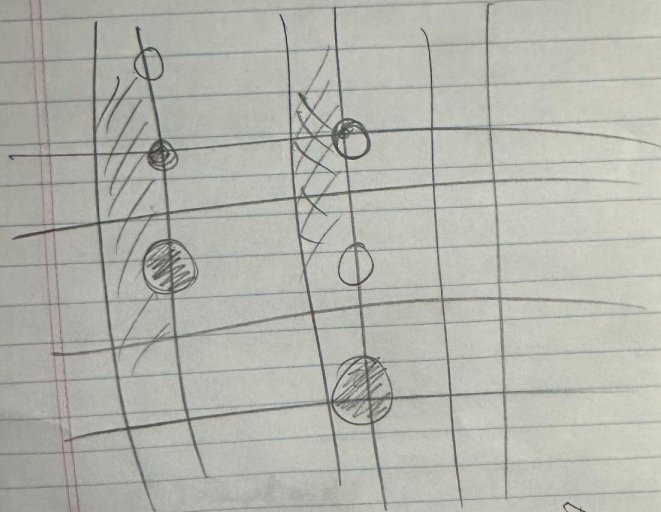
/// = less traffic   (line graph)

= more traffic

O = bus stop

◉ = trax stop

---- = transit →

____ = car

(y-axis: transit/car CO_2 emit)
(x-axis: time)