A multidisciplinary approach to assessing city-wide near misses between vehicles and vulnerable road users in Reno-Sparks, Nevada

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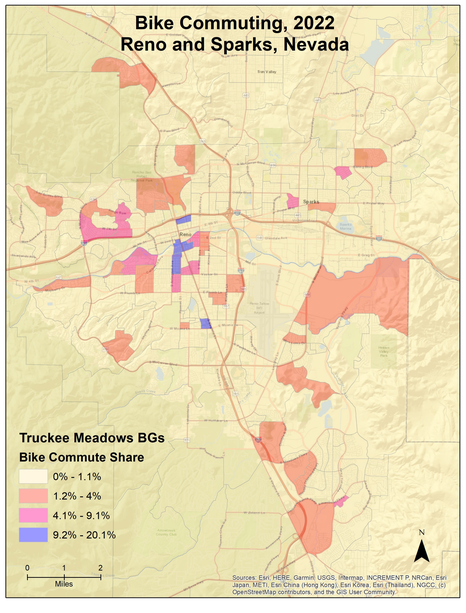
Project Overview

The Challenge

- **Crashes** between **vehicles** and **vulnerable road users (VRUs)** are a critical challenge: **fatality rates** for bicyclists and pedestrians are **increasing** on U.S. roads
- **Near-Miss events** – when a crash between a vehicles and vulnerable road user is **narrowly avoided** – dissuade active travel
- **Data-driven infrastructure safety planning** for VRUs currently relies on officially reported crashes, which suffer from underreporting and bias. **Near-misses not as well integrated**
- Crowdsourced reporting and surveys can collect data on near-misses, but are challenged by **1) inconsistency** in what constitutes an event and **2) underreporting**
- **Data collection** on near miss events remains challenging, but **necessary** to address to **plan safer roads**, particularly when communities are starting to build more infrastructure for VRUs

New infrastructure in Reno recently built to encourage bicycling



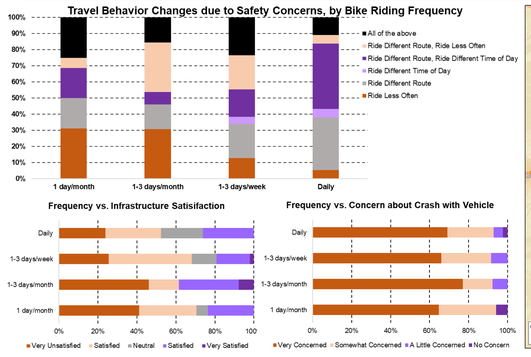
Intellectual Merit

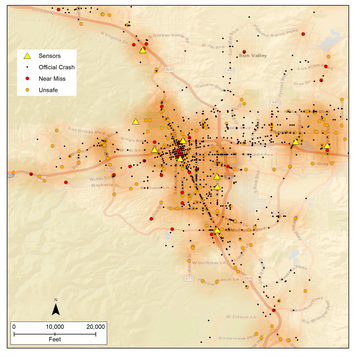
- **A distributed network of portable LiDAR sensors maps, identifies, and characterizes near-miss events community-wide, informed by public input**
- **Recommendations of what constitutes a near-miss event informs future automated detection methods**
- **The geographic variation of near-misses involving vehicles and VRUs is compared to official crash data**

Project Activites

Community Survey with Interactive Map

- August 2023: **172** residents who **regularly bike** or **walk** in our community completed a **web-based survey**
- Questions asked about **where** they had either **felt unsafe** (risk of being hit by a vehicle) or **experienced a near miss**
- There are **infrastructure** and **safety** concerns, which influence travel

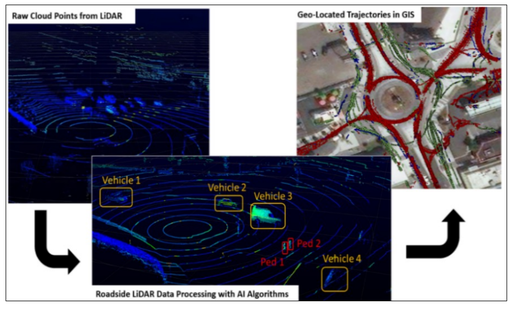




Sensor Distribution and Data Analysis

- October 2023: **Portable LiDAR sensors** installed at **10 most frequent locations** from the survey, for **72 hours each**
- Using **established methods** (PET, Hard Braking), we detected **75 near-miss events**, and even 2 vehicle crashes

Workflow to detect near-miss events



Focus Group

- December 2023: 9 members of the public **reviewed animations** of post-processed data collected from the sensors and identified through **existing** near-miss detection methods
- Feedback from public recommends that events should be classified as either: **1) Near-Miss, 2) Risky, but Calculated VRU behavior, or 3) Minimal Risk**
- Next challenge is to **integrate into detection methods**

Future Goals

Geodesign Workshop

- May 2024: We will host a **one-day Geodesign participatory mapping workshop**
- Participants (15-20) will include **broad representation** of stakeholders interested in **planning for safer VRU travel**
- **Goal** - a collaborative plan that: 1) identifies 5 to 10 locations to prioritize for **more permanent** VRU safety monitoring and evaluation, and 2) generates a list of **feasible countermeasures** for each location, drawing from collective expertise

Follow-up Activities

- **Follow-up full-scale S&CC IRG project proposal informed by these activities and results**
- **Timely, as the community continues to evaluate future bike & pedestrian infrastructure (map at right)**

Source: City of Reno Micromobility Pilot Project. https://www.reno.gov/community/sustainability/bicycling-and-micromobility/micromobility-pilot-project

Broader Impact

- **Making roads safer for VRUs can facilitate greater levels of bicycling and walking, helping to meet sustainable transportation goals and improving public health outcomes**
- **Detecting near-misses can help to develop or augment traffic safety metrics to better calibrate data-driven planning, informing policy and countermeasures**

Project Personnel lead our focus group discussion on how existing methods detect and classify near-miss events