



# Navigating Roundabout Safety

## Crossing Opportunities and Speed Patterns for Drivers and Pedestrians

Nagoya University – University of Tokyo – UWA Workshop

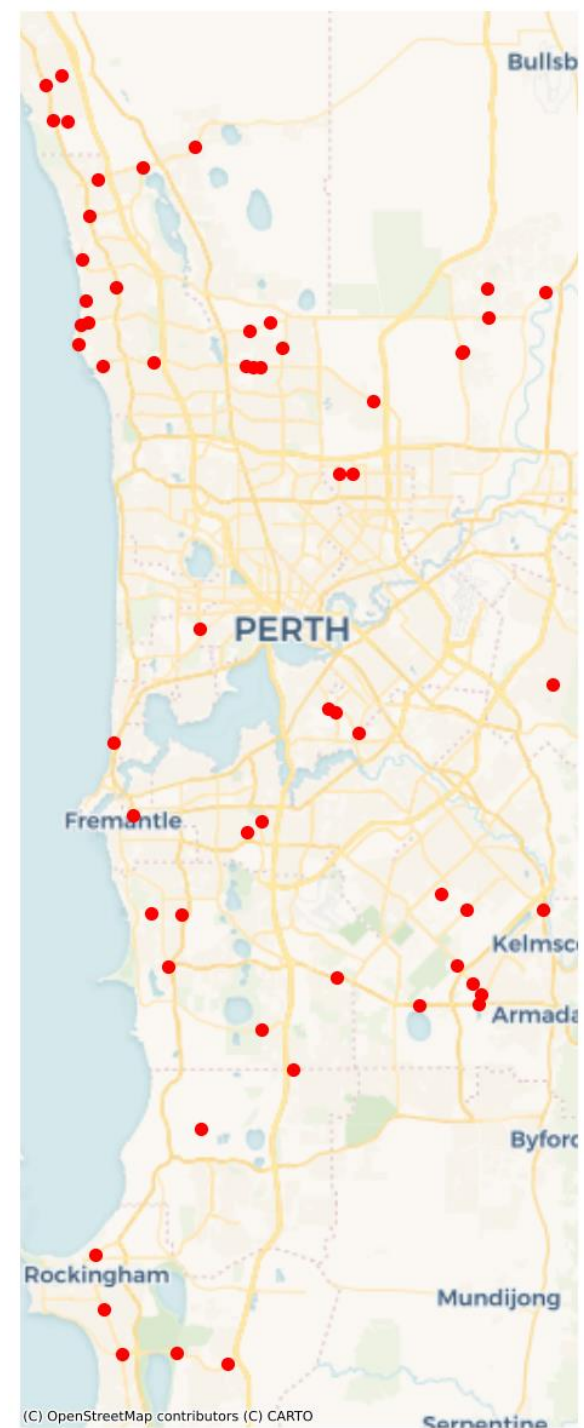
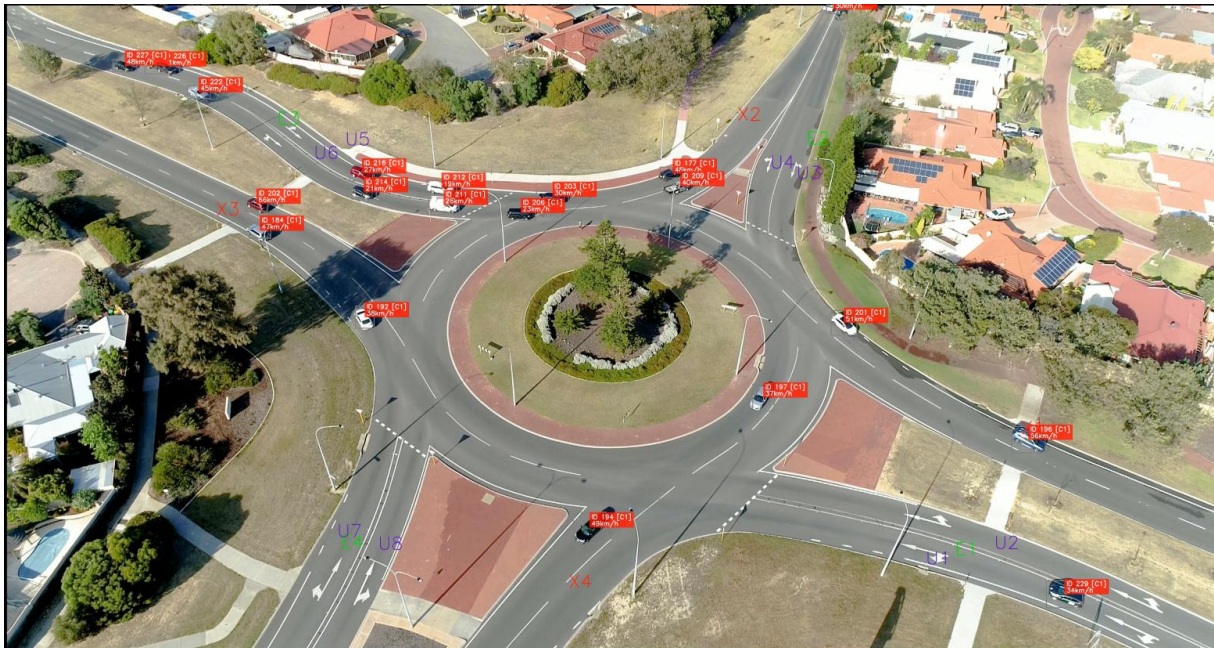
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This is an interim summary on **iMOVE project 1-095 Roundabout safety review using drone video analytics.**

The project uses vehicle trajectories extracted using AI-driven video analytics to measure the safety performance of roundabouts and gain insight safety implications of design decisions. This current results are preliminary, with the final results to be disseminated upon the completion of the project.



### **Problem:**

- Roundabouts are widely adopted due to assumed safety and efficiency benefits
- Aggregate safety analysis ignores critical driver dynamics
- Lack of detailed observational data for fine-grained analysis

### **Opportunity:**

- New technologies enable greater data collection
- From previous project: 100h of drone footage at 50 roundabouts



# Project steps

## **1. Pedestrians at roundabouts**

What are the opportunities for pedestrians to navigate roundabouts? Are these manoeuvres easy or risky?

## **2. Design impacts on vehicle dynamics**

What are the impacts of roundabout geometry on speed, paths, acceleration...? Does this reflect the guideline assumptions?

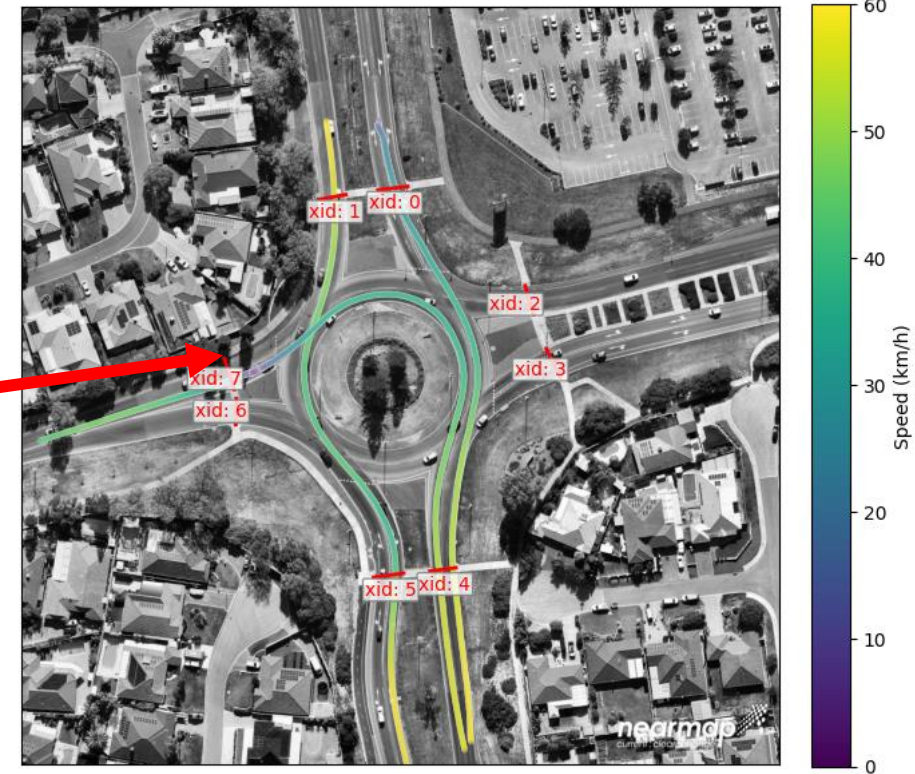
## **3. Surrogate safety analysis**

Estimate crash frequency and severity by near-miss and criticality metrics. Are there any causal links to design parameters?

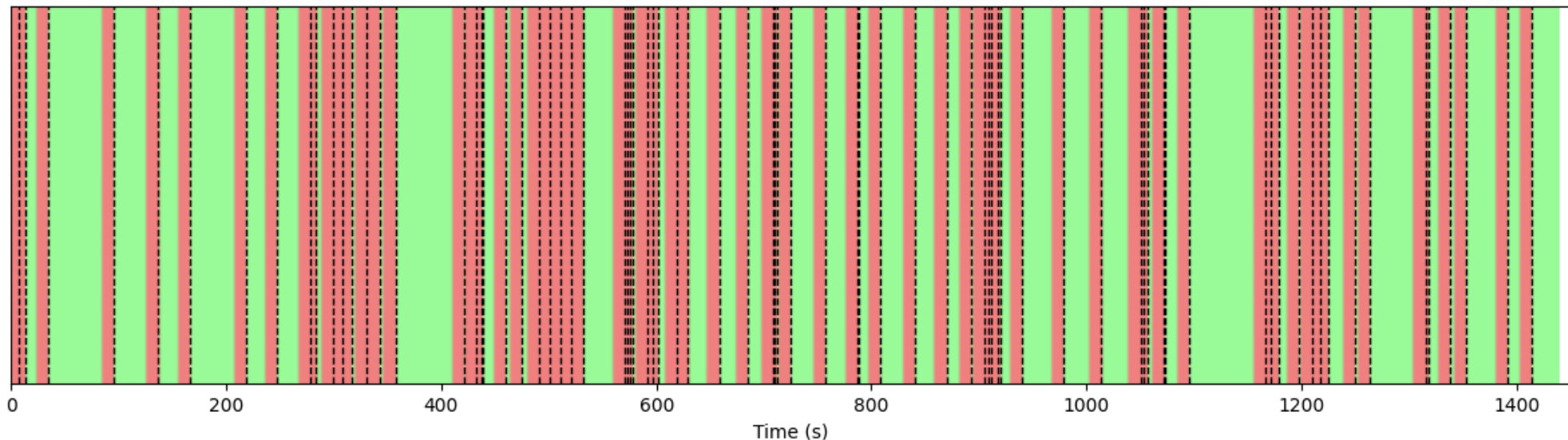
# Pedestrians at roundabouts

- Crossing opportunity based on required crossing time
- Average wait times
- Vehicle speeds at crossings
- Sightlines to upstream vehicles

Crossing event when vehicle trajectory intersects pedestrian crossing



-- Crossing Event    Crossing Opportunity    No Crossing Opportunity



Crossing opportunity time series

# Vehicle dynamics and roundabout design

- Free-flow vehicles identified using machine learning model
- Measure speed, lateral acceleration, radius of curvature along trajectory
- Group by turn movement, vehicle class, etc.
- Identify relationships with design features (road curvature, speed limit, lane selection, etc.)

