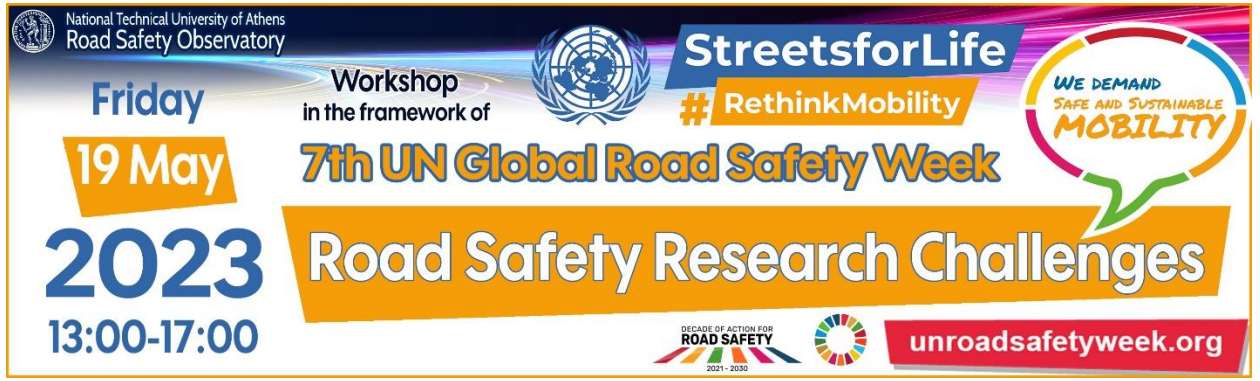


Exploring the relationship between unsafe traffic events and crash occurrence

Stella Roussou

Transportation Engineer

Together with:

Katerina Deliali & George Yannis

The Project

- **Project partner**:
  - Department of Transport Planning and Engineering (NTUA)

- **Duration of the project**:
  - 24 months (Sep. 2022 – Sep. 2024)

- **Funding Source**:
  - Basic Research Program – National Technical University of Athens

Background (1/2)

Crash prediction models:

- Dependent variable: number of crashes, crash frequency
- Independent variables (commonly): traffic volume (AADT), segment length, other road design and operational characteristics, etc.
- Crash data requirements:
  - at least 3 years
  - Collected across 100-300 sites (segments, intersections)
- These data are not always easy to collect and so, CPMs are not widely implemented even though they are the state-of-art tool in crash analysis.
- Due to technology, sensor data is widely available and can be used to describe (unsafe) driver behavior and user interactions and in turn, be used as predictor of crashes.

Background (2/2)

<u>Definitions & Data</u>

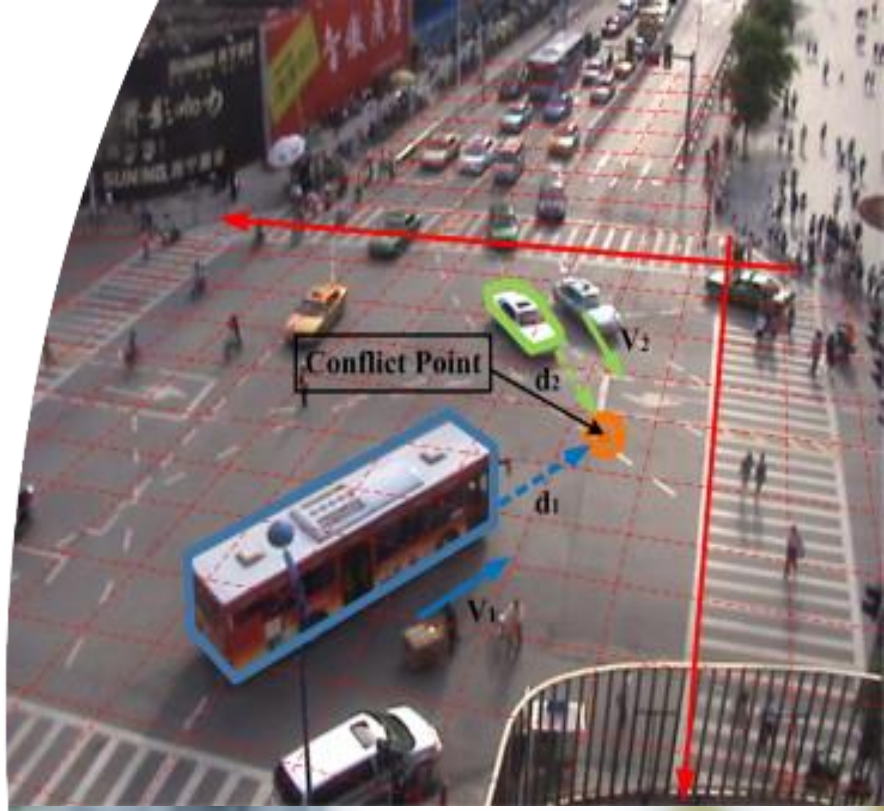
Traffic Conflicts: Traffic conflicts are defined as situations where two or more vehicles, pedestrians, or cyclists approach each other from different directions and their paths intersect, resulting in a potential collision. One user changes their speed or direction and the collision is avoided.

- <u>Data:</u> through point-based sensors (camera, radar, lidar) that simultaneously collect trajectory data from interacting users

Braking: Sudden or hard braking events can indicate a driver's reaction to a potential hazard on the road.

Speeding: Excessive speeding is a major risk factor for crashes.

- <u>Data:</u> through point-based sensors (as above) & user-based sensors (e.g., smart phone, vehicle GPS tracker) that provide network-wide coverage of a portion of the users.



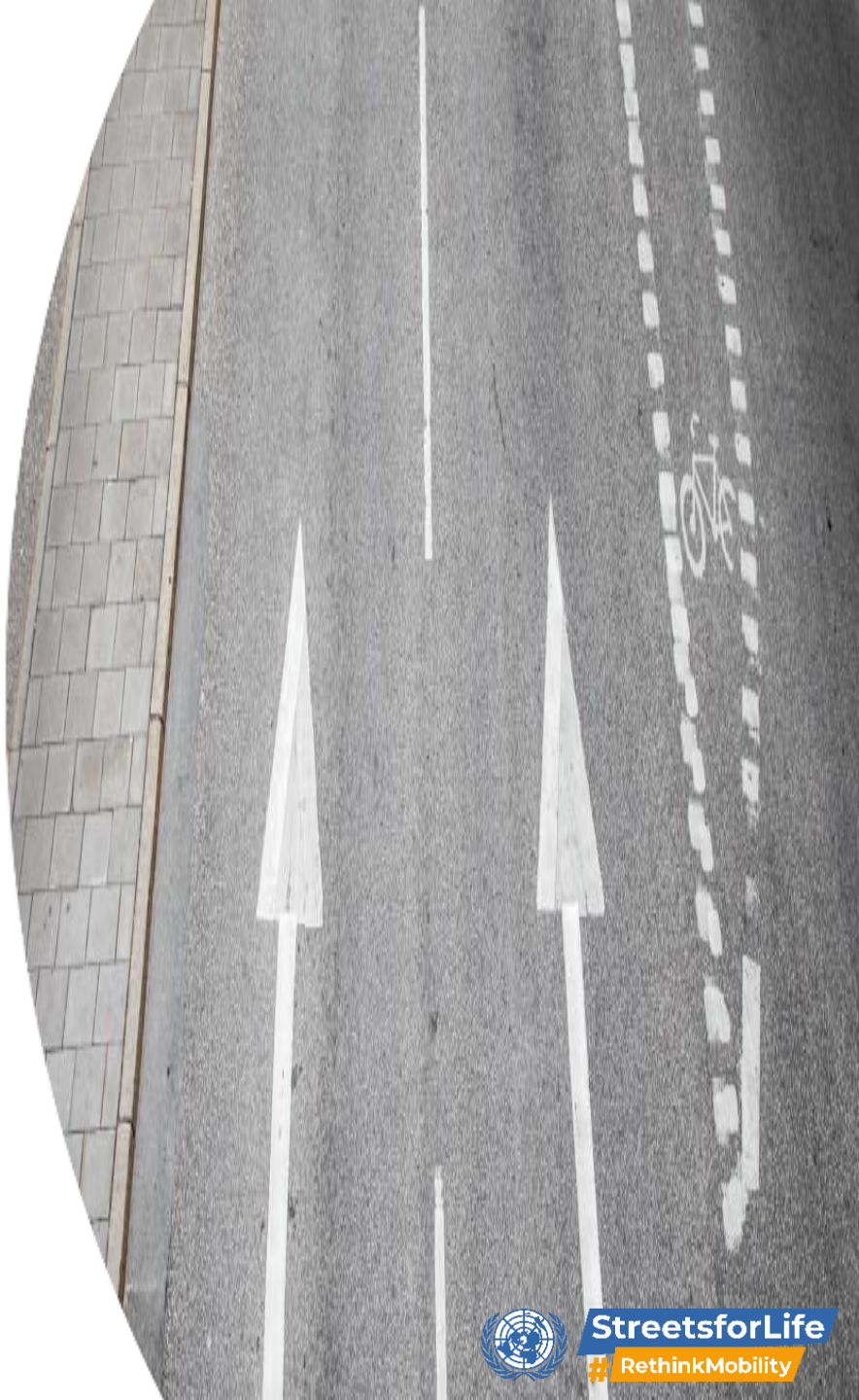
StreetsforLife #RethinkMobility

Objectives

The overarching objective of this project is the development of crash prediction models that use unsafe traffic event data as predictors.

1. Which types of unsafe traffic events (e.g., braking vs speeding) are more reliable predictors?

2. How much data is needed in terms of space (i.e., number of sites) and time (e.g., hours of observations, days, months)



Methodology

Based on the sensor types (point-based and user-based) two types of analyses are considered.

- Collect and analyze unsafe traffic event data through point-based and user-based.
  - Smartphone-based data for braking and speeding events recorded for motor vehicle drivers
  - Video-based data for traffic conflicts between bicyclists and motor vehicle drivers
- Develop crash prediction models using these data as predictors.
- Assess model performance considering the type of unsafe events as well as the associated spatio-temporal component.

Streets for Life

This project aligns with the Streets For Life objectives as the establishment of a methodology to easily and quickly assess safety through widely available sensor data improves safety for all road users and particularly for VRUs.

- Safer roads for all ensure equitable access to facilities and activities, and so fairer roads.
- Safer trips and roads for VRUs pave the path for greener roads.
- User-friendly and state-of-art sensors and data collection processes make roads smarter.

Scientific and Social Impact

- Substituting or augmenting analysis of crashes with surrogate safety measures and other (also random) more frequent events, will bring significant changes in the field of traffic safety.
- Shorter data collection and analysis periods are desirable to limit temporal variations and the influence of similar factors of unobserved heterogeneity in the data

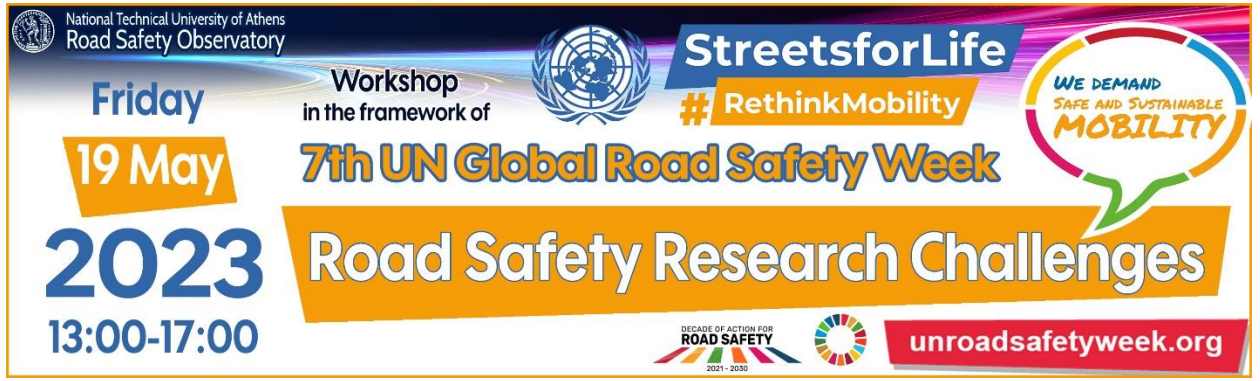
These changes in the field of traffic safety research will significantly affect the ease of conducting safety analysis and in turn, can inform authorities where safety countermeasures are needed.

Future Challenges

- Exploitation of additional data sources, e.g.:
  - Connected and Automated Vehicles (CAVs)

- Assessment of the safety across different modes, such as:
  - Single bicycle crashes,
  - Single e-scooter crashes,
  - Bicycle or e-scooter and pedestrian crashes,

- Transferability of the framework in settings with different operational characteristics (e.g., motorways vs urban streets), different modal share (e.g., more cars or more bicycles), etc.



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