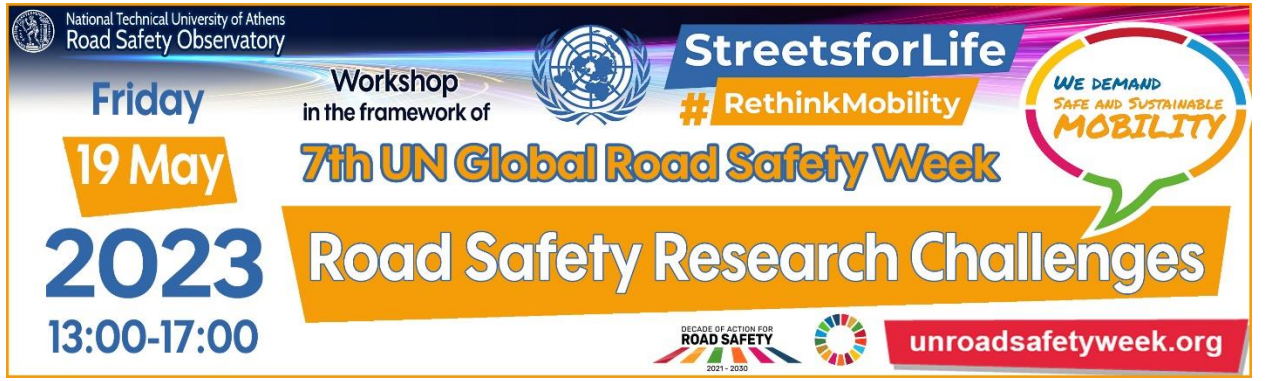


Smart city mapping for safer and eco driver behaviour

Armira Kontaxi

Transportation Engineer, PhD Candidate

Together with:

Apostolos Ziakopoulos, Dimitrios Nikolaou, George Yannis

The SmartMaps project

- **Project partners:**
  - National Technical University of Athens, Department of Transportation Planning and Engineering www.nrso.ntua.gr
  - OSeven Telematics www.oseven.io
  - Global Link www.globallink.gr
- **Duration of the project:**
  - 30 months (June 2021 – December 2023)
- **Operational Program:**
  - "Competitiveness, Entrepreneurship and Innovation" (EPAnEK) of the National Strategic Reference Framework (NSRF) – 2nd iteration

Background

- Technological advancements during recent decades have led to the development of a wide array of tools and methods to record driving behaviour and measure various aspects of driving performance

- Smartphones and data obtained from their sensors are increasingly used as informative devices for monitoring driver behaviour

- In order to effectively integrate road network distances and to precisely estimate crash risk in each location, several spatial statistical approaches and visualization tools have been implemented in the literature

Objectives

- Exploitation of large-scale spatio-temporal data from smartphone sensors
- Development of smart driver behaviour maps with online information on safety conditions and eco-driving (by reducing fuel consumption)
- Creation of a comprehensive tool to promote safe driving behaviour with application in Greece and around the world

Data Collection

Road Geometry Data (OpenStreetMap)

- Length
- Curvature
- Slope

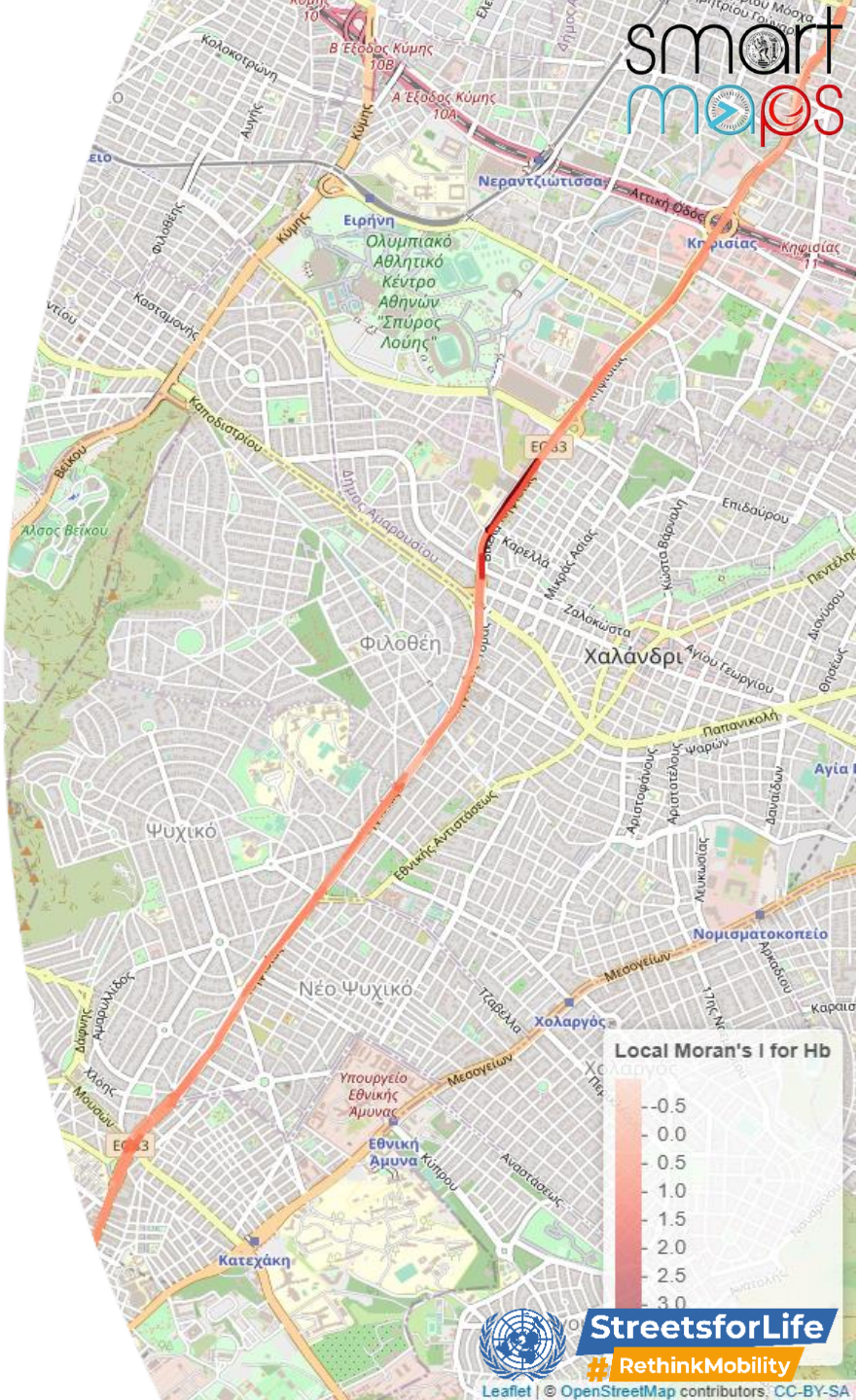
Observed Driving Data (Global Link)

- Seatbelt use
- Helmet use
- Speeding
- Distraction

Naturalistic Driving Data (OSeven Telematics)

- Harsh braking
- Harsh acceleration
- Speeding
- Distraction

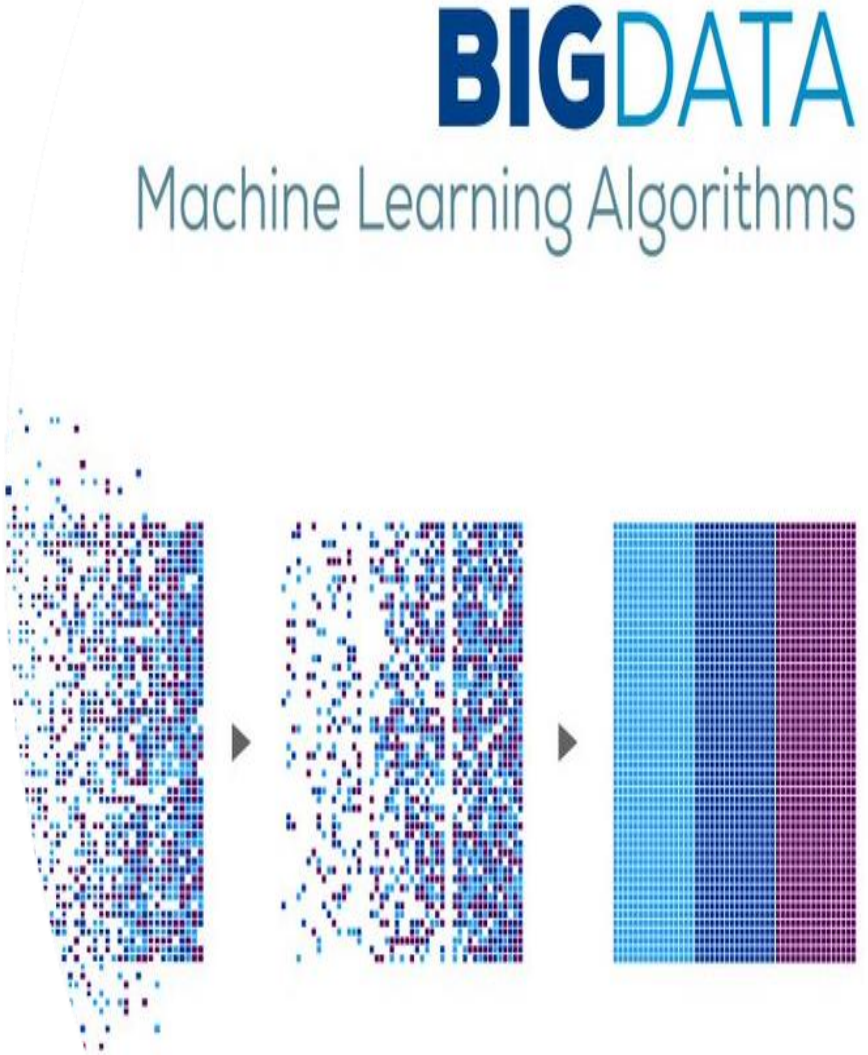
Road Crash Data (ELSTAT)



Statistical analysis

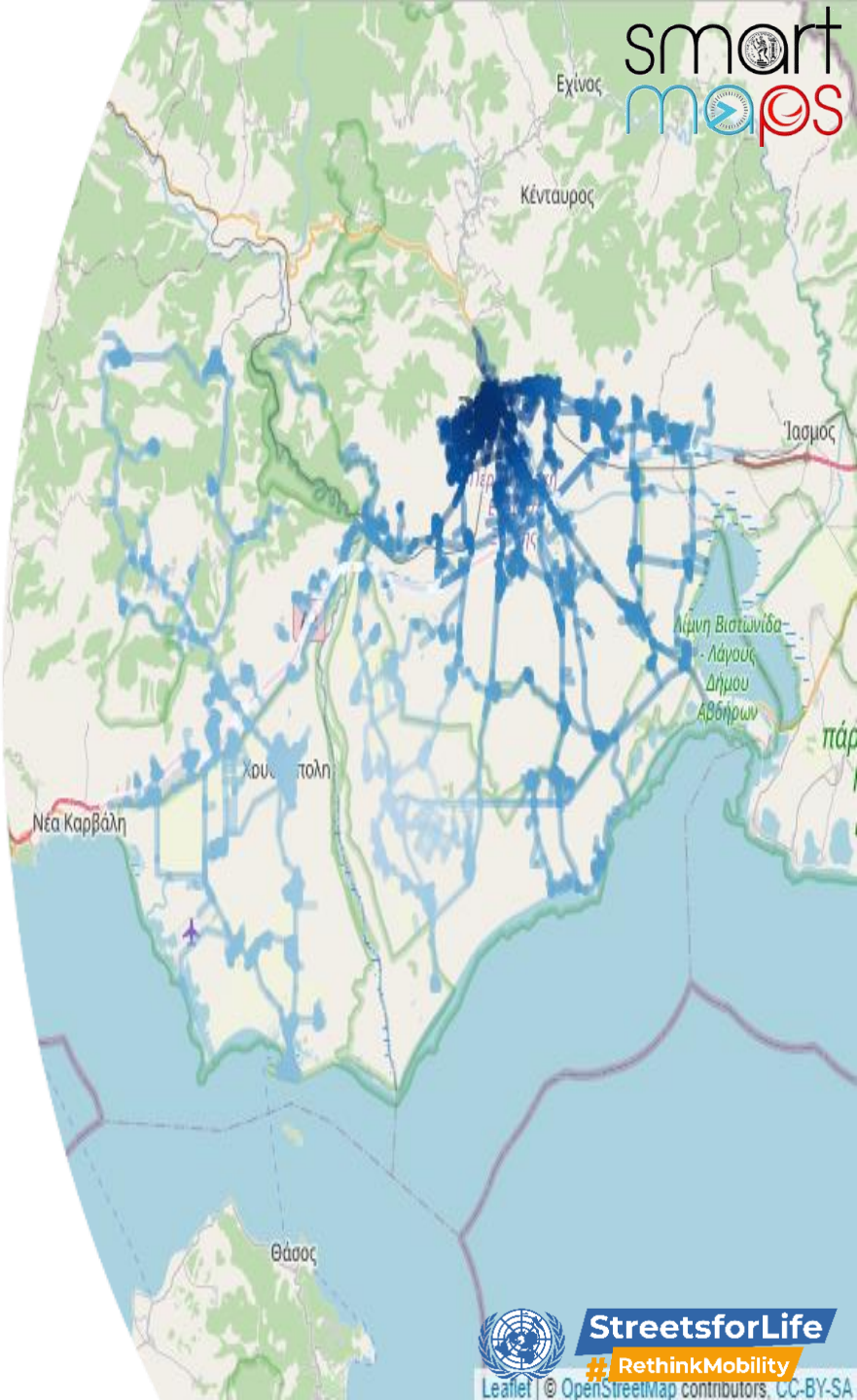
- Development of statistical models and innovative machine learning algorithms which consider:
  1. traffic data
  2. road geometry data
  3. road network data
  4. road crash data
  5. wider area/built environment data

- Several scopes to consider:
  1. Macroscopic spatial analysis (across regions)
  2. Mesoscopic spatial analysis (segment scale)
  3. Microscopic behavioral analysis (per driver/sample)



Indicative Findings

- Road geometry characteristics, naturalistic driving data, observed driving data and historical road crashes were combined for road safety modelling
- Significant positive effects of segment length, speeding events, and trip count on harsh braking events count
- Spatial models provide a better fit to the data than non-spatial models
- Transferable methodology allows for predictions in areas where no data are available



Streets for life

- The SmartMaps online platform offers insights into potential hazards, accident-prone areas, and traffic conditions, empowering drivers, pedestrians, and city planners to take proactive measures to enhance road safety

- The project incorporates eco-driving information, as well; drivers are enabled to make environmentally friendly choices, reduce their carbon footprint, and contribute to a more sustainable urban environment

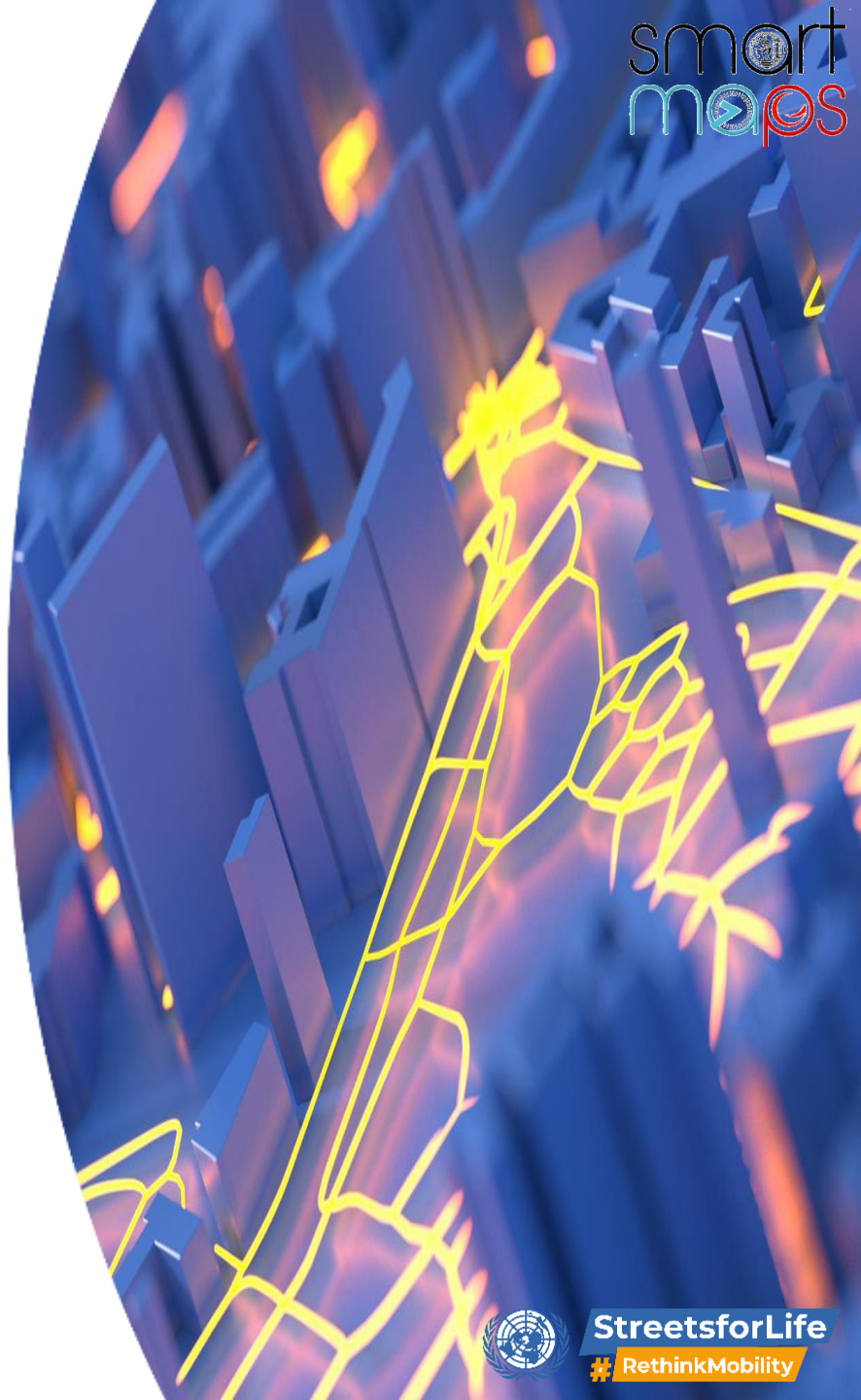
- By promoting inclusivity and accessibility, the project fosters widespread adoption and empowers a broader range of stakeholders and authorities to actively participate in creating safer city streets

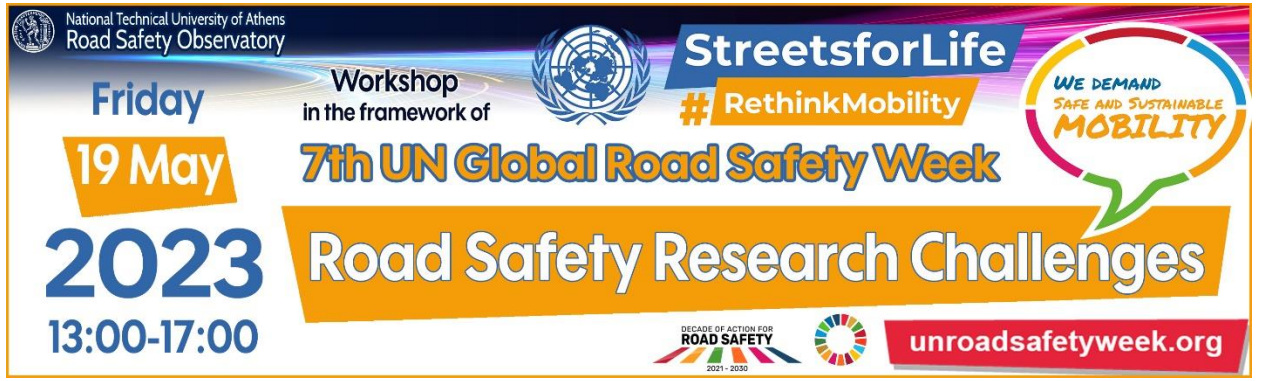
Scientific and Social Impact

- Innovative and intuitive tools for individual road users and decision makers
- Exploitation of multidisciplinary data to assess multidimensional impacts
- Novel scope of scientific approach and analysis
- Exploration of the influence of different policies on safety and environment
- Contribution towards UN and EU SDG goals for crash and fuel consumption reductions (SDGs 9&13)

Future Challenges

- Selection of representative study areas and driver samples
- Methodological topics regarding dataset harmonization and spatial scale normalization
- Development of the SmartMaps application featuring a user-friendly front-end and an efficient back-end
- Provide the use of SmartMaps as a good habit for drivers; promote safer and greener driving





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