armira kontaxi
transportation engineer, research associate
together with:

apostolos ziaiakopoulos, george yannis

smartphone applications for driver safety behaviour support
The BeSmart project

- **Project partners:**
  - National Technical University of Athens, Department of Transportation Planning and Engineering [www.nrso.ntua.gr](http://www.nrso.ntua.gr)
  - OSeven Private Company [www.oseven.io](http://www.oseven.io)

- **Duration of the project:**
  - 36 months (July 2018 – July 2021)

- **Operational Program:**
  - "Competitiveness, Entrepreneurship and Innovation" (EPAnEK) of the National Strategic Reference Framework (NSRF)

- **Project Website:**
  - [www.besmart-project.gr](http://www.besmart-project.gr)
Background

- **Accurate monitoring of driver behaviour** is progressively established in the transportation field.

- The high penetration rate of **smartphones and social networks** provide new opportunities and features to monitor and analyze driver behaviour by adopting **low-cost collection and processing methods**.

- **Naturalistic driving experiments** by means of mobile phone allow researchers to examine the effect of various **risk factors** on driving performance, identify aggressive and dangerous **driving profiles** and provide **driver feedback**.
Research Questions

- Identification of critical **risk factors** affecting driver behaviour and road safety through smartphones under naturalistic driving conditions

- Investigation of the **impact of speed** (inappropriate speed, percentage of time exceeding speed limits, etc.) and **harsh events** (harsh acceleration, harsh deceleration, harsh turn) on road safety

- Examination of the impact of different types of personalised feedback on **driving behaviour and the influence of its evolution over time on drivers** through smartphones
Methodological Challenges

➢ Development of the BeSmart application
  • International literature review on driver behaviour monitoring and feedback tools
  • Adaptation requirements for accurate recording of powered-two-wheelers behaviour

➢ Organization and exploitation of a naturalistic driving experiment of 200 drivers for 12 months
  • Different types of drivers (cars, vans, PTW, cyclists)

➢ Implementation of algorithms and statistical analyses
  • Machine Learning
  • Structural Equation Models (SEMs)
  • Road Safety Toolbox
The BeSmart Experiment

- A **200-driver naturalistic experiment**
  - 21 months (extension due to COVID-19)
  - 4 driver types included:
    - Car drivers, powered two-wheelers, cyclists
    - Professional drivers (Nea Odos fleet)
  - 6 different phases differing in the **type of feedback provided** to drivers:
    - No feedback
    - **Personalised feedback** with scorecards, statistics and reports
    - Incentives within a **social gamification** scheme, with personalised target setting, benchmarking and comparison with peers
Indicative Findings

- There is an **overall improvement of driving behaviour** in terms of speeding, mobile phone use and harsh events from no feedback to feedback phases.

- The greatest improvements were observed during the appearance of the **personalised trip scorecard** and during an **one-month competition** for a number of prizes and awards.

- **Private car drivers and professional drivers**: speeding was the most enhanced driving behavioural indicator; 30% of drivers showed a **reduction greater than 50%**.

- **PTWs**: the number of harsh accelerations was the most improved risk factor; an average **reduction of 30% for the total of PTWs**.
Scientific and Social Impact

- **Innovative monitoring driver behaviour**
  - Seamless behaviour monitoring in all vehicles including vulnerable road users (PTW, cyclists)

- **Driver training and support**
  - Significant *improvement of driver behaviour*
  - **Continuous driver feedback** to achieve road accident reduction over time
  - Development of *better road safety culture* for all road users
Future Challenges

- Integration of a multitude of **IoT technologies**, development of advanced know-how

- Development of **new smartphone applications**, for all road users and all transport modes

- Properly **matching telematics** metrics with crash risk

- Exploitation of know-how for the safe integration and monitoring of **automated vehicles**

- Enhancement of **innovation capacity** and creation of new market opportunities for driver behaviour telematics
Smartphone applications for driver safety behaviour support

Armira Kontaxi
Transportation Engineer, Research Associate

Together with:
Apostolos Ziakopoulous, George Yannis