National Technical University of Athens

The NTUA Laboratory of Traffic Engineering

School of Civil Engineering

February 2025

Presentation outline

1. The NTUA Laboratory of Traffic Engineering
2. Education
3. Research
4. Research Infrastructure
5. Cooperations and Partners
6. Research Areas

The NTUA Laboratory of Traffic Engineering

The NTUA Laboratory of Traffic Engineering

- The Laboratory of Traffic Engineering (LTE), established in 1998, is a Center of Research and Innovation Excellence in Traffic Engineering, with global recognition

- It belongs to the Department of Transportation Planning and Engineering (www.transport.ntua.gr) of the School of Civil Engineering (www.civil.ntua.gr)

- Since its establishment, the LTE contributes to transportation science through numerous academic and research activities

Mission

The Mission of the NTUA Laboratory of Traffic Engineering is:

- educate scientists engineers , and
- to promote research

in the field of traffic engineering

The Laboratory's educational and research activities are characterised by high innovation, excellent organisation and great utility for society

Vision

The Vision of the NTUA Laboratory of Traffic Engineering is:

- the substantiated support for decisions on the optimal operation of urban and interurban road traffic in Greece and internationally,
- making use of the most modern scientific theories and technological developments,
- so as to ensure both the servicing of the traffic and the medium-term economic and environmental sustainability of the mobility

Laboratory People

A dynamic team of more than 40 renowned scientists:

- Faculty 3
- Post Doctoral Researchers 8
- Ph.D. Candidates 26
- Research Assistants 10
- Information Systems Engineers 2
- Administrative assistants 3

Laboratory Faculty

George Yannis
Professor, Department Director

Eleni Vlahogianni
Professor

Eleonora Papadimitriou
Assistant Professor

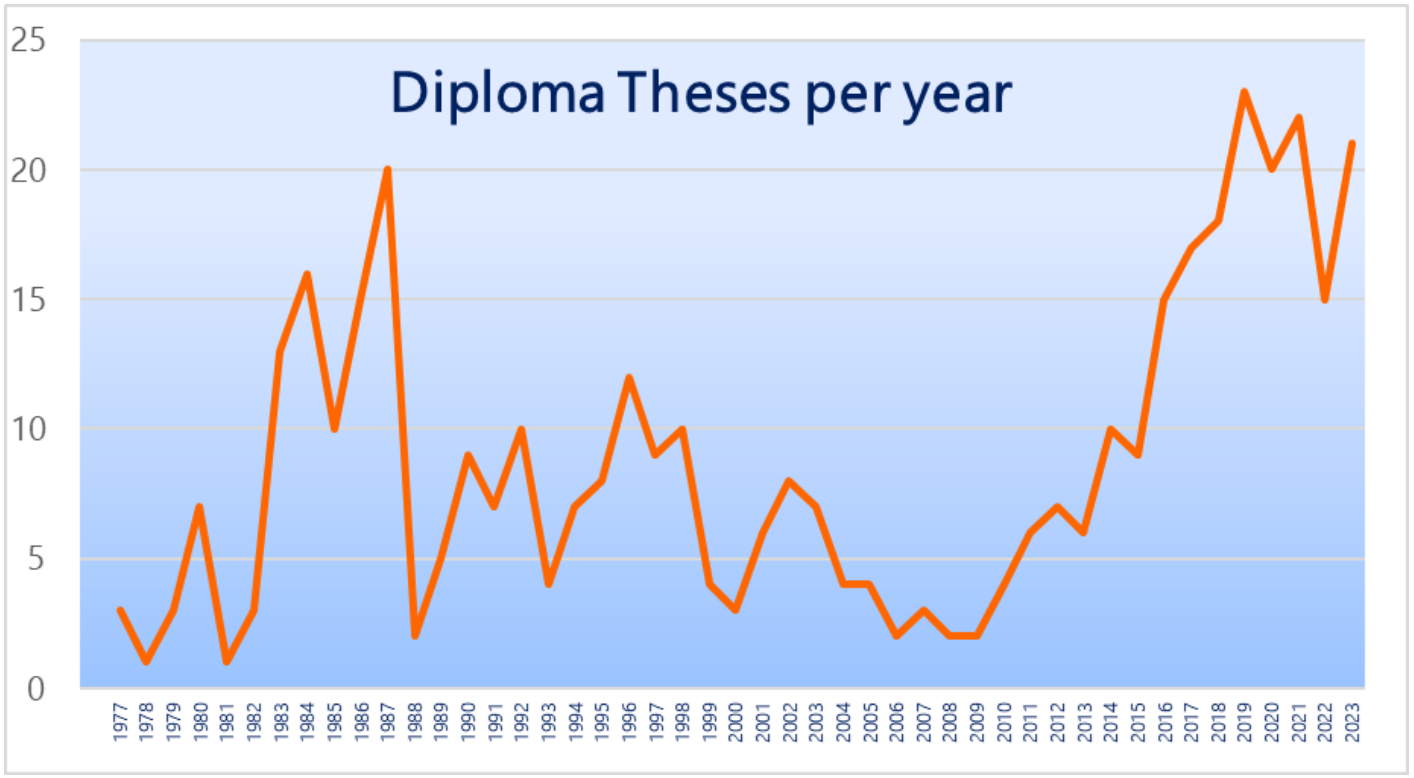
Education

Courses

1. Traffic Flow theory
   7th Semester
2. Urban Road Networks
   8th Semester
3. Traffic Management and Road Safety
   9th Semester
4. Analysis Methods in Traffic Engineering
   9th Semester
5. Quantitative Methods in Transportation
   9th Semester
6. Integrated Project in Transportation Engineering
   9th Semester

Diploma Theses

- 487 Diploma Theses since 1977
- 192 Diploma Theses since 2014
- 10 Diploma Theses per year



PhD Theses Completed

- Eva Michelaraki (2024)
- Panagiotis Fafoutelis (2024)
- Dimitris Nikolaou (2024)
- Eleni Mantouka (2022)
- Evangelos Mintsis (2022)
- Apostolos Ziakopoulos (2020)
- Dimitrios Tselentis (2018)
- Emmanouil Barmpounakis (2017)
- Dimosthenis Pavlou (2016)
- Athanasios Theofilatos (2015)
- Panagiotis Papantoniou (2015)
- Eleonora Papadimitriou (2010)
- Eleni Vlahogianni (2006)

PhD Theses Underway

- Aikaterini Papadatou (2024)
- Dimitris Tzanis (2024)
- Viktoria Petkani (2024)
- Stelios Peithis (2024)
- Aristotelis Tsoutsanis (2024)
- Simone Paradiso (2024)
- Júlia Porto (2024)
- Aristotelis Styanidis (2024)
- Nikos Karouzakis (2023)
- Stella Roussou (2023)
- Aikaterini Vakrinou (2023)
- Konstantinos Katzilieris (2021)
- Marios Giouroukelis (2021)
- Marios Sekadakis (2021)
- Maria Oikonomou (2021)
- Virginia Petraki (2020)
- Julia Roussou (2019)
- Armira Kontaxi (2019)
- Alexandra Laiou (2019)
- Charis Chalkiadakis (2018)
- Eleni Chalkia (2017)
- Alexandros Papacharalampous (2017)
- Foteini Orfanou (2016)
- Emmanouil Kampitakis (2016)
- Aikaterini Stylianou (2015)
- Aikaterini Folla (2015)


Researc
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Research Projects

More than 175 Research Projects
> 94 International
> 81 Greek

With more than 350 national and international organizations

More than 100 through highly competitive procedures

Scientific Publications

More than 1.100 Scientific Publications

Scientific Journals	>400
Conference Proceedings	>600
Conferences Presentations	>700

Research Infrastructure

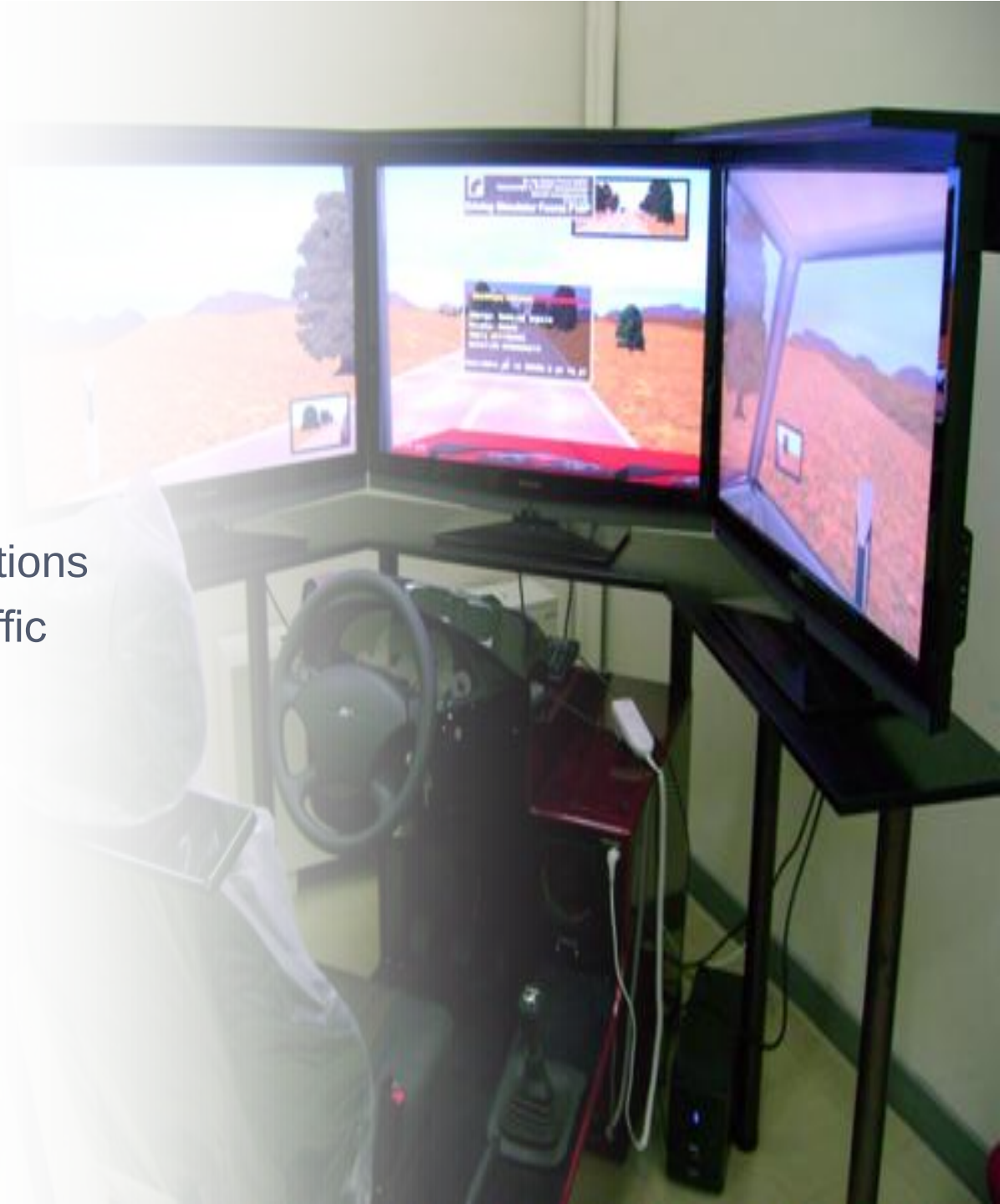
Research Infrastructure

1. Driving Simulator
2. Unmanned Aerial Vehicles (UAV
3. On-Board Monitoring Devices
4. Traffic Counts Devices
5. Data Bases
6. Data and Knowledge systems
7. NTUA Road Safety Observatory
8. Software

Driving Simulator

Foerst Driving Simulator FPF 1/4 cab

- Motion Base
  - 2 degrees of freedom
- Programming Software Tool
  - Programming driving scenarios in different conditions
  - Investigation of driver's behaviour in extreme traffic conditions and conditions of difficult geometry
- Driver Behaviour Data
  - Kinematic characteristics
  - Speed, acceleration, headways, time-headways
  - Time To Collision
  - Track of the vehicle
  - Reaction Time

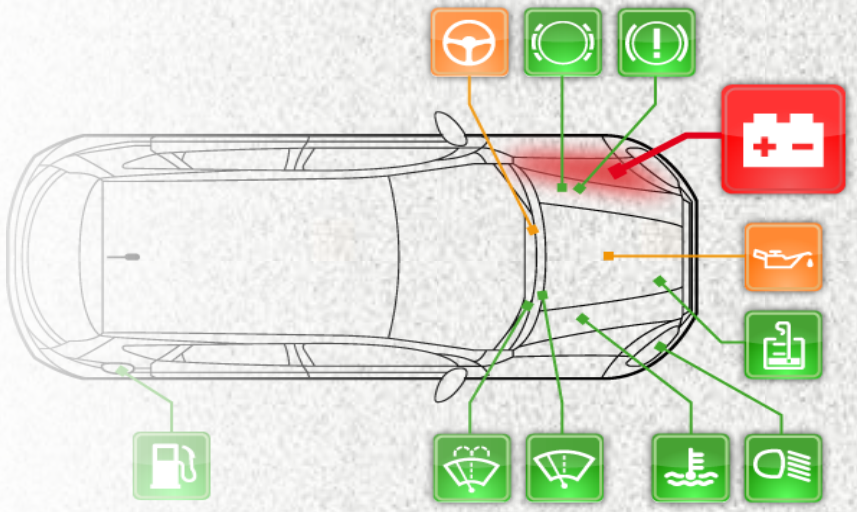


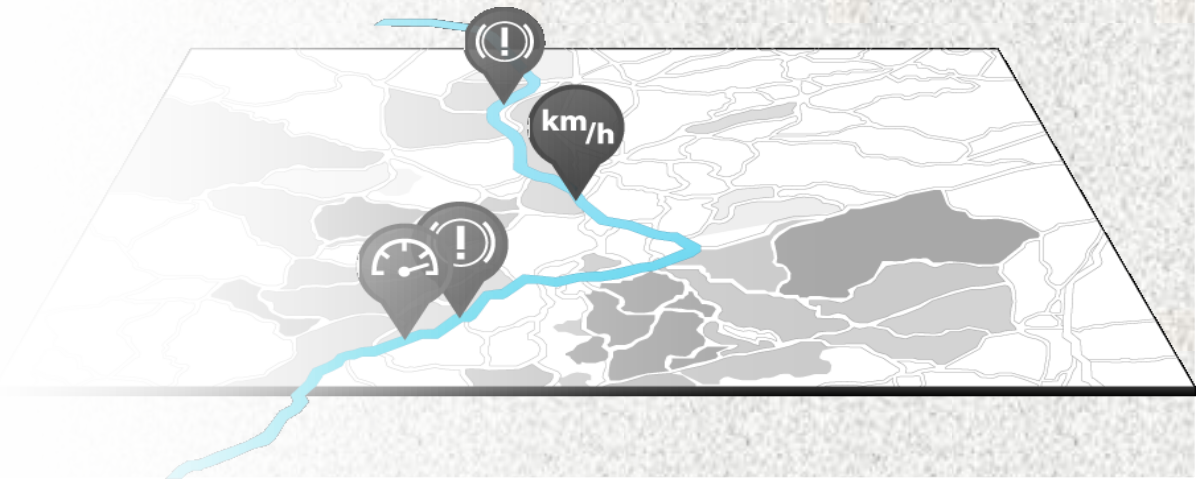
Unmanned Aerial Vehicles (UAVs)

- Traffic monitoring
- Trajectory data collection of vehicles and pedestrians
- Detection of critical traffic and roadway conditions

On-Board Monitoring Devices

- Vehicle performance monitoring data collection
- Driving performance monitoring and data collection
- Fuel consumption data collection





Traffic Counts Devices

- Manual traffic counters
- Counters of turning templates traffic
- Automatic traffic counters sectional road (ADR)
- Radar speed detection (Laser)
- Device for measuring and analyzing traffic to junction
- System for recording and analyzing real-time traffic (Autoscope)
- Device road traffic noise levels
- GPS devices log position information

Data Bases

- SANTRA - Greek Road Accident Database with disaggregated data (1985 - 2019, 1,3 million recordings)
- CARE - European Road Accident Database with disaggregated data (1991 - 2020, 40 million recordings)
- IRTAD - International Road Accident Database with aggregated data
- Databases of International Organisations (WHO, IRF, ERF, UITP)
- Databases with Aggregated Data (Vehicle fleet, veh-km, driver behavior, etc.
- Digital Road Safety Library > 6.500 key Reports

Data and Knowledge Systems

- Erso - The European Road Safety Observatory
- SaferAfrica - The African Road Safety Observatory
- SafetyCube - European Road Safety Decision Support System
- SafeFITS - Global Road Safety Model
- Pract - The CEDR Road Safety APM and CMF Repository
- SmartMaps - Smart Mapping Tool for Safer and Eco Driver Behaviour
- NRSO - The NTUA Road Safety Observatory

NTUA Road Safety Observatory

An international reference website
- information system since 2004, with
state-of-the art road safety data and knowledge

www.nrso.ntua.gr

- since 2004 with more than 2.470 items
- more than 30.000 visits per month
- 149 electronic newsletters since 2007
- tens of tweets and social media posts annually
- network of more than 5.500 road safety experts in Greece (1.500+) and worldwide (4.000+)

Software

- Traffic Flow Analysis
  - HCM, Synchro, TSIS
- Macroscopic and Microscopic Traffic Flow Simulation
  - AIMSUN, Saturn, Contram, Simtraffic, Corsi
- Statistical Analysis
  - SPSS, R, MLWIN, MATLAB, LIMDEP, Python
- Traffic Flow Forecast, Traffic Flow distributio network
    - CUBE

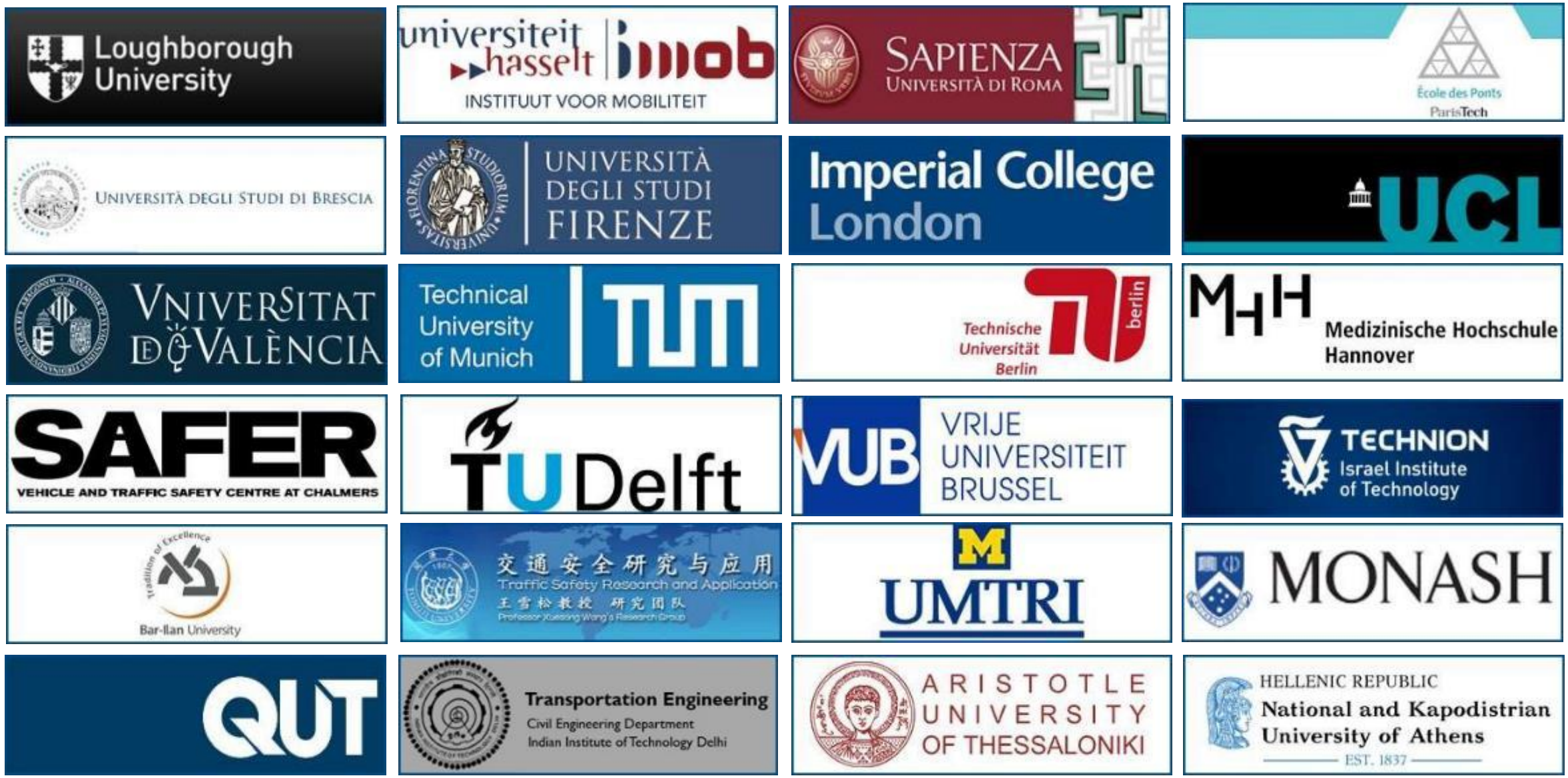
Cooperations & Partners

Cooperations - Greece

Cooperations - Europe

Cooperations - Worldwide

Partners - Universities



Partners - Research Institutes

Research Areas

Traffic Management - Topics

- Data driven traffic flow analysis and forecasting
- Simulation for automated traffic
- Mobility as a service, electromobility, connected and shared mobility
- UAV based traffic monitoring and analysis
- Traffic and safety of PTW, cyclist and pedestrians
- Network level traffic prediction and management
- Evidence based mobility optimization and policy making
- Design and implementation of traffic management systems
- Design and operation of parking systems

Traffic Management
Research Questions

- How to improve traffic monitoring using crowdsourcing?
- How ICT, social networks and smartphone sensing can be used for traffic monitoring control and management?
- Can UAVs be used for monitoring traffic and identifying congestion in urban areas?
- What is the impact of smart mobility services to large scale network traffic?
- How to manage the cooperative and automated traffic?
- Can intelligent parking services reduce traffic congestion in cities?

Traffic Safety - Topics

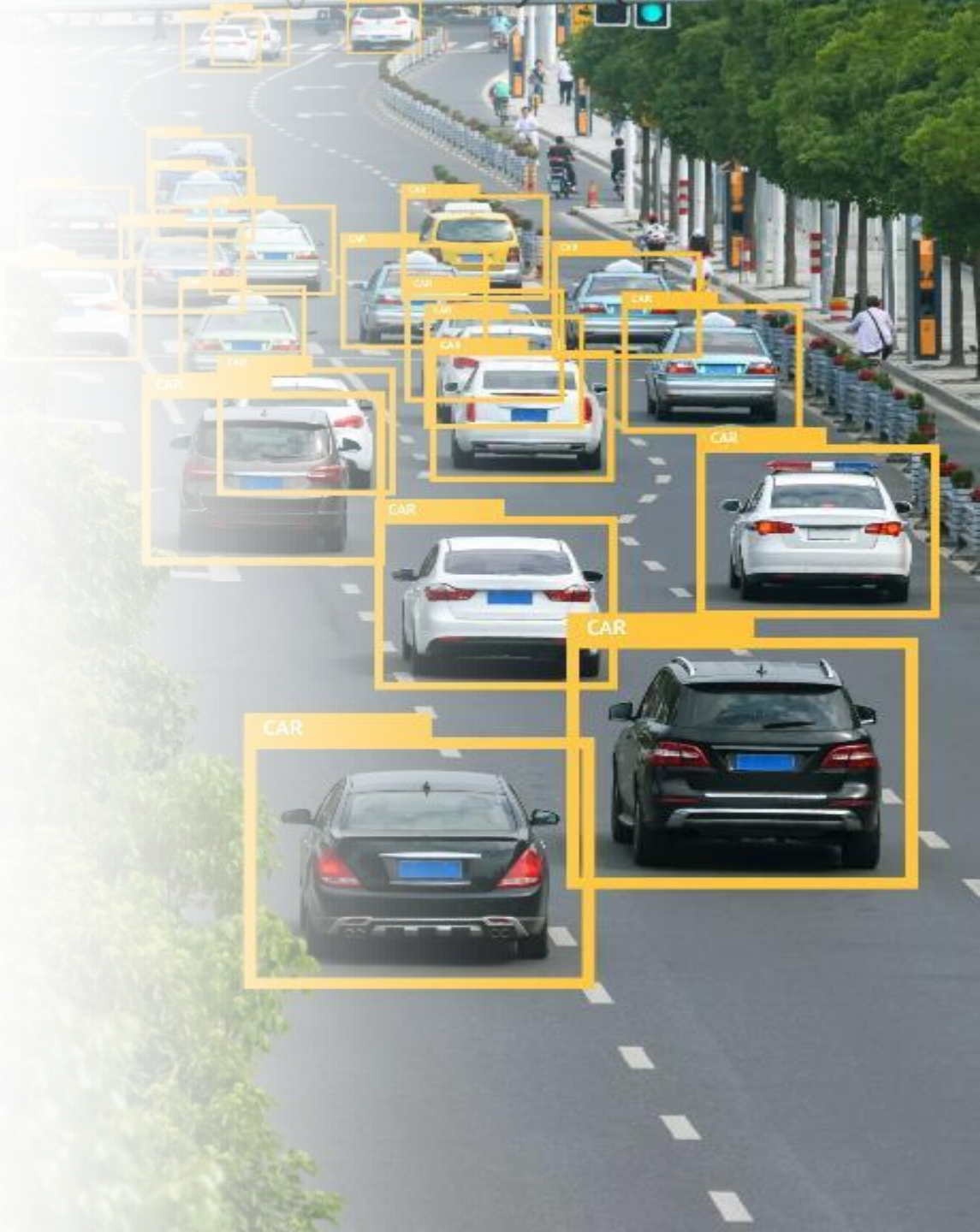
- Driver Safety Behaviour & Telematics
- Road Infrastructure Safety
- Traffic Safety Analysis
- Road Safety Data & Knowledge Systems
- Road Safety Management

Traffic Safety
Research Questions

- How to improve driver safety behaviour with focus on speeding, drink-and-drive and distraction?
- Which are the best solutions for safe traffic of Vulnerable Road Users?
- How to integrate safety into urban mobility planning and operation?
- How to identify and assess the most appropriate road safety measures?
- How to exploit big data to support better traffic safety decision making but also driver behavior?
- How are automation and connectivity going to improve traffic safety?

ITS and Automation - Topics

- Smatphone sensing and analytics, insuranc telematics, driving analytics
- C-ITS applications
- Traffic Automation
- Impact assessment of ITS, c-ITS and CAV c mobility, environment and safety



ITS and Automation
Research Questions

- Can we accurately predict demand in future cooperative and connected smart city context?
- What will be the impact of automation in future road networks?
- How to develop efficient individualized systems for managing personal mobility?
- How to accurately forecast traffic evolution in the era of autonomous, connected and shared mobility?

www.transport.ntua.gr/traffic-engineering-laboratory/

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Mission

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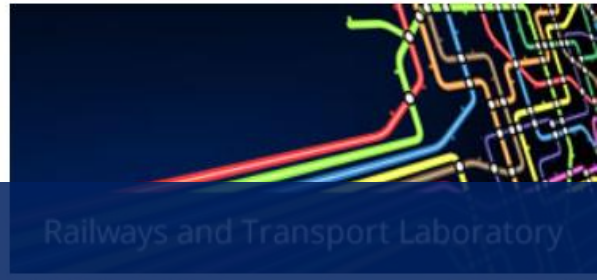

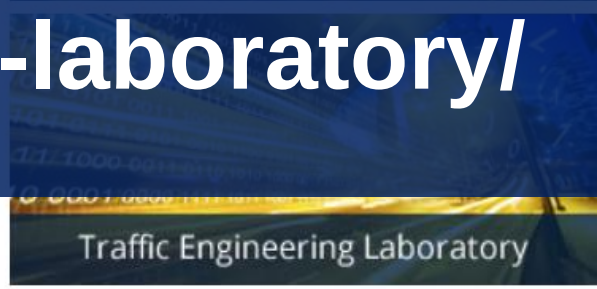

Transport Tools

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