



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 background of the slide features a complex, abstract geometric design. It consists of numerous overlapping, semi-transparent hexagonal shapes in various shades of gray, white, and light blue. These hexagons are interconnected by a network of thin, white lines, creating a sense of depth and connectivity. The overall aesthetic is modern and technical, typical of a presentation related to engineering or research.

The NTUA Laboratory of Traffic Engineering



Πτέρυγα Β
• Εργ. Κυκλοφοριακής Τεχνολογίας
• Εργ. Οδοστρωμάτων

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



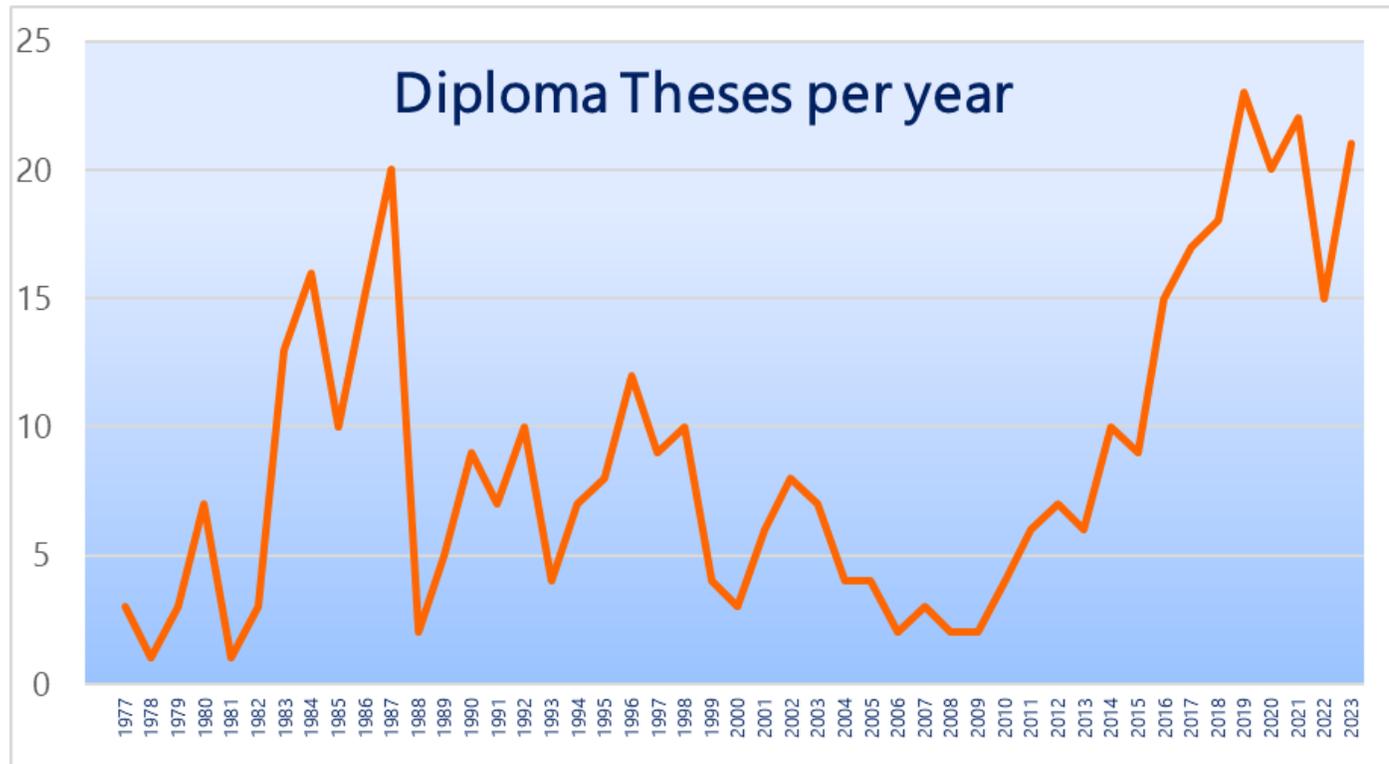
Courses

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 Barmponakis (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 Styaniadis (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)



A night cityscape with light trails from traffic and a network overlay. The image features a dark blue background with a white network of lines and nodes. The text "Research" is written in white, bold, sans-serif font, split into two lines: "Researc" on the top line and "h" on the bottom line. The background shows a city at night with light trails from traffic, suggesting a focus on technology, data, or infrastructure.

**Researc
h**

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)

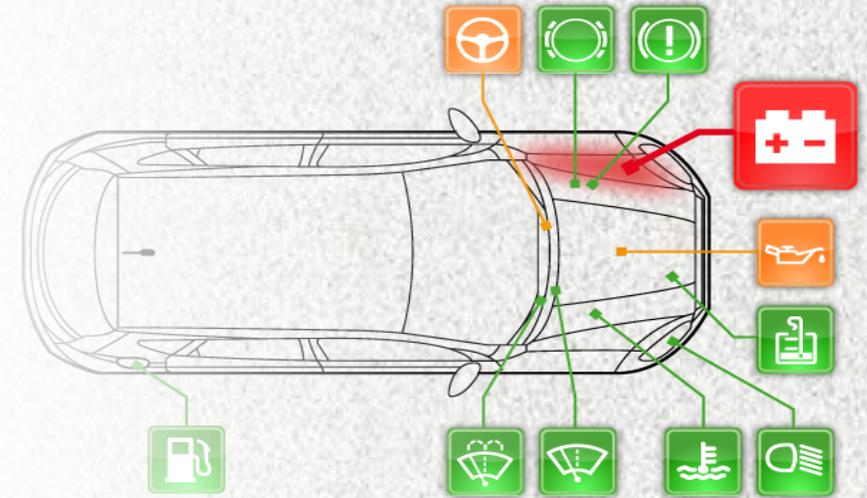
- **Traffic** monitoring
- **Trajectory** data collection of vehicles and pedestrians
- Detection of critical traffic and **roadway** conditions



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+)



The NTUA Laboratory of Traffic Engineering – February 2025

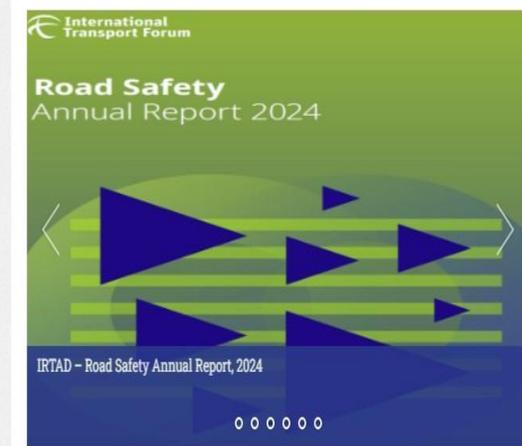
A screenshot of the NTUA Road Safety Observatory website. The header includes the university's name and navigation links. The main content area features a large banner for the 'International Transport Forum Road Safety Annual Report 2024'. Below this, there are sections for 'Systems' (listing various tools and databases), 'Cooperations' (listing partners like the European Commission and UNECE), and 'Upcoming Events' (listing conferences and symposia). The right sidebar contains a search bar and several event announcements.

Systems



Cooperations

Europe



European Commission – Promoting Safe Mobility: Vulnerable Road Users, December 2024



The European Commission with the active contribution of NTUA, SWOV and KFV launched a safe mobility promotion activity focusing on vulnerable road users, providing in-depth analysis of road safety for **cyclists, pedestrians, powered two-wheelers, and users of personal mobility devices**. According to the new Reports from the European Road Safety Observatory, one key

finding shows that infrastructure improvements, such as segregated bike lanes, significantly reduce the risk of serious accidents for cyclists. As for pedestrians, older individuals are disproportionately represented in fatality statistics. Powered Two-Wheelers face a significantly higher risk of dying on our roads compared to other motor vehicle users. The PMD report reveals a sharp rise in incidents involving e-scooters, particularly in cities highlighting the need to address aspects relating to the vehicle, infrastructure and rider behaviour to address this emerging challenge.

MetaCCAZE Blog – AI and Smart Cities, February 2025



The Horizon Europe research project metaCCAZE has recently released a new Blog Post authored by Evi Koliou on AI and Smart Cities. As stated, AI-driven solutions can transform urban environments, since smart traffic control systems are no longer a futuristic concept but a present reality. These AI-

Search ...



Upcoming Events



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



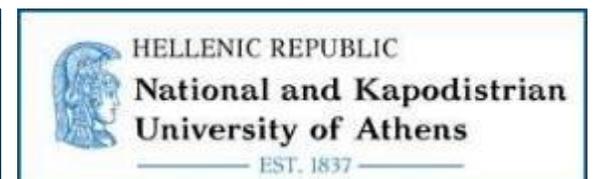
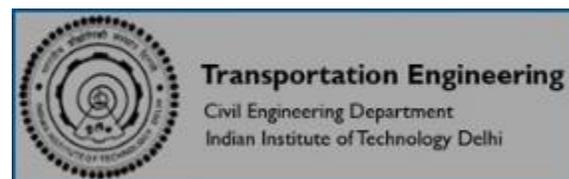
Cooperations - Europe



Cooperations - Worldwide



Partners - Universities



Partners - Research Institutes





Research Areas

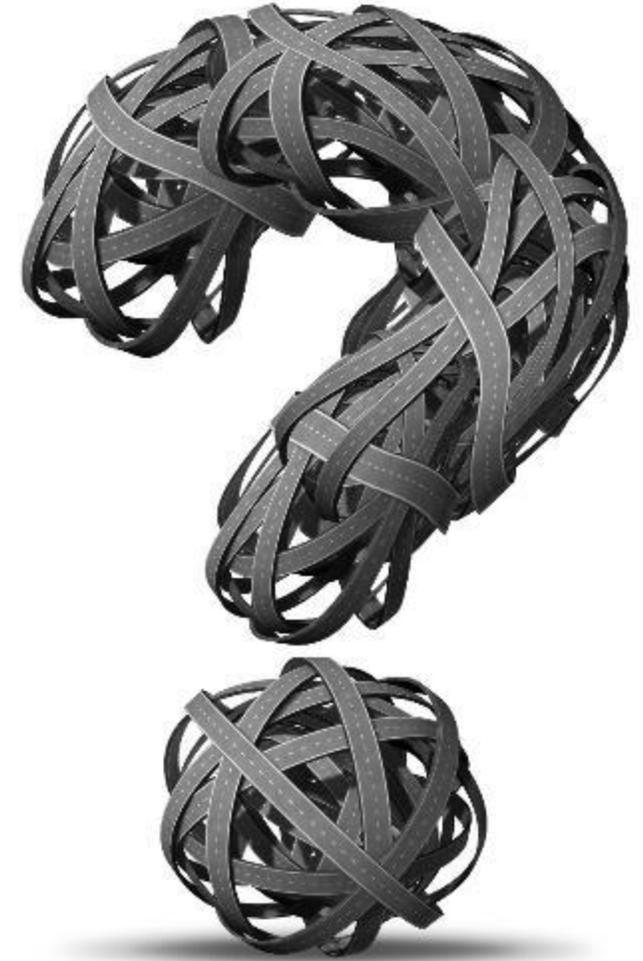
Traffic Management - Topics

- 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](#)

**SAFETY
FIRST**



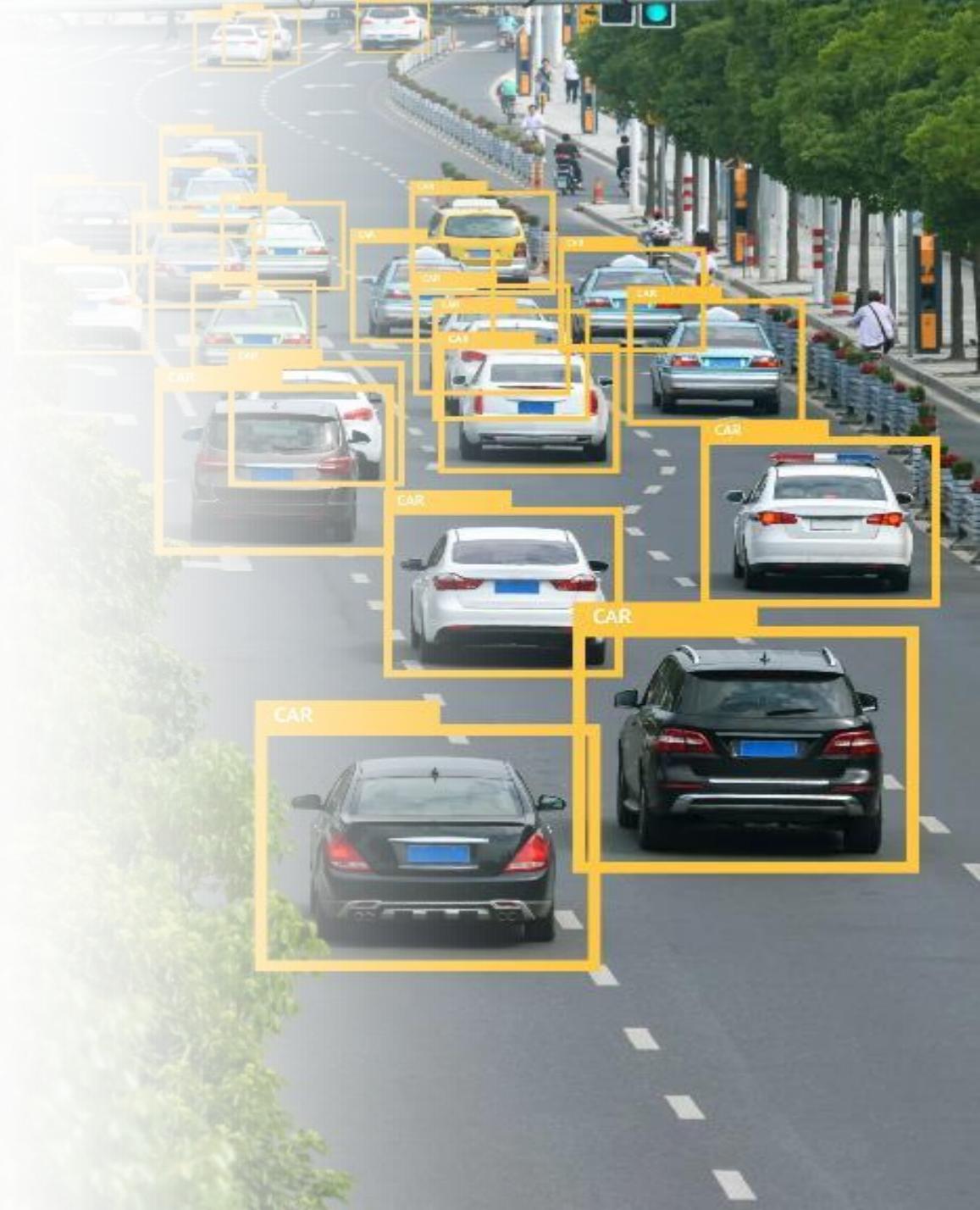
Traffic Safety Research Questions

- 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

- **Smartphone sensing** and analytics, insurance telematics, driving analytics
- **C-ITS** applications
- Traffic **Automation**
- Impact assessment of **ITS**, c-ITS and CAV 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?





Pavement Engineering Laboratory



Railways and Transport Laboratory

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

Traffic Engineering Laboratory



Traffic Engineering Laboratory

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Mission

The Mission of the NTUA Laboratory of Traffic Engineering is to provide scientists engineers with **high level of education**, and to **promote research** in the field of traffic engineering. The Laboratory's educational and research activities are characterized by high **innovation**, excellent **organisation** and great **utility** for society.

Transport Tools



Department of Transportation
Planning and Engineering

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Planning and Engineering



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