

# Intelligent cooperative integrated system for road safety and road infrastructure maintenance: ODOS 2020

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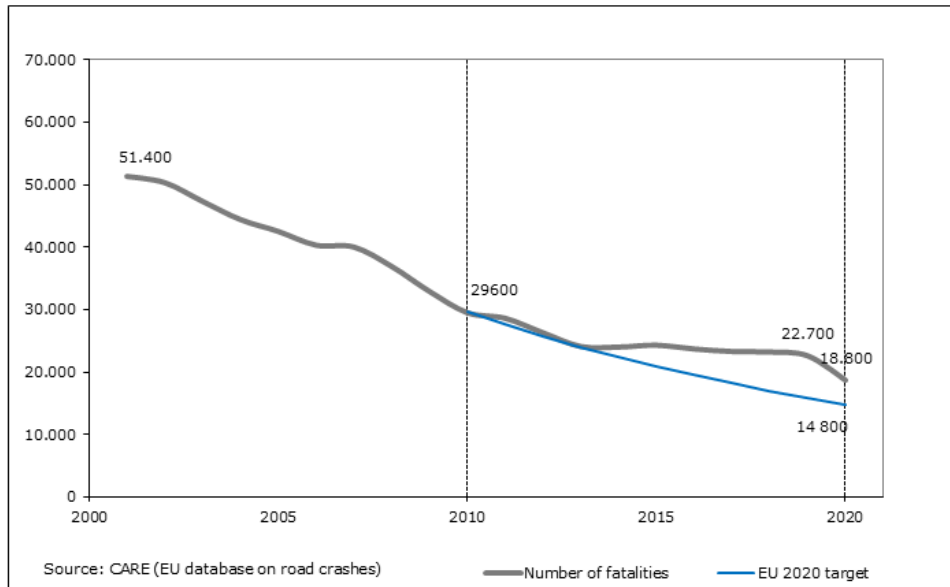
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# Road safety: the facts



Vision Zero  
EU Strategic Action Plan for Road Safety  
(2020-2030)

- **Greece:** 54 road deaths per million inhabitants in 2020, which is above the EU average. However, the country has made very significant improvements since 2010 with the biggest downward trend (54%) in the EU.

# ODOS2020

“Intelligent cooperative integrated system for road safety and road infrastructure maintenance towards 2020”

- Duration: 45 months
- Start Date: 6 September 2018
- Applications: focus on road safety and traffic efficiency & in-time detection of road infrastructure critical deficiencies leading to predictive maintenance of the infrastructure, individualized / personalised VMS and virtual toll collection payment.
- <https://odos2020.iti.gr/>



# ODOS2020 aim

**ODOS2020** aims to introduce a **disruptive technology** (ODOS integrated road safety system) that will achieve the implementation of Cooperative Intelligent Transportation Systems (C-ITS) applications, deploying Internet of Things (IoT) and Infrastructure to Vehicle (I2V) technologies.

The design will not be requiring any costly interventions in the infrastructure or purchasing costs on vehicle equipment.

The focus will be set on the **increase of road safety** and **traffic efficiency**, while it will also be contributing to the in-time detection of road infrastructure critical deficiencies leading to **predictive maintenance** of the infrastructure.



# ODOS2020 scope

- Development of a micro- and nano-sensor interface device, to be encapsulated in dedicated infrastructure components in order to provide real time condition monitoring (e.g. road, environment etc.)
- Design & development of a hybrid solution of communication technologies between the data sensor and a cloud computing server, including V2I interfaces (via IEEE 802.11p) and the use of 3G / 4G / LTE mobile network
- Development of 4 applications for smart mobile devices (3 for drivers and 1 for Traffic Management Centers) with user-friendly and personalized interfaces.
- Dissemination of the objectives and results of the project, commercial exploitation of their results and recommendations of the technological solution at National and European level
- Promotion of Greek entrepreneurship and competitiveness through the creation of new jobs not only in the context of the project but also in view of its utilization

# Methodology

A **five – step** multi view methodology has been adopted for the development of the project **Use Cases**:

1. Identification of the relevant value **stakeholders** (road users, TMC operators etc.)

2. Identification of the relevant stakeholders’ needs, **requirements** and priorities through interviews and questionnaires

3. Identification of the current technology, methodologies and tools / **Benchmarking** analysis

4. Review of the related **regulation**, legislation, technical standards, guidelines and constraints

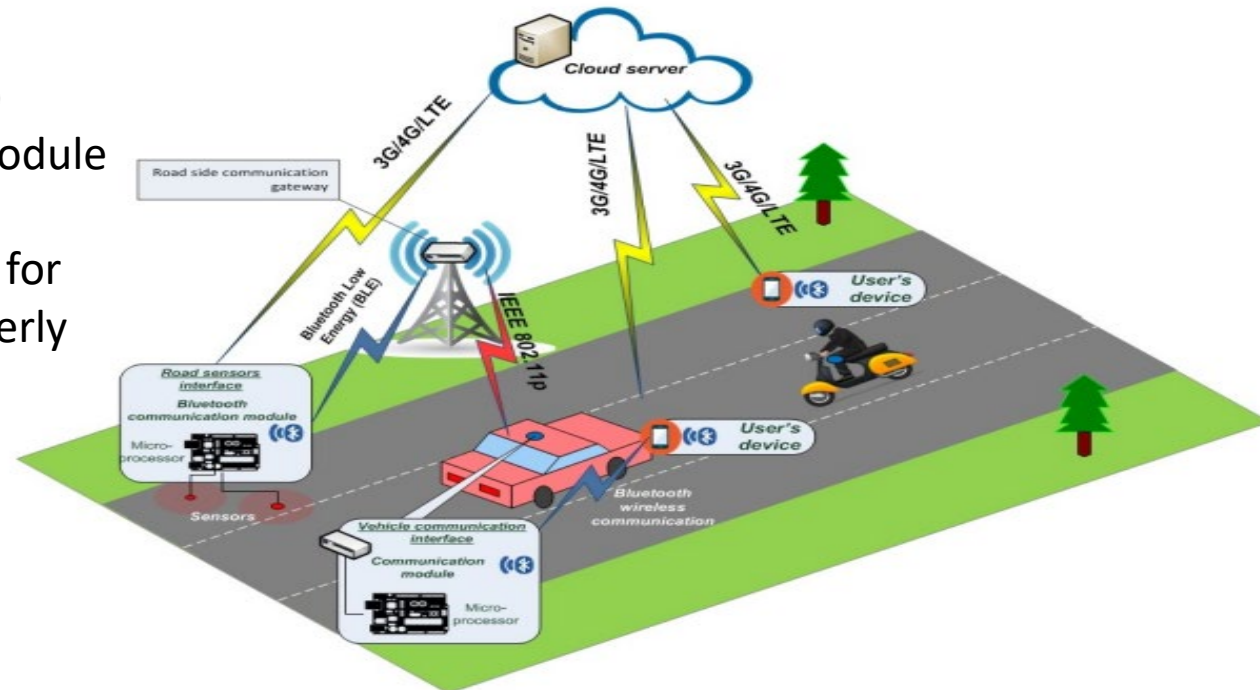
5. **Accident** analysis review in the EU and Greece, focusing on highways and Attiki Odos

# How does ODOS2020 technology work?

- Establishment of **strips markers** on the road, embodying micro nano sensors interconnected with a road side bridge (communication gateway).
- Sensors measuring and estimating several **parameters** (e.g. vehicle speed and trajectory, each user driving profile, environmental conditions in the atmosphere and on the road pavement e.g. temperature, humidity etc.).
- Seamless, continuous and real-time **communication and data exchange** amongst the road users’ devices, the TMC and the road infrastructure.

# ODOS2020 architecture

- IEEE 802.11p wireless communication protocol Road sensors interface
- Road side communication gateway – bridge
- User interface
- Bluetooth low-energy (BLE) network communication module
- Wireless broadband communication 3G/4G/LTE for transmitting data to a properly configured cloud server





# ODOS2020 applications



Road safety application for driver support; aimed at drivers of all types of vehicles



Monitoring of road wear level and road maintenance prediction for Traffic Management Centers



Personalised VMS/VDS for driver assistance



Virtual toll collection

# ODOS2020: an innovative approach

- “Intelligent” infrastructure without costly interventions
- Reduction of infrastructure equipment costs by 50-95% compared to existing methods
- Development of applications for all smart devices (Android, iOS): fast market penetration
- Provision of personalized information in real time depending on the traffic and environmental conditions: road safety & driving behaviour improvement
- Addressed to all types of vehicles, with or without C-ITS systems, upgrading their existing functions, or simulating intelligent systems where absent

# Current progress

- Iterative implementation on all levels (infrastructure, apps & demonstrators) is underway.
- Preparing for the first holistic setup on our test sites to test apps with users of equipped and non-equipped vehicles under real-life conditions – February 2022



*Test vehicles of CERTH*



*Encapsulated system on the road surface*

# Next steps

- Advance the context of ODOS20 project (Deployment, Testing, Assessing and Optimizing of ODOS2020 solution)
- Dissemination and patent
- Testing and application of the system on other means of surface transportation as well such as trains, in order to establish an interconnection (“communication”) between them towards the enhancement of safety level

### *Acknowledgment:*

The work presented was held in the context of ODOS 2020 project (<https://odos2020.itl.gr/>), which has been co-financed by the European Regional Development Fund of the European Union and Greek national funds through the Operational Program Competitiveness, Entrepreneurship and Innovation, under the call RESEARCH – CREATE – INNOVATE (project code:T1EDK-03081).

# Thank you for your attention!

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