EUROPEAN ACTIVITIES ON CONNECTED AND AUTOMATED DRIVING; THE PRESENT AND BEYOND - THE ADAPTIVE AND AUTONET2030 USE CASES

Dr. Angelos Amditis
Research Director, ICCS
OUTLINE

- ADAPTIVE developments and status
- AUTONET2030 final results
TOWARDS HIGHER LEVELS OF AUTOMATED DRIVING: THE EUROPEAN PROJECT ADAPTIVE

https://www.adaptive-ip.eu/
PROJECT FACTS

Budget:
European Commission: EUR 25 Million
EUR 14,3 Million

Duration:
42 months (January 2014 – June 2017)

Coordinator:
Aria Etemad, Volkswagen Group

8 Countries:
France, Germany, Greece, Italy, Spain, Sweden, The Netherlands, United Kingdom

28 partners

European Activities: AdaptIVe and Autonet2030
Jan 2017
Motivation (Towards Automated Driving)

Drivers are supported in demanding or repetitive tasks. Travel comfort increases.

Vehicles dynamically adapt the level of automation according to the current situation.

Vehicles react more effectively to external threats.

Vehicles are resilient to different types of system and human failure.

European Activities: AdaptIVe and Autonet2030

Jan 2017
ADAPTIVe in a Nutshell

+ Redundancy implementation for minimum risk maneuver
+ Perception in complex scenarios
+ Collaborative control
+ V2X Communication

3 Application oriented subprojects
3 horizontal activities subprojects

European Activities: AdaptIVe and Autonet2030
Jan 2017
TARGETS FOR R&D

- Demonstrate automated driving in complex traffic environments. Test integrated applications in all possible scenarios taking into account the full range of automation levels.
  - Enhance the perception performance in complex scenarios by using advanced sensors supported by cooperative and communication technologies.
  - Provide guidelines for the implementation of cooperative controls involving both drivers and automation.
  - Define and validate specific evaluation methodologies.
- Assess the impact of automated driving on European road transport.
- Evaluate the legal framework with regards to existing implementation barriers.
European Activities: AdaptIVe and Autonet2030

**Timeline**

**Scenarios for legal aspects**
- Use cases: Jan. 14
- System specifications: Jan. 15

**Legal glossary**
- System architecture: Jan. 16
- Midterm evaluation of HVI: Jan. 17

**Evaluation plan**
- Demonstrators equipped: Jan. 16
- Sensor fusion: Jan. 17

**Demonstrators ready for evaluation**
- Final results: Jun. 17
- Definition of legal aspects: Jun. 17
- Evaluation methodology: Jun. 17
- Impact analysis: Jun. 17

**HVI requirements**

**Technical workshop on automation issues**
- Athens: April 2016

**Legal issues open workshop**
- Paris: September 2015

Presentation available on the AdaptIVe webpage

---

Jan 2017
Levels of Driving Automation ACC. to SAE and VDA

Driver in the loop
- No significant change with respect to existing driver assistance systems

Driver out of the loop
- Not in accordance with regulatory law (Vienna Convention of 1968, national road law)
- Shared responsibility for control between driver and system

Source: SAE document J3016, “Taxonomy and Definitions for Terms Related to On-Road Automated Motor Vehicles”, issued 2014-01-16, see also http://standards.sae.org/j3016_201401/

European Activities: AdaptIVe and Autonet2030

Jan 2017
RESEARCH ACTIVITIES

Legal Aspects

Human Factors

Evaluation

European Activities: AdaptIVe and Autonet2030

Jan 2017
RESEARCH ACTIVITIES

Close-distance

Urban

Highway

European Activities: AdaptlVe and Autonet2030

Jan 2017
Achievements

- **System Classification and Glossary**
- Systematic derivation of relevant system parameters for:
  - Vehicle
  - Driver
  - Environment

- Public Deliverable D2.1 is available on the AdaptIVe website.

Deliverable D2.1 //
System Classification and Glossary

- Dissemination level: EU
- Version: 1.3
- Due date: 31.12.2014
- Version date: 06.02.2015
Defining Legal Aspects:

- Report on technical system limits
- Internal report on safety validation
- Internal report on legal aspects

- Open Legal Aspects Workshop in Paris on Sep 17, 2015:
  - Discussing legal topics with external stakeholders and expert community
  - 11 international speakers, 80 experts
  - Presentations and report available on www.adaptive-ip.eu
ACHIEVEMENTS

- A total of 17 experiments were conducted
  - Surveys
  - Simulator studies
  - Field studies

- More than 300 participants and one survey with 2700 respondents

- Basis for the human factors recommendations
DEMONSTRATORS READY

European Activities: AdaptIVe and Autonet2030

- Close-distance
  - Parking assistant
  - City cruise
  - Enter & exit highway
- Urban
  - Garage pilot
  - City chauffeur
  - Following lane
- Highway
  - Special areas
  - Lane-change, Filter-in,
  - Multi-level garage
  - Overtaking, Danger spot
  - Stop & go
  - Supervised city control
  - Intervention, Stop & go
  - V2V communication

Safe stop

Jan 2017
Next step - Evaluation

- User-Related Assessment
- Technical Assessment
- In-Traffic Behaviour Assessment

Impact Assessment

European Activities: AdaptIVe and Autonet2030

Jan 2017
SAVE THE DATE: ADAPTIVE FINAL EVENT

- Project results will be showcased through driving demonstrations, presentations and exhibition.
- For more information see: https://adaptive-­ip.eu/index.php/final-event.html
AUTO\textsc{Net}2030 PROJECT – FINAL RESULTS

http://www.autonet2030.eu/
THE GENERAL OVERVIEW OF THE PROJECT

Consortium of 9 partners

Approach To enable the convergence of pure sensor-based automation with cooperative V2X communications and decentralised maneuvering control algorithms
**WHAT THE PROJECT HAS ACHIEVED**

- **Enhance V2X communication for Cooperative Automated Driving**
  - *Extensions* of V2X message set and *optimization* of protocol stack
  - Contribution to V2X standardization

- **Distributed graph-based convoy control**
  - Innovative algorithm design to address the *dynamic number of heterogeneous vehicles*

- **Hierarchical control architecture for Cooperative Automated Driving**
  - *Robust* and *cooperative-aware* motion planning algorithm
  - Intersection management algorithm for automated vehicles at no-traffic light intersections
WHAT THE PROJECT HAS ACHIEVED

- 360° perception layer
  - High-confidence data through sensor-fusion
  - Combination of on-board and communication sensors

- High positioning accuracy (<0.5m) during high speed driving
  - Advanced differential positioning approach
  - Cooperative 5.9GHz broadcasting of RTK support data

- Dual-display HMI for vehicles of various automation level
  - Customized Android apps to provide directives/informative messages
THE PROJECT’S FINAL EVENT

- **Really successful** live demonstration of the AutoNet2030 system in highway use-cases, complemented by video demonstration of urban use cases!
  - Convoy-based maneuvers with 2 automated & 1 manual vehicle at ~75km/h
- **Highly-visible workshop discussing the AutoNet2030 results & latest ITS advances**
  - around 80 participants (more than 55 externals)
  - people coming from USA & Japan especially for this event!!
WHAT THE PROJECT HAS SHOWCASED
The AutoNet2030 work has clearly illustrated the benefits of (networked) cooperation in automated driving.
The experimental evidence of the effective collaboration between automated and manually-driven vehicles

- shows how vehicle-automation leads to safer & cost-effective mobility

- provides higher confidence for (potential) users of vehicle automation technology

- significantly contributes to the increase of user acceptance for emerging C-ITS technologies

Impact on ITS research (as best-paper awards suggest)
CONCLUSIONS – KEY FINDINGS

- Connected automation is evolving rapidly
- EU is continuing to invest a lot on automation in road transport in H2020 framework
- The experimental evidence of the effective collaboration between automated and manually-driven vehicles
  - shows how vehicle-automation leads to safer & cost-effective mobility
  - provides higher confidence for (potential) users of vehicle automation technology
  - significantly contributes to the increase of user acceptance for emerging C-ITS technologies
Dr. Angelos Amditis
Research Director, ICCS

✉️ a.amditis@iccs.gr
📞 +30 210 772 2398

9, Iroon Polytechniou, 15773, Zografou - Athens, Greece
🌐 http://i-sense.iccs.gr/