PILOTING AUTOMATED DRIVING ON EUROPEAN ROADS

Aria Etemad
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From 3 to 0
From euroFOT to L3Pilot

- euroFOT
- AdaptIVe
- L3Pilot

Time

Complexity
Previous Projects: euroFOT

**Longitudinal control functions**
- Forward Collision Warning (FCW)
- Adaptive Cruise Control (ACC)
- Speed Restriction System (SRS)

**Lateral control functions**
- Blind Spot Information System (BLIS)
- Lane Departure Warning (LDW)
- Impairment Warning (IW)

**Advanced applications**
- Curve Speed Warning (CSW)
- Fuel Efficiency Advisor (FEA)
- Safe Human Machine Interaction (SafeHMI)
Previous Projects: AdaptIVE
Levels of driving automation acc. to SAE and VDA

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
<th>Terms/Examples</th>
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<tbody>
<tr>
<td>0</td>
<td>No automation</td>
<td>LDW, FCW</td>
</tr>
<tr>
<td>1</td>
<td>Assisted</td>
<td>LKA, ACC</td>
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<tr>
<td>2</td>
<td>Partial automation</td>
<td>Parking Assistance</td>
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<tr>
<td>3</td>
<td>Conditional automation</td>
<td>Traffic Jam Chauffeur</td>
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<td>4</td>
<td>High automation</td>
<td>Parking Garage Pilot</td>
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<td>5</td>
<td>Full automation</td>
<td>Robot Taxi</td>
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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
  ➔ need for action

Source: SAE document J3016, “Taxonomy and Definitions for Terms Related to On-Road Automated Motor Vehicles”, issued 2016-09-30, see also http://standards.sae.org/j3016_201609/
Demonstrators

Close-distance

Parking assistant
Garage pilot
Special areas
Multi-level garage
Stop & go

Urban

City cruise
City chauffeur
Supervised city control

Highway

Enter & exit highway
Following lane
Lane-change, Filter-in,
Overtaking, Danger spot
intervention, Stop & go
V2V communication

Safe stop
Achievement

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

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

• A total of 17 experiments were conducted
  – Surveys
  – Simulator studies
  – Field studies

• Over 490 car and truck drivers
• One survey with 2743 respondents

• Basis for the human factors recommendations
Achievement

Impact Assessment

- User-Related Assessment
- Technical Assessment
- In-Traffic Behaviour Assessment
Evaluation of AdaptIVe functions

Technical assessment:
“Considering human driver behaviour as a baseline, the AdaptIVe automated driving functions are showing a more uniform driver behaviour.”

User-related assessment:
“Test persons noted that automated driving functions affected driving positively in several ways, e.g. fewer dangerous lane changes”

Impact Assessment:
“Automated parking functions can lead to a possible increase of parking space by 17 %.”
Facts

Project name: L3Pilot - Piloting Automated Driving on European Roads
Budget: €68 million
Funding: €36 million
Start: September 2017
Duration: 48 months
Coordinator: Aria Etemad, Volkswagen Group Research
Participants: 34 (OEMs, suppliers, research, SMEs, insurers, authorities and user groups)
Countries: Austria, Belgium, France, Finland, Germany, Greece, Italy, Netherlands, Norway, Sweden, Switzerland, UK

Co-funded by the European Union under Horizon 2020 programme
Supported by eucar
### Project Partners

<table>
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<th>Category</th>
<th>Logos</th>
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<tbody>
<tr>
<td><strong>OEMs</strong></td>
<td>VOLKSWAGEN, TOYOTA, BMW GROUP, PSA, FCA, DAIMLER, VOLVO, Ford, Honda, Jaguar, Land Rover, RENAULT, Opel</td>
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<tr>
<td><strong>Suppliers</strong></td>
<td>Autoliv, DELPHI, FEV</td>
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<tr>
<td><strong>Research</strong></td>
<td>bast, SAFER, DLR, Deutsches Zentrum für Luft- und Raumfahrt, ika, RWTH Aachen University, SNF, UNIVERSITÀ DEGLI STUDI DI GENOVA</td>
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<tr>
<td><strong>SMEs</strong></td>
<td>eict, ADAS Management-Consulting, Allianz, Swiss Re, FiA, RDW</td>
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<td><strong>Authorities</strong></td>
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1 December 2017 BMWi-BMBF Conference 2017, Berlin
Landscape on Major European Projects preparing AD

- SAE L0
- SAE L1
- SAE L2
- SAE L3
- SAE L4

Automation level

- TeleFOT
- euroFOT
- DRIVE C2X
- UDRIVE
- L3PILOT
- PEGASUS (GER)
- V-Charge
- Drive Me (SWE)

Field Test
- (ordinary roads)
  - KONVOI (GER)
- (dedicated areas)
  - SARTRE
  - interactIVe
- Test Track
  - PReVENT
- HAVEit
- 2005

Public Transport
- (dedicated areas)
  - CyberMove
  - CyberCars2
- CityMobil
- CityMobil2
  - 2010
  - 2015
Time
FESTA Methodology

**PREPARE** (i)
- Functions & use cases
- Research questions & hypotheses
- Performance indicators & measures
- Data collection tools
- Study design
- Test site set-up

**DRIVE** (ii)
- Pre-tests
- Tests

**EVALUATE** (iii)
- Societal impacts
- Impact on safety, mobility, efficiency and environment
- Driving & travel behaviour
- User acceptance
- Technical performance & cyber-security
- Data processing
- Test site wrap-up

**LEGAL ASPECTS & CYBER-SECURITY** (iv)
Pilot Centers for a Pan-European Pilot

- **Crossborder**
  - Austria
  - Austria
  - Belgium
  - Belgium
  - Finland
  - France
  - Germany
  - Netherland

- **Country, region - OEM**
  - BE, Brussels; NL; ES, Barcelona - Toyota
  - DE, Aachen - Ford
  - DE, Ingolstadt - Audi
  - DE, Munich - BMW
  - DE, Offenbach - Honda
  - DE, Wolfsburg - VW
  - FR, Paris and other regions - REN, PSA
  - IT, Turin - CRF
  - LU; NL - Delphi
  - SE, Gothenburg; UK, London - Volvo
  - UK, Coventry - JLR
THANK YOU FOR YOUR KIND ATTENTION

Aria Etemad
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