The EU project interACT – Designing cooperative interaction of automated vehicles with other traffic participants

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Project facts

- **Programme**: EU/H2020-ART04 - Safety and end-user acceptance aspects of road automation in the transition period
- **Duration**: 36 months
- **Period**: May 2017 – April 2020
- **EU Funding**: 5,527,581 €
- **Coordinator**: Anna Schieben, DLR
- **Partners**: 8 industrial and academic partners from 4 European countries (Germany, Italy, Greece, UK)
- **Project Officer**: Claudia Ciuca (INEA)
- **US - EU twinning project**: AVIntent (NHTSA)
Integrating automated vehicles in mixed traffic
Challenges of interACT

• The interACT project addresses the following challenges:
  – Safe integration of AVs (SAE level 3 and above) into complex, mixed traffic environments
  – Solutions for expectation-conforming interaction of AVs with other road users and on-board users
  – Increase in user acceptance and ease-of use by appropriate AV design
  – Increase the overall safety and reliability of AVs in mixed traffic environments
The challenge

1st Enabler
Psychological models

2nd Enabler
Intention recognition & behavioural predictions

3rd Enabler
CCPU & safety layer

4th Enabler
Novel HMI elements

5th Enabler
Methodology for assessing the quality of interaction

Achieve a safe, highly accepted and efficient integration of Automated Vehicles in mixed traffic environment
Project objectives

- Develop psychological models of interaction between different road users
- Novel technical methods for assessing the intentions and predicting the behaviour of other road users
- Develop the Cooperation and Communication Planning Unit (CCP Unit)
- Novel human-vehicle interaction designs and HMI elements for expectation-conforming behaviour of the AV
- Safety layer and fail-safe trajectory planning using formal verification to ensure safety and reduce certification costs
- Establish new evaluation methods for studying interaction of road user with AVs and user acceptance
1st Objective:
Psychological models – results achieved

• Observational studies successfully conducted in three EU countries
• Findings used:
  – to refine the design of explicit and implicit communication strategies for AVs
  – to improve the situation assessment algorithms of the AV;
  – to design suitable interaction strategies and algorithms for the CCP Unit which ensure that the AV behaves in an intuitive and expectation-conforming manner
• Further details: https://www.interact-roadautomation.eu/cad-webinar-series-ix-interact-project/
2nd Objective:
Intention recognition & behavioural prediction

- Tracking system, which covers 360 degree around the ego vehicle (laser scanner, radar sensors, stereo video cameras)
- Pedestrians intention recognition and behaviour prediction incl. gesture recognition and smart phone data
- Extension of the time horizon for reliable prediction of vehicles movement from 1-2s, as is the case with physics-based prediction models today
3rd Objective:
Cooperation and Communication Planning Unit

- Matches the traffic situation with an interaction scenario (from a digital catalogue)
- Select an interaction strategy (integrated and time-synchronised planning of AVs behaviour and explicit HMI on-board and external), plans and monitors its execution
- Safety layer, calculating and initiating a minimum risk solution, if needed

4th Objective:

**Novel HMI elements**

- Solutions for the three-way cooperation between all agents
- Under development:
  - 360° LED light band
  - Directed single lamp
  - On-board HMI LED band and additional displays

interACT project / TRB 2019
Upcoming activities
The challenge

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5th Objective:

Methodology for assessing the quality of interaction

• Measuring cooperation capabilities of AVs with other road users is a completely new area of research.
• Develop methodologies required to measure and quantify how the on-board user, the AV and other road users establish and use each-others’ intentions and behaviour
• Impact assessment and safety and user acceptance
Expected or potential impacts

- Impact on easy-of use and user acceptance of automated vehicles
- Impact on societal changes in the traffic environment
  - Traffic safety
  - Traffic flow
  - Changes in Mobility
- Impact on validation procedures for automated vehicles
- Impact on leadership position of EU vehicle industry (standardization and product innovations)
interACT video
Thank you
Any questions?

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http://interact-roadautomation.eu

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