interACT

Designing cooperative interaction of automated vehicles with other road users in mixed traffic environments

interACT – Project overview

Anna Schieben

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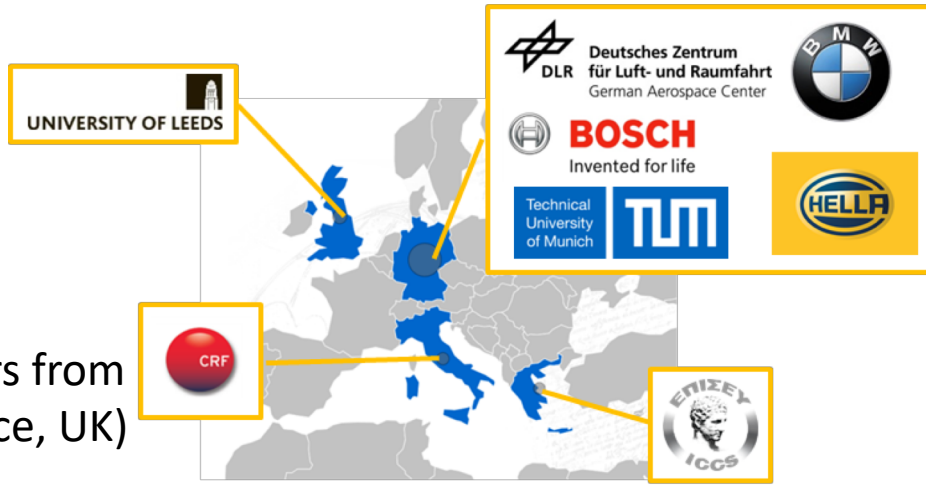
Project facts

- **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:** Begona Munoz (INEA)
- **US - EU twinning project**: AVIntent (NHTSA)



This project has received funding from the European Union's Horizon 2020 research and innovation programme

Integrating automated vehicles in mixed traffic

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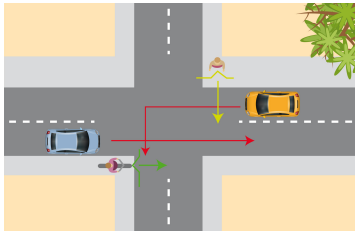
The challenge

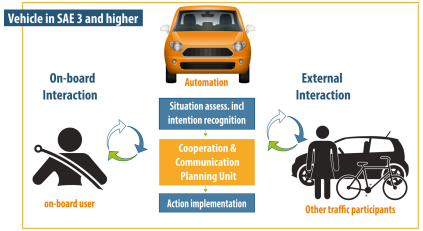
Achieve a safe, highly accepted and efficient integration of Automated Vehicles in mixed traffic environment

1st Objective
Psychological models

2nd Objective
Intention recognition & behavioural predictions



3rd Objective
CCPU & safety layer



4th Objective
Novel HMI elements

5th Objective
Methodology for assessing the quality of interaction

1st Objective:
Psychological models – results achieved

- Observational studies successfully conducted in three EU countries
- Data used:
  - to refine user requirements for the design of explicit and implicit communication strategies for AVs
  - to improve the situation assessment algorithms of the AV by providing a set of communication signs and behaviours intuitive to humans;
  - to design suitable algorithms for the *CCP Unit* which ensure the AV behaves in an intuitive expectation-conforming manner
- Further details: https://www.interact-roadautomation.eu/cad-webinar-series-ix-interact-project/

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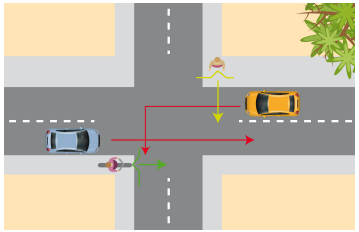
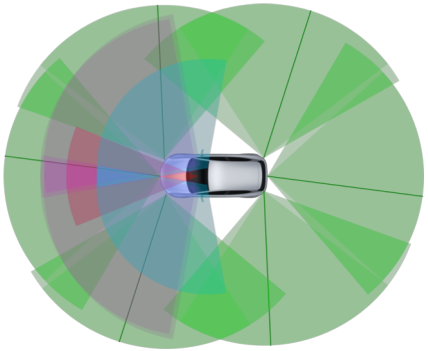
2nd Objective:

Intention recognition & behavioural predictions



- Tracking system, which covers 360 degree around the ego vehicle (laser scanner, radar sensors, stereo video cameras)
- Intention recognition and behaviour prediction incl. gesture recognition
- Extension of the time horizon for reliable prediction from 1-2s, as is the case with physics-based prediction models today, to ≥3s for pedestrians
- Inclusion of smart phone data for behaviour prediction
- Further details: https://www.interact-roadautomation.eu/cad-webinar-series-xii-designing-cooperating-interactions-of-avs-with-other-road-users-interact-project/



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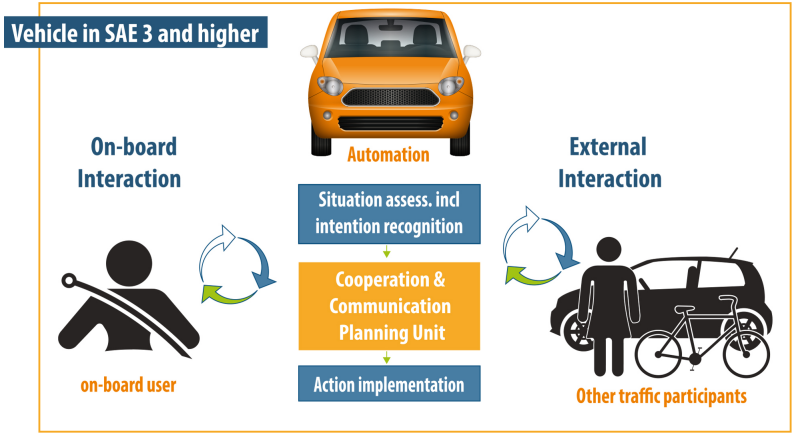
3rd Objective:
Cooperation and Communication Planning Unit & Safety Layer

- The CCP Unit is responsible for managing the time-synchronised, integrated planning of explicit communication message (on-board and external HMI) with the behaviour of the AV
- Software components under development for situation matching, interaction planning and trajectory planning



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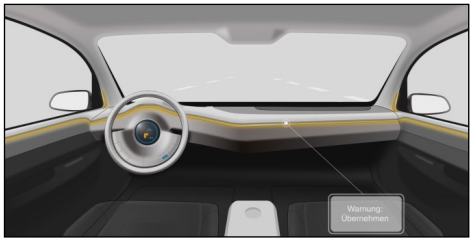
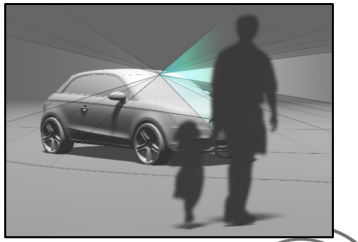
4th Objective:

Novel HMI elements

- Provides research and solutions on how to design interaction strategies required 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





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Upcoming objectives and results

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Methodology for assessing the quality of interaction

The challenge

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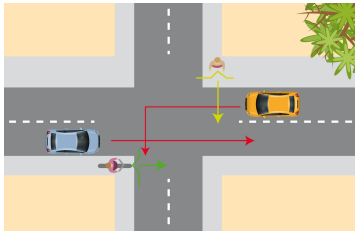
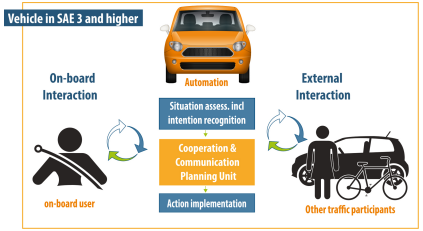


2nd Objective
Intention recognition & behavioural predictions

3rd Objective
CCPU & safety layer



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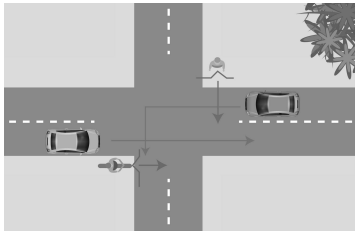

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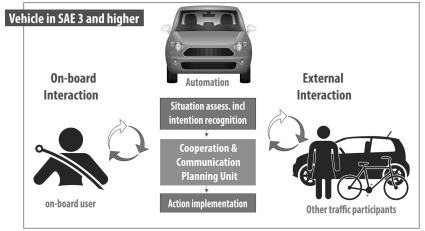
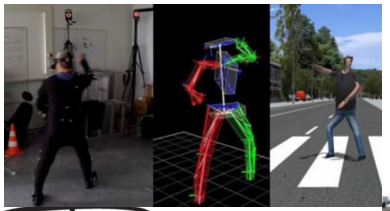


5th Objective:

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



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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)

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http://interact-roadautomation.eu

Thank you

Any questions?

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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 723395