PROSPECT

PROactive Safety for Pedestrians and CyclisTs

Workshop “Future mobility –challenges for human factors and behaviour”, Brussels, 14th Sept 2016

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Summary

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2. Key actions within the project
3. Focus of the project
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PROSPECT: background and objective

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Background

- Accidents involving pedestrians and cyclists still remain as a pending issue for road safety. Pedestrians and cyclists fatalities account for 28% of road fatalities in EU.
- Most of these accidents are caused by the driver not being in-alert or misinterpreting the situation
- Active safety systems have potential to reduce these numbers. Already AEB-pedestrian systems in the market

Objective:

To significantly improve the effectiveness of active VRU safety systems compared to those currently on the market

- **by expanding scope of scenarios addressed by the systems**
- **and improving overall system performance**

Key actions within the project

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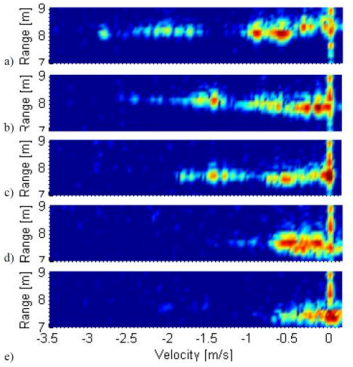
1 Better understanding of relevant VRU accident scenarios, combining multiple European accident studies with urban naturalistic observations

2 Improved VRU sensing and situational analysis: enlarged sensor coverage; earlier and more robust detection; sophisticated path prediction and intent recognition

3 Advanced vehicle control strategies and HMI

4 Integration in 4 vehicle demonstrators, 1 driving simulator, test tools



5 Testing in realistic traffic scenarios, system performance assessment of the novel VRU active safety functions and user acceptance study, including modelling and analysis

Focus of the project

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SAE levels of automation *(SAE International 2014)*

Level	Name	Narrative definition	Execution of steering and acceleration/ deceleration	Monitoring of driving environment	Fallback performance of *dynamic driving task*	System capability (*driving modes*)
Human driver **monitors the driving environment**						
0	No Automation	the full-time performance by the *human driver* of all aspects of the *dynamic driving task*, even when enhanced by warning or intervention systems	Human driver	Human driver	Human driver	n/a
1	Driver Assistance	the *driving mode*-specific execution by a driver assistance system of either steering or acceleration/deceleration using information about the driving environment and with the expectation that the *human driver* perform all remaining aspects of the *dynamic driving task*	Human driver and system	Human driver	Human driver	Some driving modes
2	Partial Automation	the *driving mode*-specific execution by one or more driver assistance systems of both steering and acceleration/deceleration using information about the driving environment and with the expectation that the *human driver* perform all remaining aspects of the *dynamic driving task*	**System**	Human driver	Human driver	Some driving modes
Automated driving system **("system") monitors the driving environment**						
3	Conditional Automation	the *driving mode*-specific performance by an *automated driving system* of all aspects of the *dynamic driving task* with the expectation that the *human driver* will respond appropriately to a *request to intervene*	System	**System**	Human driver	Some driving modes
4	High Automation	the *driving mode*-specific performance by an *automated driving system* of all aspects of the *dynamic driving task*, even if a *human driver* does not respond appropriately to a *request to intervene*	System	System	**System**	Some driving modes
5	Full Automation	the full-time performance by an *automated driving system* of all aspects of the *dynamic driving task* under all roadway and environmental conditions that can be managed by a *human driver*	System	System	System	**All driving modes**

Operation types for vehicle functions. *BASt* (Tom *Gasser*, et al.)

Operation type A: Informing and warning functions	*Operation type B:* Continuously automating functions	*Operation type C:* Intervening emergency functions (near-accident situations)
Take only indirect influence on vehicle control via the driver	Take immediate control over the vehicle. Division of tasks between the human driver and the function (usually convenience functions - control always remains overrideable)	Take immediate control over the vehicle in near-accident situations that de facto cannot be controlled / handled by the driver (usually safety functions)
Popular examples (today): • Traffic sign recognition (display of current speed limit) • Lane departure warning (e.g. Vibration on the steering)	Popular examples (today): • Adaptive cruise control (ACC) • Lane keep assist (via steering interventions)	Popular examples (today): • Automatic emergency braking (system triggered)

Pedestrians and cyclists:

- Situations of conflict occur suddenly and cannot be anticipated.
- Not enough time for a reaction by the driver.

PROSPECT:

Main focus on Type C operations, the system takes immediate control over the vehicle

Human factors and behaviour: Key findings and contribution to the State of Art

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Accident analysis and user needs

In-depth accident analysis

Naturalistic Driving Studies: behavioural parameters to predict de intention of cyclists and pedestrians. Interaction with the driver, what is the VRU planning to do in the near future.

Focus groups: cyclist characteristics for path prediction through traffic, driver and cyclist situational awareness.

HMI taxonomy: HMI recommendations and guidelines for AEB systems

Improved sensors

New testing tools (pedestrian, cyclist dummies)

Development

Sensors; actuation and control strategies i.e. combined vehicle steering and braking

Integration of advanced HMI concepts: display / control technologies

Integration in project demonstrators

Validation

Predictive model for user acceptance:

When system takes control over the vehicle accurate response is very important. Influence of false alarms and interventions on the driver will be studied.

Information and Warning: design of HMI requirements and guidelines

Test protocols

Expected impact of PROSPECT

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Scientific impact

Data collected at European level from real world situations involving vehicles and VRUs

Better understanding of VRU accidents and their interactions to better anticipate conflicts.

Market

Introduction in the broad market expected for the timeframe 2020-2025

Maintain European leading role in VRU protection systems

Next generation of (pro) active VRU safety systems

Contribution to the transport safety policy objectives and targets

VRU accident reduction (impact based on addressed scenarios and efficiency of the system)

Contribution to the 'Vision Zero' objective set out in the Transport White Paper.

Short-term: methods for 2018 and 2020 Euro NCAP tests -> supports the EC goal of halving the road toll in the 2011-2020 timeframe.

Consumer advice for vehicle safety

Test procedures: safety-critical HMI guidelines as an input for Euro NCAP

FOR SAFER CARS EURO NCAP

Research needs

- Development and integration of driver-state monitoring technologies.
- HMI challenge:
  - Hand over control to the vehicle / automated driving / display / return vehicle control to the driver (although it applies mainly to Category A, B functions)

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- Incorporation of HMI Guidelines in Euro NCAP and other Car Assessment Programs.
- Legislation framework regarding HMI.

Project facts

- **Project title** PROactive Safety for Pedestrians and CyclisTs
- **Acronym** PROSPECT

- **Funding** European Commission, Innovation and Networks Executive Agency, under the frame of Horizon 2020 programme
- **Topic** MG-3.4-2014 Traffic safety analysis and integrated approach towards the safety of vulnerable road users
- **GA number** 634149

- **Consortium** 17 partners, 9 EU countries
- **Coordinator** Andrés Aparicio
  IDIADA Automotive Technology, SA

- **Starting date** 1st May 2015
- **Ending date** 31st October 2018

- **Budget** 6.931.978,75 €

Consortium

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