European Commission

Advanced driver assistance systems 2016

Summary

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Transport

Advanced driver assistance systems - Summary

What is the problem?

Vehicle safety is a key strategy to address ambitious long-term and interim goals and targets as part of an integrated Safe System approach. Secondary safety or crash protection technologies continue to deliver large savings; in the last few years primary safety or crash avoidance technologies have started to contribute to casualty reduction and hold potentially large future promise. New in-vehicle technologies under development have the potential to increase as well as decrease crash injury risk through introducing new driver distraction and inadvertent behavioural change which may solve one problem but create another. With the rapid deployment of new technologies on to the market, evaluation of systems with reference to analysis of final and intermediate outcome data as well and other relevant data is essential before wide-scale deployment is anticipated.

What are Advanced Driver Assistance Systems (ADAS)?

ADAS are vehicle-based intelligent safety systems which could improve road safety in terms of crash avoidance, crash severity mitigation and protection and post-crash phases or, indeed, integrated in-vehicle or infrastructure based systems which contribute to more than one of these crash-phases or all.

Categories of ADAS

Crash avoidance systems

There is large future promise of casualty reduction from crash avoidance technologies, as long as development is prioritised to provide maximum casualty reduction. Since driver behaviour can modify the performance of safety systems which aims for crash avoidance, assessment of the human-machine interface, while complex, is essential.

Crash mitigation systems

These refer to active in-vehicle systems which aim to mitigate the severity of the crash. Examples include intelligent speed adaptation and advanced braking systems.

Crash protection systems

Substantial and evidence-based improvements have been made in the last 20 years. Research has identified continuing large scope for enhanced vehicle safety from improved crash protection which aims to reduce injury severity during the impact phase. Examples include improvements in occupant restraint systems which better reflect the different human tolerance thresholds of male and female occupants and of different age groups.

Post-crash response systems

A new development is the implementation of systems such as eCall which aim to alert and advance emergency medical system support in the event of crash.

Integrated systems

The potential for in-vehicle systems to integrate crash avoidance, crash protection and post-crash objectives, based on vehicle to vehicle and vehicle to network communications, is being increasingly understood, .

ADAS examples:

- Intelligent Speed Adaptation (ISA): informs, warns and discourages the driver to exceed the statutory local speed limit or other desired speed thresholds below this limit at safety critical points.
- Seat belt reminders: intelligent, visual and audible devices that detect whether seat belts are in use in various seating positions and give out increasingly urgent warning signals until the belts are used.
- Electronic stability control: to stabilise the vehicle and prevent skidding under all driving conditions and situations, within physical limits
- Alcohol interlocks: automatic control systems which are designed to prevent driving with excess alcohol by requiring the driver to blow into an in-car breathalyser before starting the ignition
- In-vehicle data recorders (event data recorders & journey data recorders)
- Anti-lock braking systems (ABS): to prevent skidding where loss of steering and control occurs from locked wheels when braking hard
- Autonomous emergency braking systems: to detect approaching vehicles or other road users and apply braking to either prevent a collision occurring or to reduce the impact severity.
- Lane support systems: electronic warning systems that are activated if the vehicle is about to veer off the lane or the road
- Emergency Brake Assist: to distinguish between emergency and normal braking and apply full braking effect in case of emergency.
- Collision avoidance systems: includes several sub-systems, such as: Forward Collision Warning, Reverse Collision Warning System, Adaptive Cruise Control (ACC), Attention assist, Vision enhancement, Multi-collision brake.
- eCall: to provide an automated message to the emergency services following a road accident which includes the precise accident location
- Electronic driving licences: a smart card containing personal information about the driver, including which vehicles he/ she is authorised to drive that serves as an ignition key access.

Evaluation of ADAS

Research has attempted to record and classify ADAS by their impacts, however various problems need to be addressed in the assessment of both existing and new systems. No systematic methods currently exist to evaluate new systems. While systems are under development, they are not yet mature. It is not possible to predict eventual casualty reduction on the basis of experimental studies, field trials or simulators for most new systems. Further naturalistic driving studies and the establishment of a European in-depth crash injury database are urgently required to evaluate current measures as well as identify future problems and solutions. In addition, the implications of retrofit of nomadic devices could be problematic since the response of the vehicle to the technology in question might not be predictable. There needs to be a clear policy for handling nomadic devices so that no gross assumptions are made to the effect that any single device will offer the same benefit to all vehicle types and make/models and that they will not interfere with vehicle systems or add to the load of the driver.

Notes

1. Country abbreviations

	Belgium	BE		Italy	IT		Romania	RO
	Bulgaria	BG		Cyprus	CY		Slovenia	SI
	Czech Republic	CZ		Latvia	LV		Slovakia	SK
	Denmark	DK		Lithuania	LT		Finland	FI
	Germany	DE		Luxembourg	LU		Sweden	SE
	Estonia	EE		Hungary	HU		United Kingdom	UK
	Ireland	IE		Malta	MT			
	Greece	EL		Netherlands	NL		Iceland	IS
	Spain	ES		Austria	AT		Liechtenstein	LI
	France	FR		Poland	PL		Norway	NO
	Croatia	HR		Portugal	PT		Switzerland	CH

2. This 2016 edition of Traffic Safety Synthesis on Advanced Driver Assistance Systems updates the previous versions, entitled eSafety, produced within the EU co-funded research projects SafetyNet (2008) and DaCoTA (2012). This Synthesis was originally written in 2008 by Jeanne Breen, Jeanne Breen Consulting, and then updated in 2012 by Ellen Townsend, ETSC, and Jeanne Breen, Jeanne Breen Consulting, and in 2016 by Pete Thomas, Loughborough University, UK.

3. All Traffic Safety Syntheses of the European Road Safety Observatory have been peer reviewed by the Scientific Editorial Board composed by: George Yannis, NTUA (chair), Robert Bauer, KFV, Christophe Nicodème, ERF, Klaus Machata, KFV, Eleonora Papadimitriou, NTUA, Pete Thomas, Loughborough University, UK

4. Disclaimer

5. Please refer to this Report as follows:

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