Vision Inspired Driver Assistance Systems

Results

Project Information

**VI-DAS**

Grant agreement ID: 690772

**Funded under**

H2020-EU.3.4.

**Overall budget**

€ 6,225,246.25

**EU contribution**

€ 6,225,246.25

**Coordinated by**

FUNDACION CENTRO DE TECNOLOGIAS DE INTERACCIÓN VISUAL Y COMUNICACIONES VICOMTECH Spain

Start date: 1 September 2016

End date: 31 August 2019

This project is featured in...

**RESULTS PACK**

Connected and automated driving: The route to a safer, more efficient and cleaner transport system

13 March 2019
Deliverables

Documents, reports (48)

OUTSIDE scene monitoring system specification, design, and implementation (second version)
Updated report describing the specifications and design of SW and HW components to be used for the development of the OUTSIDE modules.

INSIDE monitoring specification, design and implementation (initial version)
Initial report describing the specifications and design of SW and HW components to be used for the development of the INSIDE modules.

Underwriting, legal and ethics protocols for future ADAS development (final version)
Final description of created protocols for speeded up adaption of future ADAS innovation, including a road map.

Driver model and behaviour assessment (final version)
Final report on the developments for creating and updating personalised and statistical models of the driver status and behaviour.

Product liability (final version)
Final analysis of the changes in product liability of modules in technical and contractual details.

Data legal requirements reference guide (initial version)
First version of the reference document with best practices and guidelines for data management and protection.

Standardisation plan (first version)
Initial analysis of existing standards, open working groups, and liaison with open standard organisation.

Use cases definition using Human-Centred Design methodology (second version)
Updated version of the report containing description on use cases defined following the HCD methodology, updated at each cycle.

Use cases definition using Human-Centred Design methodology (first version)
Initial version of the report containing description on use cases defined following the HCD methodology, updated at each cycle.

Report on scientific and industrial dissemination activities (final version)
The scientific production of the project is reported periodically along with the activities carried out to communicate the project results to the industry and...
INSIDE monitoring specification, design and implementation (final version)
Final report describing the specifications and design of SW and HW components to be used for the development of the INSIDE modules.

TESTFEST report and completion of standardisation
Report on the TESTFEST event and the tested and validated functionalities related to the set of standards identified by the stakeholders.

Integration of scene context data: Technical specification (final version)
Description of the integration layers used to inject LDM and scene descriptions for the analysis modules of this WP.

Report on scientific and industrial dissemination activities (first version)
The scientific production of the project is reported periodically along with the activities carried out to communicate the project results to the industry and academia.

Integration of scene context data: Technical specification (initial version)
Initial description of the integration layers used to inject LDM and scene descriptions for the analysis modules of this WP.

Legal responsibility and ethical considerations (final version)
Manual of legal considerations and guide related to ethical issues arisen from the usage of innovative ADAS technology.

Dissemination plan (final version)
Final analysis of strategic communication priorities and dissemination plan.

Use cases definition using Human-Centred Design methodology (final version)
Final version of the report containing description on use cases defined following the HCD methodology, updated at each cycle.

Visual driver monitoring (final version)
Final description of the modules developed for the detection and analysis of driver attention and alertness, mainly using vision-based techniques.

Legal responsibility and ethical considerations (initial version)
First version of the manual of legal considerations and guide related to ethical issues arisen from the usage of innovative ADAS technology.

Dissemination plan (first version)
Initial analysis of strategic communication priorities and dissemination plan.
The scientific production of the project is reported periodically along with the activities carried out to communicate the project results to the industry and academia.

Updated specifications of the requirements for networking, and cloud services, such as storage and processing, required for the development and testing stages.

Reference guide with the description of IPR management principles.

Initial design and developments of models able to describe predictions and plans based on risk analysis.

Final design and developments of models able to describe predictions and plans based on risk analysis.

Initial description of the techniques developed for the detection of objects in the surrounds of the vehicle.

Final description of the system functionality and reference architecture mapping the use cases.

Initial specifications of the requirements for networking, and cloud services, such as storage and processing, required for the development and testing stages.

Initial report describing the specifications and design of SW and HW components to be used for the development of the OUTSIDE modules.

Report on the modules designed to compose the scene generation and its content in the form of Local Dynamic Maps.

Analysis of the changes in product liability of modules in technical and contractual details.
OUTSIDE scene monitoring system specification, design, and implementation (final version)
Final report describing the specifications and design of SW and HW components to be used for the development of the OUTSIDE modules.

Personal and fleet auto liability (initial version)
Initial description of insurable risk metric to be fed back to development WPs related to technical innovations and their impact on personal and fleet auto liability.

Model for situation-specific risk prediction, estimation and behaviour planning (second version)
Updated design and developments of models able to describe predictions and plans based on risk analysis.

Data legal requirements reference guide (final version)
Final version of the reference document with best practices and guidelines for data management and protection.

Driver model and behaviour assessment (first version)
First report on the developments for creating and updating personalised and statistical models of the driver status and behaviour.

Standardisation plan (second version)
Updated analysis of existing standards, open working groups, and liaison with open standard organisation.

Dissemination plan (second version)
Updated analysis of strategic communication priorities and dissemination plan.

Personal and fleet auto liability (final version)
Final description of insurable risk metric to be fed back to development WPs related to technical innovations and their impact on personal and fleet auto liability.

Visual driver monitoring (first version)
Initial description of the modules developed for the detection and analysis of driver attention and alertness, mainly using vision-based techniques.

OUTSIDE scene monitoring system, LDM generation (final version)
Final report on the modules designed to compose the scene generation and its content in the form of Local Dynamic Maps.

Standardisation plan (final version)
Analysis of existing standards, open working groups, and liaison with open standard organisation.
Detection, tracking and classification of static and dynamic objects (final version)
Final description of the techniques developed for the detection of objects in the
surrounds of the vehicle.

Requirements, specifications and reference architecture (first version)
Initial version of the description of the system functionality and reference
architecture mapping the use cases, updated at each cycle.

Specifications of the network and cloud infrastructure (final version)
Final specifications of the requirements for networking, and cloud services, such
as storage and processing, required for the development and testing stages.

Underwriting, legal and ethics protocols for future ADAS development (initial version)
Description of created protocols for speeded up adaption of future ADAS
innovation, including a road map.

Requirements, specifications and reference architecture (second version)
Updated version of the description of the system functionality and reference
architecture mapping the use cases, updated at each cycle.

Websites, patent fillings, videos etc. (2)

Final dissemination material
Project updated presentation and flyers, printed materials, etc.

Dissemination material
Project presentation, website, etc.

Other (3)

VI-DAS second workshop
Periodic reports containing the description of the Requirements workshop, the
Benefits, risks and ethic workshop, and the Final VI-DAS workshop.

VI-DAS first workshop
Periodic reports containing the description of the Requirements workshop, the
Benefits, risks and ethic workshop, and the Final VI-DAS workshop.

VI-DAS third workshop
Periodic reports containing the description of the Requirements workshop, the
Benefits, risks and ethic workshop, and the Final VI-DAS workshop.
Publications

Peer reviewed articles (19)

Applying crash data to injury claims - an investigation of determinant factors in severe motor vehicle accidents

**Author(s):** Darren Shannon, Finbarr Murphy, Martin Mullins, Julian Eggert

**Published in:** Accident Analysis & Prevention, Issue 113, 2018, Page(s) 244-256, ISSN 0001-4575

**DOI:** 10.1016/j.aap.2018.01.037

Semi-autonomous vehicle motor insurance: A Bayesian Network risk transfer approach

**Author(s):** Barry Sheehan, Finbarr Murphy, Cian Ryan, Martin Mullins, Hai Yue Liu

**Published in:** Transportation Research Part C: Emerging Technologies, Issue 82, 2017, Page(s) 124-137, ISSN 0968-090X

**DOI:** 10.1016/j.trc.2017.06.015

The Impact of Autonomous Vehicle Technologies on Product Recall Risk

**Author(s):** Martin Mullins, et all.

**Published in:** Intl. Journal of Production Research, 2018, ISSN 0020-7543

Taking responsibility: A responsible research and innovation (RRI) perspective on insurance issues of semi-autonomous driving

**Author(s):** Martina F. Baumann, Claudia Brändle, Christopher Coenen, Silke Zimmer-Merkle

**Published in:** Transportation Research Part A: Policy and Practice, Issue Volume 124, 2018, Page(s) 557-572, ISSN 0965-8564

**DOI:** 10.1016/j.tra.2018.05.004

ASTEROIDS: a stixel tracking extrapolation-based relevant obstacle impact detection system

**Author(s):** W.P. Sanberg, G. Dubbelman, P.H.N. de With

**Published in:** IEEE Transactions in Intelligent Vehicles (T-IV), 2019, ISSN 2379-8904

Intersection Warning System for Occlusion Risks Using Relational Local Dynamic Maps

**Author(s):** Florian Damerow, Yuda Li, Tim Puphal, Benedict Flade, Julian Eggert

**Published in:** IEEE Intelligent Transportation Systems Magazine, Issue 10/4,
From semi to fully autonomous vehicles: New emerging risks and ethico-legal challenges for human-machine interactions

**Author(s):** Bellet, Thierry; Cunneen, Martin; Mullins, Martin; Murphy, Finbarr; Pütz, Fabian; Spickermann, Florian; Braendle, Claudia; Baumann, Martina Felicitas

**Published in:** Transportation Research Part F, Issue Transportation Research Part F, 63 (2019), 2019, Page(s) 153–164, ISSN 1369-8478

From stixels to asteroids: Towards a collision warning system using stereo vision

**Author(s):** Willem P. Sanberg, Gijs Dubbelman, Peter H.N. de With

**Published in:** Electronic Imaging, Issue 2019/15, 2019, Page(s) 34-1-34-7, ISSN 2470-1173

**DOI:** 10.2352/issn.2470-1173.2019.15.avm-034

Continuous Risk Measures for Driving Support

**Author(s):** Julian Eggert, Tim Puphal

**Published in:** International Journal of Automotive Engineering, Issue Volume 9 Issue 3, 2018, Page(s) Pages 130-137, ISSN 2185-0992

**DOI:** 10.20485/jsaeijae.9.3_130

Probabilistic Uncertainty-Aware Risk Spot Detector for Naturalistic Driving

**Author(s):** Tim Puphal, Malte Probst, Julian Eggert

**Published in:** IEEE Transactions on Intelligent Vehicles, Issue 4/3, 2019, Page(s) 406-415, ISSN 2379-8904

**DOI:** 10.1109/tiv.2019.2919465

Artificial Driving Intelligence and Moral Agency: Examining the Decision Ontology of Unavoidable Road Traffic Accidents through the Prism of the Trolley Dilemma

**Author(s):** Martin Cunneen, Martin Mullins, Finbarr Murphy, Seán Gaines

**Published in:** Applied Artificial Intelligence, Issue 33/3, 2018, Page(s) 267-293, ISSN 0883-9514

**DOI:** 10.1080/08839514.2018.1560124

Autonomous Vehicles and Embedded Artificial Intelligence: The Challenges of Framing Machine Driving Decisions

**Author(s):** Martin Cunneen, Martin Mullins, Finbarr Murphy

**Published in:** Applied Artificial Intelligence, Issue 33/8, 2019, Page(s) 706-731, ISSN 0883-9514

**DOI:** 10.1080/08839514.2019.1600301
Semiautonomous Vehicle Risk Analysis: A Telematics-Based Anomaly Detection Approach

Author(s): Cian Ryan, Finbarr Murphy, Martin Mullins
Published in: Risk Analysis, Issue 39/5, 2019, Page(s) 1125-1140, ISSN 0272-4332
DOI: 10.1111/risa.13217

Connected and autonomous vehicles: A cyber-risk classification framework

Author(s): Barry Sheehan, Finbarr Murphy, Martin Mullins, Cian Ryan
Published in: Transportation Research Part A: Policy and Practice, Issue 124, 2019, Page(s) 523-536, ISSN 0965-8564
DOI: 10.1016/j.tra.2018.06.033

Reasonable, Adequate and Efficient Allocation of Liability Costs for Automated Vehicles: A Case Study of the German Liability and Insurance Framework

Author(s): Fabian PÜTZ, Finbarr MURPHY, Martin MULLINS, Karl MAIER, Raymond FRIEL, Torsten ROHLFS
Published in: European Journal of Risk Regulation, Issue 9/3, 2018, Page(s) 548-563, ISSN 1867-299X
DOI: 10.1017/err.2018.35

Connected automated vehicles and insurance: Analysing future market-structure from a business ecosystem perspective

Author(s): Fabian Pütz, Finbarr Murphy, Martin Mullins, Lisa O’Malley
Published in: Technology in Society, Issue 59, 2019, Page(s) 101182, ISSN 0160-791X
DOI: 10.1016/j.techsoc.2019.101182

Autonomous Vehicles and Avoiding the Trolley (Dilemma): Vehicle Perception, Classification, and the Challenges of Framing Decision Ethics

Author(s): Martin Cunneen, Martin Mullins, Finbarr Murphy, Darren Shannon, Irini Furxhi, Cian Ryan
Published in: Cybernetics and Systems, 2019, Page(s) 1-22, ISSN 0196-9722
DOI: 10.1080/01969722.2019.1660541

Driving to a future without accidents? Connected automated vehicles’ impact on accident frequency and motor insurance risk

Author(s): Fabian Pütz, Finbarr Murphy, Martin Mullins
Published in: Environment Systems and Decisions, 2019, ISSN 2194-5403
DOI: 10.1007/s10669-019-09739-x

Editorial for the special issue – Liability and insurance for semi-autonomous vehicles

Author(s): Finbarr Murphy, Martin Mullins
Published in: Transportation Research Part A: Policy and Practice, Issue 124,
Cloud-support for collaborative services in connected cars scenarios

**Author(s):** Cristian Olariu, Simon McLoughlin, Gary Thompson
**Published in:** 2017 IEEE Vehicular Networking Conference (VNC), 2017, Page(s) 255-258
**DOI:** 10.1109/VNC.2017.8275630

Driving Situation Analysis with Relational Local Dynamic Maps (R-LDM)

**Author(s):** Julian Eggert, Daniela Aguirre Salazar, Tim Puphal and Benedict Flade
**Published in:** International Symposium on Future Active Safety Technology (FAST-zero), 2017

Continuous Risk Measures for ADAS and AD

**Author(s):** Julian Eggert and Tim Puphal
**Published in:** International Symposium on Future Active Safety Technology (FAST-zero), 2017

Risk-based driver assistance for approaching intersections of limited visibility

**Author(s):** Florian Damerow, Tim Puphal, Yuda Li, Julian Eggert
**Published in:** 2017 IEEE International Conference on Vehicular Electronics and Safety (ICVES), 2017, Page(s) 178-184
**DOI:** 10.1109/ICVES.2017.7991922

Continuous Risk Measures for ADAS and AD

**Author(s):** Julian Eggert and Tim Puphal
**Published in:** IEEE International Conference on Vehicular Electronics and Safety (ICVES), 2017


**Author(s):** Cian Ryan
**Published in:** 26th SRA-E conference, 2017
Comfortable Priority Handling with Predictive Velocity Optimization for Intersection Crossings

**Author(s):** T. Puphal, M. Probst, M. Komuro, Y. Li, J. Eggert  
**Published in:** Intelligent Transportation Systems Conference (ITSC), 2019

Real-Time Driver State Monitoring Using a CNN Based Spatio-Temporal Approach

**Author(s):** Kose, Neslihan; Kopuklu, Okan; Unnervik, Alexander; Rigoll, Gerhard  
**Published in:** IEEE Intelligent Transportation Systems Conference (ITSC 2019), 2019

Relational Local Dynamic Maps for Driving Situation Analysis

**Author(s):** J. Eggert, D. Aguirre Salazar, T. Puphal and B. Flade  
**Published in:** International Symposium on Future Active Safety Technology toward Zero Accidents (FAST-zero), 2017

Anomaly Detection in Vehicle-to-Infrastructure Communications

**Author(s):** Michele Russo, Maxime Labonne, Alexis Olivereau, Mohammad Rmayti  
**Published in:** 2018 IEEE 87th Vehicular Technology Conference (VTC Spring), 2018, Page(s) 1-6  
**DOI:** 10.1109/VTCSpring.2018.8417863

Optimization of Velocity Ramps with Survival Analysis for Intersection Merge-Ins

**Author(s):** Tim Puphal, Malte Probst, Yiyang Li, Yosuke Sakamoto, Julian Eggert  
**Published in:** 2018 IEEE Intelligent Vehicles Symposium (IV), 2018, Page(s) 1704-1710  
**DOI:** 10.1109/ivs.2018.8500667

IFSTTAR In-depth accident study (EDA)

**Author(s):** VAN ELSLANDE, Pierre; BANET, Aurélie  
**Published in:** 2016-01-23, Issue 1, 2016

Efficient monocular point-of-gaze estimation on multiple screens and 3D face tracking for driver behaviour analysis

**Author(s):** Jon Goenetxea, Luis Unzueta, Unai Elordi, Juan Diego Ortega, Oihana Otaegui  
**Published in:** DDI2018 Proceedings, 2018

The role of cloud-computing in the development and application of ADAS
Artificial Intelligence Technologies and Decision Disorientation: Why Ontology Matters for Anticipating the Societal, Ethical and Legal Impacts of Artificial Intelligence Products

Author(s): Cristian Olariu, Juan Diego Ortega, J. Javier Yebes
Published in: 2018 26th European Signal Processing Conference (EUSIPCO), 2018, Page(s) 1037-1041
DOI: 10.23919/eusipco.2018.8553029

Multi-sensor fusion localization framework: map-based vehicle localization

Author(s): Siavash Shakeri
Published in: 2019

Artificial Intelligence Technologies and Decision Disorientation: Why Ontology Matters for Anticipating the Societal, Ethical and Legal Impacts of Artificial Intelligence Products

Author(s): Martin Cunneen, Martin Mullins
Published in: S.NET 2018, 2018

Multi-sensor fusion localization framework: map-based vehicle localization

Author(s): Siavash Shakeri
Published in: 2019

Other (1)

IFSTTAR In-depth accident study (EDA)

Author(s): VAN ELSLANDE; BANET
Published in: 2016

Non-peer reviewed articles (1)

Dis/orientations on driverless driving and autonomous vehicles?

Author(s): Martina F. Baumann, Claudia Brändle, Silke Zimmer-Merkle
Published in: Applied Mobilities, Issue 4/2, 2019, Page(s) 251-255, ISSN 2380-0127
DOI: 10.1080/23800127.2019.1623566

Book chapters (1)

How Can Deep Neural Networks Be Generated Efficiently for Devices with Limited Resources?

Author(s): Unai Elordi, Luis Unzueta, Ignacio Arganda-Carreras, Oihana Otaegui
Published in: Articulated Motion and Deformable Objects, Issue 10945, 2018, Page(s) 24-33
DOI: 10.1007/978-3-319-94544-6_3