## 5-7 SEPTEMBER 2018

## G U I D E B O O K

# Driving Simulation & Virtual Reality Conference & Exhibition

Palais des Congrès, Antibes | France

Organized by the Driving Simulation Association



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# Diving Simulation & Virtual Reality Conference & Exhibition

The DSC Conference gathers driving simulation specialists from the industrial and academic communities as well as commercial simulation providers. This 17<sup>th</sup> edition follows that of 2017, held in Stuttgart, with close to 400 participants and 35 exhibitors. Participants came from all around the world from about 20 different countries of Europe, America, Asia and Africa.

## This year's edition will be held in Antibes, France with an extended professional exhibition.

Topics will include state of the art in driving simulation technology, research and developments, extended with progressively merging virtual reality (VR) developments. This year program will also give an enlarged place for simulation tools for autonomous and connected vehicles along with advanced driving assistance system (ADAS) applications. Human factors and motion rendering nevertheless will remain the now traditional axis of the conference.

You are welcome to the DSC 2018 Europe Conference organized by the Driving Simulation Association, in cooperation with INRIA, Arts et Métiers ParisTech, IFSTTAR and La Tribune, sponsored by Renault, ANSYS-Optis, SystemX and Smart Vehicle Côte-d'Azur, held at Palais des Congrès in Antibes, on September 5<sup>th</sup>-7<sup>th</sup> in the South of France!

The DSC 2018 Organizing Committee



We are committed to bringing you the best opportunity to meet and network with many customers, prospects and partners in the field of driving simulation.

Authors, keynote speakers and delegates are attending this conference with the common aim of hearing about the latest developments in the field and will be keen to learn about your technology and services. The conference is expected to attract close to 400 attendees, which will ensure that the event has the buzz you need to generate interest in your products.

The DSC organizing team wishes to all the participants and exhibitors a great time at the DSC 2018 – Driving Simulation conference & Exhibition.



Antibes Juan-les-Pins Conference Centre 60 chemin des Sables, 06160 Juan-les-Pins, France GPS coordinates: Latitude : 43.5683583 / Longitude : 7.115730900000017



WiFi hotspot: DSC2018 /// Password: PDC092018



### **Organizing Committee**



Andras Kemeny | Conference Chair President, Driving Simulation Association Associate Professor, Arts et Métiers ParisTech Expert Leader, Immersive Simulation & VR Director LIV, Arts et Métiers ParisTech - Renault



. **George Drettakis** | Program Co-Chair Research Director, INRIA



**Florent Colombet** | Program Co-Chair Research Engineer, Renault Treasurer of Driving Simulation Association



**Frédéric Mérienne** | Program Co-Chair Professor, Arts et Métiers ParisTech Director of Image Institute, Arts et Métiers ParisTech



Jean-Rémy Chardonnet | Program Co-Chair Assistant Professor, Arts et Métiers ParisTech



**Philippe Cas** | Exhibition Chair Operational Marketing Manager, ANSYS OPTIS Driving Simulation Association



Hans-Peter Schöner | Senior Automotive Expert Driving Simulation Association

#### **Scientific Committee**

Chaired by Andras Kemeny, is composed of scientists from leading Research Institutes, as well as engineers from prominent companies and major car manufacturers spread across Europe, the United States, Canada and Japan.

#### Chairman

Andras Kemeny	Renault, Arts et Métiers ParisTech (France)
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#### **Scientific Committee Members**

Mohammad Bahram	BMW Group R&T (Germany)
Gerd Baumann	FKFS (Germany)
Jost Bernasch	The Virtual Vehicle (Austria)
Mike Blommer	Ford Motor Co. (United States)
Erwin R. Boer	Entropy Control Inc. (United States)
Heinrich H. Bülthoff	Max Planck Institute (Germany)
Viola Cavallo	IFSTTAR (France)
Frank Cardullo	State University of NY (United States)
Jean-Rémy Chardonnet	Arts et Métiers ParisTech (France)
Florent Colombet	Renault (France)
George Drettakis	INRIA (France)
Stéphane Espié	IFSTTAR (France)
Zhou Fang	Renault (France)
Peter Grant	University of Toronto (Canada)
Jens Häcker	Daimler AG (Germany)
Franck Mars	IRCCyN (France)
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Arne Nåbo	VTI (Sweden)
Lena Nilsson	VTI (Sweden)
Jean-Christophe Popieul	Valenciennes University (France)
Paolo Pretto	Max Planck Institute (Germany)
Hans-Peter Schöner	Driving Simulation Association (Germany)

The Scientific Committee would like to thank the following ad hoc reviewers for their support: Diane Cleij, Daniel Diers, Frank Drop, Suzanne Nooij, Mario Olivari and Ksander de Winkel from the Max Planck Institute for Biological Cybernetics.

#### **Keynote speakers**

Keynotes are historically grounded inspiring 30min talk, followed by discussion, given by eminent scientists in the field of Man-Machine Systems.



. **Mr. Olivier Colmard** | VP, Integrated CAE & PLM, Renault "Connected and autonomous vehicles, a major challenge for the Automotive industry"



Dr Hans-Peter Schöner | Senior Automotive Expert, Driving Simulation Association - Former Head of Driving Simulation & Vehicle Testing, Daimler AG "Automotive Needs and Expectations towards Next Generation Driving Simulation"



Pr James H. Oliver | Professor, Iowa State University, Director, Virtual Reality Applications Center "Virtual and Augmented Reality: From Promise to Productivity"



**Pr Natasha Merat** | Professor, Institute for Transport Studies, University of Leeds "Driver-in-the-Loop Simulation for Human Factors Challenges and Opportunities of Automated Vehicles"



Dr George Drettakis | Research Director, INRIA "Algorithms for Image-Based Rendering with an Application for Driving Simulation"



**Pr Jelte Bos** | Professor, TNO, The Netherlands "Motion sickness, simulator sickness and automated vehicles "



Dr Mike Blommer | Technical Leader, Ford Motor Company "Ford's use of driving simulation technology for automated driving feature development"

## **Simulating reality**

## for reliable test results

Bosch Rexroth motion systems for advanced driving simulators are built on proven technology, and all motion system components are in-house products from the Rexroth program. Smooth yet robust, our systems achieve accelerations up to 1 g and speeds up to 9 m/s in both longitudinal and lateral directions. A 6000 kg payload allows complete vehicles with driver and passengers to be tested under extremely realistic conditions.

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#### 1:30 pm

#### **KEYNOTE** - Antipolis Auditorium

"Automotive Needs and Expectations towards Next Generation Driving Simulation" | Dr. Hans-Peter Schöner - Senior Automotive Expert, Driving Simulation Association - Former Head of Driving Simulation & Vehicle Testing, Daimler AG

#### **3 ROUND TABLES** at choice

#### 2 pm I/ Simulation data interface standardization - Fitzgerald Room

The discussion will cover the following topics: Why do standards for simulation data interface make sense, and which are important (openDrive, openScenario, OSI, NDS, ...)? How do standards develop, how are they supported, who does the work, how is this financed? Which standards are in the pipeline, who is driving it, how long does it take?

Dr. Klaus Estenfeld (ASAM) - Mr. Martin Schleicher (Elektrobit / Chairman NDS) Mr. Hans Grezlikowski (Daimler) - Mr. Guillaume Millet (AV Simulation) Mr. Gilles Gallée (ANSYS OPTIS) - Mr. Antoine Saulgrain (IRT SystemX)

Moderated by Dr. Hans-Peter Schöner (DSA, formerly Daimler)

#### 2 pm 2/ Interactions in VR environments - Armstrong Room

The specificity of virtual reality (VR) is to enable interaction with virtual environments, to assess product design, ergonomics in vehicle architecture as well as perceived quality. The discussion will cover the following topics: what can be done in VR environments? what are the current technologies existing on the market? what are the future possibilities we can expect in the next years?

Dr. Naufal Saad (University of Technology of Petronas) - Mr. Stéphane Régnier (Renault) - Dr. Lionel Bennes (ANSYS OPTIS) - Mr. Fabrice Malaingre (Theoris)

Moderated by Dr. Jean-Rémy Chardonnet (Arts et Métiers)

#### 2 pm

#### 3/ Operational Standards for driving simulators - Davis Room

For simulator methodology both the technical as well as the experimental aspects are fundamental for collecting valuable results from simulator experiments with human drivers in the loop. In order to increase the comparability and the transferability of experiment results collected in different simulators – and thus magnifying the scientific value of simulator results – defining operating standards for driving simulators would be beneficial.

Mr. Stéphane Masfrand (PSA) - Dr. Stéphane Espié (IFSTTAR) -Dr. Gerd Baumann (FKFS) - Mr. Arne Nåbo (VTI) -Dr. Joost Venrooij (BMW) - Mr. Omar Ahmad (NADS)

Moderated by Dr. Jens Häcker (Daimler)

#### 3:30 - 4 pm COFFEE BREAK

#### 4 - 5 pm INDUSTRIAL PITCHES - Antipolis Auditorium - part 1

- Bruno Bocaert (RSWL) "Renault Software Labs, one year in Sophia-Antipolis"
- Adam Staton (McLaren Applied Technologies) "Introducing the MTS Vehicle Dynamic Simulator"
- Holger Krumm (dSPACE) "dSPACE Technology Provider (not only) for Autonomous Driving"
- Timothy Coley (XPI Simulation) "XPI Simulation, World-Leading Driving Simulation and Advanced Synthetic Environments"
- Martin Peller (BMW Group) Driving Simulation NEXT: BMW's New Driving Simulation Center
- Rik de Swart (Bosch Rexroth) "Advanced Driving Simulator Motion Systems"
- Christian Schost (AV Simulation) "High performance driving simulator design for the BMW research center"
- Dennis Marcus (Cruden) "The Driving Simulator as a tool for engineering and research"
- Lionel Bennes (ANSYS Optis) "The benefits of VR simulation for HMI development"
- Franck Reynolds (Antycip) "TORE a new reality for virtual simulation"
- Peter Tamas Kovacs (Almotive) "How Simulation Accelerates Self-Driving Technology"
- Steve Chapman (Digital Projection Ltd.) "3D Multi-View Projection Six Independent Points of View"

DSC 2018 EUROPE VR Driving Simulation & Virtual Reality Conference & Exhibition

#### 5 - 5:30 pm

**KEYNOTE** - Antipolis Auditorium

"Ford's use of driving simulation technology for automated driving feature development" | **Mike Blommer** - Technical Leader, Ford Motor Company



#### 6 pm

**COCKTAIL** - Espace Méditerranée, third floor **Offered** by Côte d'Azur Smart Vehicle Initiative Introduced by Pierre Sigrist (CEO, epicnpoc) and Jean-François Chapperon (Head of International Networks, Team Côte d'Azur) - "Nice-Sophia Antipolis: A European Hub for smart vehicle players"

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## 9 am INTRODUCTION /// WELCOME SESSION - Antipolis Auditorium

#### 9:30 am

**KEYNOTE** - Antipolis Auditorium

"Connected and autonomous vehicles, a major challenge for the automotive industry" | **Mr. Olivier Colmard** - VP, Integrated CAE & PLM, Renault

#### 10 am

**KEYNOTE** - Antipolis Auditorium "Motion sickness, simulator sickness and automated vehicles" **Pr. Jelte Bos** - Professor, TNO

## 10:30 - 11 am BREAK /// EXHIBITION /// POSTERS

#### SESSION A - Motion sickness - Antipolis Auditorium

II am - A simulation sickness study on a driving simulator equipped with a vibration platform

G. Lucas (Renault, Arts et Métiers), A. Kemeny, D. Paillot, F. Colombet

11:30 am - Modelling visual-vestibular integration and behavioural adaptation in the driving simulator

G. Markkula (University of Leeds), R. Romano, R. Waldram, O. Gilles, C. Mole, R. Wilkie

 $12\ pm$  - Identification and evaluation of influences on the occurrence of simulator sickness

Y. Forster (BMW Group), S. Hergeth, T-A. Kugler, E. Krichbaum, A. Keinath

12:30 - 2:30 pm LUNCH /// EXHIBITION /// POSTERS

#### 2:30 pm

**KEYNOTE** - Antipolis Auditorium

"Human-in-the-Loop Simulation for Human Factors Challenges and Opportunities of Automated Vehicles" | **Pr. Natasha Merat** - Professor, Institute for Transport Studies, University of Leeds

#### 3 - 3:15 pm

BREAK

SESSION B Human Factors and Automated Vehicle	SESSION C Motion I
3:15 pm - Human behavior	3:15 pm - Driving Simulators with
understanding when using Head-Up Display systems in autonomous driving situations J. A. Betancur Ramirez (Pontificia Universidad Javeriana), J. Plouzeau, F. Merienne, D. R. Suarez Venegas	Hexapod Motion System: Adding a Yaw Turntable. M. Olivari (Max Planck Institute for Biological Cybernetics), F. Drop, M. Katliar, H. H. Bülthoff
3:45 pm - Projection-Based External Human Machine Interfaces – Enabling Interaction between Automated Vehicles and Pedestrians A. Dietrich (Technical University of Munich), J-H. Willrodt, K. Wagner, K. Bengler	3:45 pm - An MPC based Motion Cueing Algorithm with side slip dynamics M. Bruschetta (University of Padova), D. L. Mendola, A. Beghi, D. Minen

#### 4:15 - 5 pm BREAK /// EXHIBITION /// POSTERS



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### Program Thursday, September 6<sup>th</sup> 2018 - Afternoon

#### SESSION B INDUSTRIAL KEYNOTES

Antipolis Auditorium

5 pm - "A global leader building the most comprehensive simulation platforms addressing driving, training and testing of ADAS, Autonomous Vehicles and Human Machine Interaction" | **Emmanuel Chevrier** -*CEO*, AV Simulation

"Using the virtual world to conceive better human-centered products" Jacques Delacour - CEO, ANSIS OPTIS

"Development of High Performance Driving Simulator" | **Mr. Masaru Ishikawa** - JRC

#### 6 - 7:30 pm EXHIBITION /// POSTERS

#### 7:30 - 8:00 pm FREE TIME

#### **8** pm

Cocktail Dinner Party Plage des Pirates, Juan-les-Pins

23 boulevard Baudoin 06160 Juan les Pins +33 (0)493 610 041 +33 (0)493 617 574

Two minutes walk in front of Palais des Congrès Conference site

#### SESSION D Motion II Fitzgerald Room

## 5 pm - Experimental evaluation of an optimization-based motion cueing algorithm.

F. Ellensohn (Technical University of Munich), J. Venrooij, M. Schwienbacher, D. Rixen

#### 5:30 pm - Solving the Constrained Problem in Model Predictive Control based Motion Cueing Algorithm with a Neural Network Approach

C. Rengifo (Renault, Arts et Métiers), J-R. Chardonnet, D. Paillot, H. Mohellebi, A. Kemeny

### AGENDA Friday September 7<sup>th</sup> 2018

#### **9** am

#### **KEYNOTE** - Antipolis Auditorium

"Virtual and Augmented Reality: From Promise to Productivity" Pr. James Oliver - Professor, Iowa State University, Director, VR Applications Center

9:30 - 9:45 am BREAK

SESSION E Connected & Autonomous Vehicles Antipolis Auditorium	SESSION F Motion III Fitzgerald Room
9:45 am - Testing cooperative intelligent transport systems in driving simulators M. Aramrattana (VTI, Halmstad University), A. Andersson, H. Burden, F. Reichenberg, N. Mellegard	9:45 am - Model Predictive Motion Cueing: Online Prediction and Washout Tuning F. M. Drop (Max Planck Institute for Biological Cybernetics), M. Olivari, M. Katliar, H. H. Bülthoff
10:15 am - A Simulation Framework for Testing a Conceptual Hierarchical Autonomous Traffic Management System including an Intelligent External Traffic Simulation S. Henning (Heinz Nixdorf Institute, University of Paderborn), P. Biemelt, N. Rüddenklau, S. Gausemeier, A. Trächtler	10:15 am - A Model Predictive Motion Cueing Strategy for a 5-Degree-of- Freedom Driving Simulator with Hybrid Kinematics .Biemelt (Heinz Nixdorf Institute, University of Paderborn), S. Henning, N. Rüddenklau, S. Gausemeier, A. Trächtler

#### 10:45 - 11:30 am

#### BREAK /// EXHIBITION /// POSTERS



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#### **SESSION G** Virtual Prototyping Antipolis Auditorium

#### 11:30 am - Validation of a Fixed-Base Driving Simulator to Assess Behavioural Effects of Road Geometrics.

M. Bassani (Politecnico di Torino), L. Catani, A. A. Ignazzi, M. Piras

#### 12 pm - Assessing dynamics of heavy vehicles in a driving simulator.

S. Kharrazi (VTI), B. Augusto, N. Fröjd

#### SESSION H **Driving simulators design** Fitzgerald Room

#### 11:30 am - Driving simulator motion base right sizing.

E. Sadraei (University of Leeds), R. Romano, S. Jamson, G. Markkula, H. Jamson

12 pm - Offline Motion Simulation Framework: Optimizing Motion Simulator Trajectories and Parameters M. Katliar (Max Planck Institute for Biological Cybernetics, University of Freiburg), M. Olivari, F. M. Drop, S. Nooij, M. Diehl, H. H. Bülthoff

#### 12:30 - 2:30 pm LUNCH /// EXHIBITION /// POSTERS

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SESSION I	SESSION J
Simulation Applications	Simulation Design
Antipolis Auditorium	Fitzgerald Room
2:30 pm - <b>KEYNOTE</b> Algorithms for Image-Based Rendering with an Application for Driving Simulation. George Drettrakis - Research Director, INRIA	2:30 pm - Effects in latency in immersive display systems for Virtaul Reality and Driving Simulation. B. Perroud (Renault, Arts et Métiers), S. Regnier, A. Kemeny, F. Merienne
3 pm - An Objective Assessment of the	2:50 pm - Dynamic Glare Simulation in
Utility of a Driving Simulator for Low	Virtual Night Driving.
Mu Testing.	S. Strebel (Porsche), C. Neumann
R. Romano (University of Leeds), G. Markkula,	3:10 pm - Large scale collaborative
E. Boer, H. Jamson, A. Bean, A. Tomlinson,	autonomous vehicle simulation and
A. Horrobin, E. Sadraei	analysis using smartphones.
3:30 pm - Driving Simulation Technologies for Sensor Simulation in SIL and HIL Environments. G. Sievers (dSPACE), C. Seiger, M. Peperhowe, H. Krumm, S. Graf	A. Kemeny (Renault, Arts et Métiers), E. Icart, A. Sepchat, F. Colombet, S. Espié, J-R. Chardonnet
	3:30 pm - Exploring the suitability of virtual reality for driving simulation. B. Blissing (VTI), F. Bruzelius
3:50 pm - A Data-driven Verification	3:50 pm - Simulation of driving
Framework for Active Safety Functions.	scenarios from physical scenes
M. Elgharbawy (Daimler), I. Scherhaufer,	E. Gouraud (Renault SW Labs), L. Juste,
M. Frey, F. Gauterin	P. Remusan, P. Revnaud

P. Remusan, P. Reynaud

4:10 pm - Ideal Trajectory: how Augmented Reality in Video Games Increases Players' Performance. Inspiration for Real Driving Experience. S. Langlois (Renault), N. Grandjean 4:10 pm - Generation of Highway Sections for Automated Test Case Creation.

U. Noyer (Deutsches Zentrum für Luft- und Raumfahrt e.V.), M. Scholz, A. Richter

4:30 - 4:40 pm CLOSING REMARKS - Antipolis Auditorium





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### POSTER PRESENTATIONS

The posters are presented during the breaks on the Espace Méditerranée on third floor

## The Influence of Motion Scaling on the Driver's Discrimination of Longitudinal Acceleration

E. Baumgartner (FKFS), A. Ronellenfitsch, H-C. Reuss, D. Schramm

**Prototyping and evaluation of an automated driving system in the SHERPA simulator** - *M*. *A*. Benloucif (Université de Valenciennes), J. Floris, P. Simon, *C*. Sentouh, S. Debernard, J-C. Popieul

Seeing, Feeling, and Assessing Self-Motion In Real and Virtual Environments - J. E. Bos (TNO, Vrije Universiteit), E.C.M. Berg-Kroon, M. M.J. Houben, O. X. Kuiper

Gaze behavior during take-over after a long period of autonomous driving: A pilot study - A. Bourrelly (Aix-Marseille University), C. Jacobé de Naurois, A. Zran, F. Rampillon, J-L. Vercher, C. Bourdin

#### A Scenario-based Verification Framework for Truck Platooning

M. Elgharbawy (Daimler, Karlsruhe Institute of Technology), H. Elsayed, A. Birlet, M. Frey, F. Gauterin

## The Influence of the Center of Rotation on the Simulation Quality using an Offline Optimization-Based Motion Cueing Algorithm

P. Erler (TU Darmstadt), S. Thein, S. Rinderknecht

#### Fast MPC based MCA development and application

Z. Fang (Renault), M. Tsushima, N. Machida, F. Colombet, D. Wautier, A. Kemeny

#### Virtual Testing and the Test Bed Lower Saxony - Services and

Applications - M. Fischer (DLR), A. Wodtke, J. Mazzega, F. Köster

#### Comparing driving behavior in real and simulation conditions

E. M. Gemonet (Aix-Marseille University, Groupe PSA), V. Honnet, M. Poueyo, S. Masfrand, D. R. Mestre

#### Improving reproduction of NVH characteristics of vehicles in a full-

**vehicle driving simulator** - C. Holzapfel (Universität Stuttgart), J. Pitz, M. Kehrer, H-C. Reuss

**Design and implementation of dynamic scenarios for Virtual Test Drives** *M. Kehrer (FKFS), J. Pitz, C. Holzapfel, H-C. Reuss* 

**Error minimizing motion cueing algorithm based on adaptive tilt coordination for longitudinal movements** - *T. Miunske (FKFS), H-C. Reuss, A. Janeba, J-O. Pitz* 

**Comparable Evaluation of a 3DOF Mid-Size Simulator Concept** A. Parduzi (BMW Group), F. Bezikofer, E. Comulada-Simpson, S. Marker

**Gender differences affect enjoyment in HMD virtual reality simulation** S. Rangelova (Robert Bosch), N. Marsden

Effects of individual reactions to driving simulators on emergency breaking reaction times: temporal variations over the course of multiple drives - R. T. Reinhard (Fraunhofer ITWM, Technische Universität Kaiserslautern), M. Kleer, K. Dreßler

Night Drive Simulation: A Tool for Dynamic and Interactive Lighting System Assessment - M. C. Reiter (Ford-Werke), M. Koherr, M. Gottschalk, A. Steghafner, A. van Bilsen, E. Tramoy

Technical and experimental aspects of driving simulator studies: Towards Defining Operating Standards for Driving Simulators used in vehicle development - H. Schmieder (Daimler), K. Nagel, J. Haecker

**Driving simulator architectures for modern collaborative science with complex multi-component integration** - A. M. Tomlinson (University of Leeds), R. Romano, G. Markkula

**Driving Simulator in Brazil: Initial implementations in a Drivers Training Center** - *R. Torres (Federal University of Minas Gerais)* 

Smart IoT for Mobility: Automating of Mobility Value Chain through the Adoption of Smart Contracts within IoT Platforms - F. Verdier (Université Côte d'Azur, LEAT), P. De Fillippi, T. Marteu, F. Mallet, P. Collet, L. Arena, A. Attour, M. Ballatore, M. Chessa, A. Festré, P. Guitton-Ouhamou, R. Bernhard, B. Miramond



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JRC celebrates 103 anniversary in 2018. Driving Simulator is one of the technologies accumulated from 1915 within JRC.

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- a wide range of simulators adapted to specific use case and,
- value-added services.

SCANeR<sup>™</sup> is the most complete that simulates traffic, terrain, vehicle dynamics, autonomous traffic, pedestrians, feedback as well as sensors. Far from being a "black box" tool, it is a genuine modular simulation platform, flexible, expendable and open, meeting the needs of researchers and engineers.

AV Simulation leverages 20 years' experience and global credentials to build turnkey advanced driving simulators in line with rapidly changing requirements:

- Headlight / night simulators using cylindric screens and high volumes of projectors
- Advanced simulators that encompass a complete vehicle with all equipment's, dome with visual field of up to 360°, motion platform offering the highest degree of freedom, movement restitution at scale I and total immersion. These simulators allow to study the driver within the vehicle and adjust design for enhanced visibility, ergonomics and human-car interaction.
- Our simulators also help fine-tune the vehicle and all on-board systems: Active Chassis control, lighting, ADAS, Dynamic handling, pre-dimensioning in the project planning phase.

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- On-board systems fine-tuning and validation.

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SystemX is one of eight institutes for technological research that have been established by the Government to enhance the country's attractiveness.



The LiV laboratory (Laboratory for Immersive Visualization) is a joint laboratory between Renault and Arts et Métiers ParisTech. It was founded in 2011 and gathers teams from the Immersive Simulation Center from Renault and Institut Image from Arts et Métiers ParisTech, in the fields of Virtual Reality, Augmented Reality and Driving Simulation.

#### www.liv.institutimage.fr

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Inria, the French National Institute for computer science and applied mathematics, promotes "scientific excellence for technology transfer and society".

Graduates from the world's top universities, Inria's 2,400 employees rise to the challenges of digital sciences. Research at Inria is organised in "project teams" which bring together researchers with complementary skills to focus on specific scientific projects. With this open, agile model, Inria is able to explore original approaches with its partners in industry and academia and provide an efficient response to the multidisciplinary and application challenges of the digital transformation. The source of many innovations that add value and create jobs, Inria transfers expertise and research results to companies (startups, SMEs and major groups) in fields as diverse as healthcare, transport, energy, communications, security and privacy protection, smart cities and the factory of the future.

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3D Mapping Solutions GmbH is one of the leading experts in kinematic surveying of road and railway networks. The company offers services, hardware and software solutions as well as consulting services in the field of kinematic surveying. For any customer demand we will offer an individualized, robust high quality solution. Many years of experience in practical kinematic surveying, sensor integration and sensor fusion, calibration of multi-sensor systems and interpretation of kinematic surveying data qualifies us as leading experts for all subject related issues.

www.3d-mapping.de



AB Dynamics supply test equipment to vehicle manufacturers and tier I suppliers. In 2016 the aVDS advanced Vehicle Driving Simulator was launched. This simulator, which utilises the Williams Advanced Engineering motion platform and rFpro digital content, has both exceptional excursion capability and consistent dynamic performance across the full range of motion. To arrange to test drive the aVDS simulator email simulatorenquiries@abd. uk.com

www.abdynamics.com



For more than 25 years, ANTYCIP Technologies offers a set of innovative solutions for the manufacturing and testing of microelectronic and electronic products. All our products come along with a complete service that includes technical support, training performance and maintenance contracts. Since 2011, ANTYCIP Technologies is part of NEXEYA Group (1000

employees) and in 2015, we integrated the Business Line Customer's Service.



ASAM e.V. (Association for Standardization of Automation and Measuring Systems) is a non-profit organization that actively promotes standardization in the Automotive Industry. Together with its more than 200 member companies worldwide, the association develops standards that define interfaces and data models for tools used for the development and testing of electronic control units (ECUs) and for the validation of the entire vehicle. Tools and products developed based on ASAM standards allow easy integration into existing value chains and a seamless data exchange.

ASAM is requesting and encouraging an open exchange among all stakeholders: manufacturers, suppliers, tool vendors, and research institutes. Technical experts from these member companies worldwide collaborate to commonly develop standards in project groups. This ensures a high level of quality and industry-wide acceptance of the standards

#### "Simulation" – a New Standardization Domain at ASAM

Several standards for the validation of highly-automated driving will soon complement the ASAM standards portfolio: OpenDRIVE® has already been transferred into ASAM, constituting the new standardization domain "Simulation". OpenCRG® und OpenSCENARIO® will follow within the next months. They will be continued under the names of ASAM OpenDRIVE, ASAM OpenCRG, and ASAM OpenSCENARIO.

Other work groups have also indicated interest in transferring their specifications into ASAM, thus ensuring an independent, long-term development and maintenance of the standards in a professional setting. The transfer of these standards allow ASAM to position itself in the area of highly-automated driving.

www.asam.net



Aspic Technologies is a French Tech® company providing realtime audio solutions for Virtual Reality, 360 video and video games. We help our customers to create an outstanding audio immersion with innovative audio software products and professional services. Our dedicated team made of digital audio specialists is based at La Plaine Images, a 100+ companies cluster devoted to creative industries and located in Northern France.

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Concurrent's SIMulation Workbench® (SimWB) is a complete modeling environment for developing and executing real-time hardware-in-the-loop and man-in-the-loop simulations. Fully integrated SimWB solutions improve test quality and reduce development and production costs. Concurrent iHawk multiprocessing systems running SimWB are based on COTS components offering the latest, leading-edge processor, chipset, memory and I/O bus technology. With SimWB, individual I/O processes can be targeted to different system cores and I/O buses for parallel execution, thus allowing the simulation loop to run at faster frame rates. SimWB recognizes and utilizes multiple cores by default and there is no limit on the number of cores than can be used by SimWB.

www.concurrent-rt.com



#### Cruden - open architecture simulators and simulator software

Cruden is the world's leading designer, manufacturer and integrator of professional open-architecture driving simulators for the automotive, motorsport, marine and motorcycle industries.

Many automotive OEMs and research institutions rely on Cruden simulators as an engineering tool for vehicle dynamics, autonomous driving, ride & comfort, driver training, HMI, ADAS, NVH and audio development and testing. Cruden's driver-in-the-loop (DIL) simulators and Panthera Simulator Software Suite are designed to slot into customers' existing tool chains so their engineers can be up and running quickly with a future-proof system that does not tie them to any one supplier.

Cruden's line up of off-the-shelf, open-architecture driving simulators delivers all of the above in a compact, affordable package that allows customers to use their own vehicle model and integrate HIL testing.

#### **Products & services**

Cruden supplies flexible, durable, high performing real-time simulators and

their modular components: hardware, software, vehicle models and content (LIDAR-based roads and tracks), as well as on- and off-board projections systems.

All simulators allow:

- Easy integration of vehicle modelling packages (from VI-grade, IPG, CarSim, VeDyna, SIMPACK, dSPACE ASM, AVL ASM, Dymola etc.)
- Customizable motion-cueing algorithms
- Own hardware integration

The Cruden team looks forward to meeting you at this year's DSC!

www.cruden.com



domeprojection.com<sup>®</sup> develops high-end automatic projection alignment and calibration technologies for visual display systems for professional simulationand training environments: the ProjectionTools guarantee a perfectly warped and blended projection combined with meticulously precise correction of colour and black level.

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FORUM8 is at the forefront of interactive and web based real-time 3D Simulation & Modeling technology. Its products are produced to the highest specification, meeting all modern international standards of ease of use and functionality.

VR-Design Studio (formerly VR-Design Studio) is the company's premier software solution for many interactive 3D virtual reality transport and urban simulation applications. Users benefit from the availability of many software plug-ins that add value to a growing number of 3rd party products. In addition there is a software development kit (SDK) and an interactive Cloud interface (VR-Cloud).

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MTS is pioneering the application of advanced simulation technologies and methods throughout all stages of vehicle development to realize new efficiencies, reduce costs and decrease time to market. Integrating these methods and technologies strategically throughout vehicle development enables more meaningful subjective and objective evaluation—at both the component and vehicle levels—earlier in the process, minimizing expensive late-stage rework and reducing the number of required prototypes. Visit us at DSC Europe 2017 (Stand 25) and explore how advanced MTS simulation solutions can transform the efficiency and speed of your vehicle development program.

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Sony Corporation (Sony), incorporated on May 7, 1946, is engaged in the development, design, manufacture and sale of various kinds of electronic equipment, instruments and devices for consumer, professional and industrial markets, as well as game consoles and software.

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TrianGraphics is operating on the Vis/Sim market and is specialized on the generation of databases for all types of real-time simulations. Besides the service of terrain generation, TrianGraphics is developing the terrain modelling solution Trian3DBuilder, which has unique features for road generation. Navigation data is analysed and parametrized to generate complex road networks. The software supports databases of arbitrary size, fully featured and ready to be used in driving simulations.

www.triangraphics.de



VectorZero builds interactive road modeling and traffic simulation software. Our main product, RoadRunner, significantly speeds the creation of detailed road networks for simulation and testing. GIS data (aerial imagery, point clouds, DEM) can be used to model real-world areas or you can create specific test scenarios manually or procedurally. In addition, RoadRunner provides tools for the fast creation of traffic signals, signs, markings and buildings. RoadRunner runs on Windows and Linux systems and exports to FBX (for Unity and Unreal), OpenDRIVE and OpenFlight.

www.vectorzeroinc.com



VI-grade is the leading provider of best-in-class software products and services for advanced applications in the field of system level simulation. Together with Saginomiya, leading provider of automatic controls and test systems, and a network of selected partners, VI-grade also provides revolutionary turn-key solutions for static and dynamic driving simulation. Established in 2005, VI-grade delivers innovative solutions to streamline the development process from concept to sign-off in the transportation industry, mainly automotive, aerospace, motorcycle, motorsports and railways. With office locations in Germany, Italy, UK, Switzerland, Japan, China, and the USA, and a worldwide channel network of 20 trusted partners, VI-grade is a dynamic and growing company with a highly skilled technical team.

www.vi-grade.com | www.driverinmotion.com



VIRES Simulations technologie GmbH, a German company founded in 1996, provides solutions for automotive, railroad and flight simulation. Our core product, the highly modular "VIRES Virtual Test Drive", is used for the development and testing of advanced driver assistance and active safety systems, leading to solutions for automated driving. It covers the full range from the generation of 3d content to the simulation of complex traffic scenarios and, finally, to the simulation of either simplified or physically driven sensors. Installations cover SiL, DiL, ViL and HiL applications which may also be operated as co-simulations including 3rd party or custom packages. Adapting to our customers 'requirements is a core strength of our company. VIRES is key partner in the standardization projects "OpenDRIVE", "OpenCRG" and "OpenSCENARIO".

www.vires.com

## **XP**Isimulation

XPI Simulation designs and manufactures a range of world-leading, cost-effective simulator systems for driver training and research applications. XPI offers a range of solutions that are fully scalable and flexible according to different budget and performance requirements.

XPI works closely with our customers in order to deliver systems that improve human performance – combining innovative use of technology with outcome-based training

approaches in order to realise tangible gains.

XPI's ethos of excellence in delivery has been recognised by civil and military customers alike, with our client base including the UK Ministry of Defence, emergency services, Transport for London, Formula  $I^{TM}$  teams, road safety agencies and UK academic institutions.

XPI is currently delivering 28 high-fidelity driving simulators to General Dynamics for the AJAX armoured fighting vehicle (AFV) programme. The simulators – a mix of static and full-motion devices – will be the first of their type to enter service with the British Army, and will be accompanied by high-fidelity LiDAR-scanned driving databases covering the UK's AFV training and exercise areas at Bovington and Salisbury.

XPI has also delivered driving simulators to the Universities of Warwick, Brunel and Nottingham. Warwick's drive-in/drive-out 3xD simulator is a unique example of XPI's engineering capability, providing a controlled environment for advanced behavioural research, human-machine interface development and autonomous vehicle modelling.

Moreover, XPI's innovative approach to the use of cutting-edge technology for simulation has enabled us to pursue and deliver numerous research contracts for government agencies including Dstl and Highways England.

XPI is also leading ground-breaking research in the field of driving simulation for connected and autonomous vehicles (CAV), having recently been awarded a feasibility study examining certification in synthetic environments and a concept demonstrator addressing virtual validation of CAV in rural environments (OmniCAV). Both of these projects are funded by the UK government's Centre for Connected and Autonomous Vehicles (CCAV) and managed by Innovate UK.

In conjunction with its range of standard and bespoke driving simulator platforms, XPI provides simulator-based driver training services through the Driving Simulation Centre (DSC).

XPI is a wholly-owned subsidiary of Thales UK.

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## COCKTAIL DINNER PARTY

You are cordially invited to a cocktail dinner party on the Sept. 6<sup>th</sup> at 8 pm at the Pirate's Beach. Nested in the Pine Park, Les Pirates private beach is ideally situated in the Bay of Juan les Pins, at the entry of the city center and the beginning of the Cap d'Antibes.

Just two minutes walk in front of Palais des Congrès Conference site

Get directions: https://goo.gl/maps/LkniNIxRqfQ2

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