GUIDEBOOK

DSC 2020 EUROPE VR

Driving Simulation & Virtual Reality Conference & Exhibition

Palais des Congrès, Antibes | France

Organized by the Driving Simulation Association

DSA

The way for tomorrow's vehicle

With the cooperation and support of:

Arts et Métiers Sciences et Technologies

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Université Gustave Eiffel

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DSC 2020 EUROPE VR

Driving 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 19th edition follows that of 2019, held in Strasbourg, France, with close to 350 participants and 40+ 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 Product Solution sessions, more than 80 speakers and panelists as well as an extended professional exhibition.**

Recent trends and developments for AD/ADAS scenario factory and standards will be again one of the main axis and human factors and motion rendering will remain the now traditional axis of the conference. Topics will include state of the art in driving simulation and virtual reality technology, research and developments. This year program will also give an enlarged place for driver in the loop (DIL) simulation tools for autonomous and connected vehicles along with advanced driving assistance system (ADAS) applications as well as vehicle in the loop (VIL) systems and use-cases.

You are welcome to the DSC 2020 Europe Conference organized by the Driving Simulation Association, in cooperation with Arts et Métiers and IFSTTAR, with the support of Renault, held on September 9th-11th!

DSA

The way for tomorrow's vehicle

DSC 2020 Exhibition

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. This year's conference, thanks to its hybrid version, is expected to attract both onsite and remote 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 participants and exhibitors a great time at the Driving Simulation Conference Exhibition 2020!

Palais des Congrès
60 chemin des Sables, 06160 Juan-Les-Pins, France

WiFi hotspot : DSC2020 // Password : PDC092020

Organizing Committee

Andras Kemeny | *Conference chair*

President, Driving Simulation Association
Associate Professor, Arts et Métiers
Expert Leader, Immersive Simulation & Virtual Reality, Renault
Director, Laboratory of Immersive Visualization Renault-Arts et Métiers

Amar Bouali | *Program Co-Chair*

Director, Digital Challenge Center, Université Côte-d'Azur

Florent Colombet | *Program Co-Chair*

Treasurer of Driving Simulation Association
Research Engineer, Renault

Frédéric Merienne | *Program Co-Chair*

Driving Simulation Association
Professor, Arts et Métiers
Director of Image Institute, Arts et Métiers

Jean-Rémy Chardonnet | *Program Co-Chair*

Driving Simulation Association
Assistant professor, Arts et Métiers

Lucile Frugier | *Conference Assistant*

Driving Simulation Association
Intern, DSA

Jean Schmitt | *Conference Assistant*

Driving Simulation Association
Intern, DSA

Scientific Committee

The 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 and Canada.

Chairman

Andras Kemeny	Renault, Arts et Métiers (France)

Scientific Committee Members

Mohammad Bahram	BMW Group R&T (Germany)
Gerd Baumann	FKFS (Germany)
Klaus Bengler	Technical University Munich (Germany)
Jost Bernasch	The Virtual Vehicle (Austria)
Mike Blommer	Ford Motor Co., (United States)
Jelte Bos	TNO (The Netherlands)
Heinrich H. Bülthoff	Max Planck Institute (Germany)
Viola Cavallo	Université Gustave Eiffel (France)
Frank Cardullo	State University of NY (United States)
Jean-Rémy Chardonnet	Arts et Métiers (France)
Florent Colombet	Renault (France)
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Joseph K. Kearney	University of Iowa (United States)
Franck Mars	CNRS (France)
Stéphane Masfrand	PSA Peugeot Citroën (France)
Philippe Mathieu	University of Lille (France)
Frédéric Mérienne	Arts et Métiers (France)
Arne Nåbo	VTI (Sweden)
James Oliver	Iowa State University (United States)
Jean-Christophe Popieul	Valenciennes University (France)
Paolo Pretto	Virtual Vehicle (Austria)
Richard Romano	University of Leeds (United Kingdom)
Hans-Peter Schöner	Driving Simulation Association (Germany)
Xuesong Wang	Tongji University (China)

Keynote Speakers

Keynotes are historically inspiring talks given by eminent scientists in the field of driving simulation, completed now by important industrial executives.

Dr. Liam Pedersen | *Deputy Director, robotics at Alliance Innovation Lab – Silicon Valley*

"Toward safe and socially acceptable autonomous vehicles"

Mr. Olivier Sappin | *CATIA CEO, Dassault Systèmes*

"Cyber system for Autonomous Vehicle – An end to approach from Vehicle Mission to Certification Driven Simulation"

Dr. Vincent Abadie | *VP, Senior Expert, Autonomous Vehicle and ADAS, PSA*

Mrs. Jasmin von Göler | *Senior Manager E/E Chassis Systems, Driving Simulator and Functions, Mercedez-Benz AG*

"Simulation and testing for automated driving"

Mr. Rémi Bastien | *Vice President, Automotive Prospective, Renault Group*

"Safety is the biggest challenge for autonomous vehicle and simulation will complete actual data"

Pr. Thomas Stoffregen | *Professor of Kinesiology, University of Minnesota*

"Motion sickness in physical and virtual systems"

Dr. Roland Niemeier | *Director Sales and Business Development, DYNARDO GmbH, an ANSYS company*

"Workflow based exploration of parameter space and reliability analysis for automated driving"

Mr. Emmanuel Chevrier | *CEO, AV Simulation*

"Industry trends and accelerators with AV Simulation"

Mr. Luc Jacobs | *System Engineer Motion Simulation Technology, Bosch Rexroth B.V.*

"Advanced technologies for motion simulators"

Mr. Sébastien Lozé | *Industry Manager, Simulations, Epic Games – Unreal Engine*

"From Manufacturing to Autonomous Vehicles: How Unreal Engine is an accelerator for automotive simulation development"

Comprehensive Simulation and Software Development for ADAS and Autonomous Technology

The race to market is on … but the hurdles are huge.

You can't deploy autonomous technology — on land, at sea or in air — without proving it will perform safely.

This requires a massive and potentially costly testing effort. Your advanced driver-assistance-systems (ADAS), highly autonomous or urban air mobility (UAM) vehicle must be tested under millions of possible operating scenarios.

To do this, you'd need to drive a prototype autonomous vehicle billions of miles — and do it faster than the competition.

Simulation is the only answer and Ansys Autonomy is the industry's most comprehensive simulation solution for ensuring the safety of autonomous technology.

Ansys.com/autonomous

Ansys

Wednesday, September 9th 2020

9 am — REGISTRATION

9:30 am — TUTORIAL - *Antipolis Auditorium*

Simulation Tool Chain for Autonomous Driving (ANSYS)

Session 1: System Architecture Design – Safety Analysis (FuSa and SOTIF)

- *Requirements analysis*
- *Robustness Testing of Perception algorithms and iteration with Safety Analysis*

Session 2: Design – Verification and Tuning of AD Embedded Software features

10:30 am — BREAK

11 am — TUTORIAL - *Antipolis Auditorium*

Simulation Tool Chain for Autonomous Driving (ANSYS)

Session 3: Creation & Execution of Driving Scenario – Verifying & Validating the AD Software

- *Creation of World Models and parametric Driving Scenarios, based on Safety Analysis*
- *Exploration of the Scenario Parameter space in a HPC environment; production of KPIs.*
- *Execution of Driving Scenarios, coupled to AD Embedded Software for Verifying/Validating the AD Software*

Session 4: HIL & DIL Scenarios

- *Execution of driving scenarios in hardware-in-the-loop (HIL) for V&V*
- *Evaluation of the driver performance in driver-in-the-loop (DIL) against some driving scenarios*

Wednesday, September 9th 2020

12 am **LUNCH**

1 pm **TUTORIAL** - *Antipolis Auditorium*

Discover Unreal Engine: Your first steps guided by Epic Games

In this session, James Butcher, from the Epic Games training team, will take you through your first hour with Unreal Engine. James will guide the class as we work our way through the basics of the user interface and the essential features of the engine, and by the end of this course you'll be able to create your first projects with more confidence.

Overall this session will be a great way for the DSC community to get more familiar with Unreal Engine, and to help smooth out the initial learning curve with respect to using such a powerful and flexible development platform.

2 pm **BREAK**

2:15 pm **CONFERENCE OPENING**- *Antipolis Auditorium*

Pr. Andras Kemeny | Conference Chair
(President, Driving Simulation Association,
Expert Leader Immersive Simulation & VR, Renault,
Director, LiV Renault-Arts et Métiers)

2:30 pm **KEYNOTE** - *Antipolis Auditorium*

"Toward safe and socially acceptable autonomous vehicles"
Dr. Liam Pederson | *Deputy Director, robotics at Alliance Innovation Lab - Silicon Valley*

3 pm **3 ROUND TABLES at choice**

I/ Simulation data standardization for Autonomous Vehicles - *Fitzgerald Room*

For designing, validating and homologating autonomous vehicle, it seems to be now well established that the process will be scenario-based. It will be massive in term of scenarios, unitary tests cases, and based on global data. The effort to develop the whole physical and numerical framework from the raw data and scenario detection to the real world driving through a scenario database, with scenarios for simulated test cases, simulation models, extensive simulation, but also validation criteria is also massive. It will need standardization for safety purpose and credibility of simulations on one side, but also to share the huge job in front of us ! In this domain, it is still not possible to work alone!

II/ *The Roundtable aims to bring together researchers, users and developers of this eco-system to share current status in term of needs from users and proposals from developers, and define a road map and priorities in term of standardisation items.*

Klaus Estenfeld, ASAM (Germany)
TÜV Süd (Germany)
Bernard Dion, ANSYS (United States)
Matthieu Worm, Siemens (Germany)
Dominique-Laure Tézenas, IPG (France)

Moderated by Dr. Emmanuel Arnoux, Renault (France)

II/ VR & AR – the future of XR for driver research and training - *Bechet Room*

The recent advent of sophisticated ADAS and AD/AV systems made increasingly crucial to better understand driver behavior and training. VR and AR will play an essential role to design, implement and deploy driver research and training experiments.

This round table will explore the various VR and AR technologies used in AD & ADAS HMI design and learning as well the caveats, such as technical limitations and simulation sickness. A discussion about the role of future XR systems for driver entertainment and motion sickness reduction will complete the overview of XR systems used in driver aid systems.

Alexandre Ibanez, VR Connection (France)
Bert Hartfiel, Volkswagen (Germany)
Siddhant Gupta, Volvo Cars (Sweden)
James Oliver, Iowa State
University (USA)

Moderated by Mr. David Defianas, PSA Group (France)

III/ Vehicle in the Loop (VIL) Simulation challenges, towards virtual reality? - *Davis Room*

This round table will address the VIL (Vehicle in the loop) simulation: description, solutions and challenges. Among the challenges, a particular focus will be proposed on the integration of driver's perception of the driving environment. Lots of challenges for VIL meet those found in DIL simulation, such as environment perception (road, traffic, events), transport delay, field of view, which could typically be addressed with VR/MR/AR based display systems.

III/ *Dr. Tobias Dueser AVL (Germany)*
Thomas Nguyen, AV Simulation (France)
Thomas Karasiewicz, IPG Automotive (France)

Moderated by Stéphane Régnier, Renault (France)

4:30 pm **BREAK**

5 pm **INDUSTRIAL PITCHES** - *Antipolis Auditorium*

- Gilles Gallée (Autonomous Vehicle Simulation SOultion Director, ANSYS)
  "Validation and Verification of Driving Systems "
- Didier Wautier (GM AD Simulation & Virtual Reality, Renault)
  "« ROADS » to immersive and high dynamic driving simulation"
- Pierre Sigrist (Co-Founder & General Manager, epicnpoc)
  "ADAVEC – a validation environment for safe machine to man transition in AD context"
- John Mould (Commercial Development Manager, ST Engineering Antycip)
  "Virtual Reality for Product Design & Review"
- Dr. Sergey Kovyryalov (Director of VIOSO Simulation)
  "Auto-alignment technology for simulation visual systems"

5:30 pm **KEYNOTE** - *Antipolis Auditorium*

"Cyber System for Autonomous Vehicle – An end to end approach from Vehicle Mission to Certification Driven Simulation"
Olivier Sappin | *CATIA CEO, Dassault Systèmes*

6 pm **KEYNOTE** - *Antipolis Auditorium*

Vincent Abadie | *VP, Senior Expert, Autonomous Vehicle and ADAS, PSA*

6:30 pm **COCKTAIL** - *Espace Méditerrannée, third floor*

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Sustainable Mobility Contest Award Ceremony

Thursday, September 10th 2020

8 am — REGISTRATION

9 am — KEYNOTE - *Antipolis Auditorium*

"Simulation and testing for automated driving"
Jasmin von Göler | *Senior Manager E/E Chassis Systems, Driving Simulator and Functions, Mercedes-Benz AG*

9:30 am

SCIENTIFIC PAPER SESSION **ADAS, Autonomous and Connected Vehicle** *Antipolis Auditorium*	SCIENTIFIC PAPER SESSION **Perception and Motion** *Fitzgerald Room*
9:30 am Integration and training of a ROS autonomous driver for human-like driving style in a complex multi-component driving simulator *A. Solernou (University of Leeds), R. Romano, I. Souflas, F. Hajiseyedjavadi, E. Paschalidis, N. Merat*	Sensitivity Analysis of an MPC-based Motion Cueing Algorithm for a Curve Driving Scenario *J. R. van der Ploeg (Delft University of Technology), D. M. Pool, D. Cleij, M. Mulder, H. H. Bülthoff*
10 am A flexibly linkable meta layer of geographic features supplementary for driving automation and simulation *R. Ebendt (German Aerospace Center DLR)*	Identification of Drivers' Controlled Stimuli in Nonlinear Vehicle Dynamics Driving Simulation *T. Schwarzhuber (BMW Group), J. von Schleinitz, H. Geiser, M. Graf, A. Eichberger*
10:30 am Measurable Safety of Automated Driving Functions using Stochastic Analysis Methods *M. Elgharbawy (Mercedes-Benz AG), A. Schwarzhaupt, M. Frey, F. Gauterin*	Optimizing an Optimization-Based MCA using Perceived Motion Incongruence Models *D. Cleij (Delft University of Technology), D. M. Pool, M. Mulder, H. H. Bülthoff*

EXHIBITION

EXHIBITION

11 am — BREAK

11:30 am — INDUSTRIAL KEYNOTES SESSION - *Antipolis Auditorium*

11:30 am — *"Workflow based exploration of parameter space and reliability analysis for automated driving"*
Dr. Roland Niemeier, Director Sales and Business Development, DYNARDO GmbH, an ANSYS company

11:50 am — *"Industry trends and accelerators with AVSimulation"*
Emmanuel Chevrier, CEO, AV Simulation

12:10 am — *"Advanced technologies for motion simulators"*
Luc Jacobs, System Engineer Motion Simulation Technology, Bosch Rexroth B.V.

12:30 am — LUNCH

1:30 pm — POSTERS

2:30 pm

	PRODUCT SOLUTION SESSION **ADAS, Autonomous and Connected Vehicle** *Antipolis Auditorium*	SCIENTIFIC PAPER SESSION **Perception and Human Factors I** *Fitzgerald Room*
2:30 pm	Smart Testing of Autonomous Systems *D. Mear (Hexagon VIRES)*	Using Simulation to Assess Right-Hook Conflicts Between Bicycles and Cars at Protected and Unprotected Intersections *J. K. Kearney (University of Iowa), L. D. Subramanian, E. E. O'Neal, J. M. Plumert*
3 pm	MOOVE & MOSAR Projects: a scenario library for designing & validating ADS *B. Foyer (SystemX), M. Pajon, F. Gaillard, L. Durville, G. Bresson*	Effectiveness of an alert feedback system in reducing moped-riders' speed limit violations *M. Tagliabue (University of Padua), R. Rossi, M. Gastaldi, G. De Cet, F. Freuli, F. Orsini, L. L. Di Stasi, G. Vidotto*

3:30 pm — BREAK

EXHIBITION

EXHIBITION

Thursday, September 10th 2020

4 pm

PRODUCT SOLUTION SESSION **Simulation Design and Architecture I** *Antipolis Auditorium*	SCIENTIFIC PAPER SESSION **Perception and Human Factors II** *Fitzgerald Room*
4 pm Motion Cueing Washout Tuning based on Step Responses *C. R. Brown (McLaren)*	Measuring acceleration perception with real-world, in-car data on a cable-robot-simulator *H. Kang (Korea University), J. Yang, R. Boss, M. Lächele, H. H Buelthoff, C.Wallraven*
4:30 pm Generating virtual environments for mobility simulation using procedural modeling *T.N. Dang (IFSTTAR)*	Transitioning back from SAE-L3 autonomy – comparing traded and shared control *K. M van Dintel (Delft University of Technology), D. A. Abbink, B.M. Petermeijer, E. J. H. De Vries*

5 pm INDUSTRIAL KEYNOTE - *Antipolis Auditorium*

"From Manufacturing to Autonomous Vehicles: How Unreal Engine is an accelerator for automotive simulation development"

Sébastien Lozé, Industry Manager, Simulations, Epic Games – Unreal Engine

5:20 pm
6:30 pm EXHIBITION

8 pm COCKTAIL DINNER PARTY

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

EXHIBITION

EXHIBITION

11th Program

Friday, September 11th 2020

8 am — REGISTRATION

9 am — KEYNOTE - *Antipolis Auditorium*

"Safety is the biggest challenge for autonomous vehicle and simulation will complete actual data."
Rémi Bastien | *VP, Automotive Prospective, Renault; President, VEDECOM; President, Mov'eo*

9:30 am

PRODUCT SOLUTION SESSION **Simulation Design and Architecture II** *Antipolis Auditorium*	SCIENTIFIC PAPER SESSION **Motion Cueing I** *Fitzgerald Room*
9:30 am — Development of a Compact, High-Performance Virtual Reality Driving Simulator *W-S. Lee (Innosimulation), J. Yu, J. Lee*	Design and Evaluation of a Novel Filter-Based Motion Cueing Strategy for a Hybrid Kinematics Driving Simulator with 5 Degrees of Freedom *P. Biemelt (Heinz Nixdorf Institute, University of Paderborn), S. Mertin, N. Rüddenklau, S. Gausemeier, A. Trächtler*
10 am — Single Projector VDS for Full Immersive Driving Simulator *G. Nonque (TREALITY SVS)*	Comparison of Quality Metrics between Motion Cueing Algorithms in a Virtual Test Environment *M. J.C. Kolff (BMW Group), J. Venrooij, D. M. Pool, M.Mulder*

10:30 am — BREAK

11 am

SCIENTIFIC PAPER SESSION **Virtual Reality for Driving Simulation I** *Antipolis Auditorium*	SCIENTIFIC PAPER SESSION **Motion Cueing II** *Fitzgerald Room*
11 am — HMD and CAVE simulators to study pedestrian street-crossing decisions *P. Arvind Pala (IFSTTAR, Université Gustave Eiffel), V. Cavallo, D. N. Thong, M-A. Granié, S. Schneider, P.Maruhn, K. Bengler*	Motion cueing algorithms and objective criteria investigation for reproducing high lateral dynamic motion perception in driving simulator *Z. Fang (Renault), M. Soyer, D. Wautier, Y. Isono, A. Kemeny, N. Machida*

EXHIBITION

EXHIBITION

11:30 am	Contribution of stereoscopy and motion parallax for inter-vehicular distance estimation in driving simulator experiments *B. Perroud (Renault), F. Colombet, R. Gosson, S. Regnier, J-C. Collinet, Z.Fang, A. Kemeny*	Interpolation-Based MCA for acceleration rendering *Martin Soyer (Renault), S. Olaru, Z. Fang, D. Wautier, A. Kemeny*
12 am	POSTERS	
12:30 am	LUNCH	
2 pm	SCIENTIF PAPER SESSION **Virtual Reality for Driving Simulation II** *Antipolis Auditorium*	SCIENTIFIC PAPER SESSION **Simulator Design & Architecture** *Fitzgerald Room*
2 pm	The Effect of Head-Mounted Displays on the Behavioural Validity of Driving Simulators *A. Parduzi (BMW), J. Venrooij, S. Marker*	Using a Bicycle Simulator to Examine the Effects of External HMI on Behavior of Vulnerable Interaction Partners of Automated Vehicles *C. Kaß (WIVW), S. Schoch, F. Naujoks, S. Hergeth, T. Stemmler, A. Keinath, A. Neukum*
2:30 pm	Criteria Evaluation of a Virtual Reality Platform to Investigate People's Behaviour towards Autonomous Vehicles *S. Stadler (TUMCREATE), H. Cornet, F. Frenkler*	Assessing the Impact of 3DOF Motion on Driver Performance in a Small DiL *J. P. Chrstos (The Ohio State University), R. Sekar, R. Dupaix, R. Romano*

3 pm	SCIENTIFIC PAPER SESSION **Virtual Reality for Driving Simulation III** *Antipolis Auditorium*	SCIENTIFIC PAPER SESSION **Motions Sickness** *Fitzgerald Room*
	3 pm – A Virtual Reality Study on How Communication & Gamification Influence Driver Compliance and Emotion *N. Forchhammer (TUMCREATE), P. Y. Lim, H. Cornet, F. Frenkler* 3:30 pm – Vehicle-Pedestrian Interaction: A Distributed Simulation Study *E. Sadraei (University of Leeds), R. Romano, N. Merat, J. G. de Pedro, Y. M. Lee, R. Madigan, C. Uzondu, Wei Lyu, A. Tomlinson*	3 pm – Simulator Sickness Ratings Reduce with Simulator Motion when Driven Through Urban Environments *M. Hogerbrug (BMW, Delft University of Technologies), J. Venrooij, D. M. Pool, M. Mulder* 3:20 pm – Motion Predictability and Sickness *J. E. Bos (TNO), O. X. Kuiper, E. A. Schmidt* 3:40 pm – The metrics for measuring motion sickness *A. J.C. Reuten, J. E. Bos, J. B.J. Smeets*
4 pm	KEYNOTE - *Antipolis Auditorium*	
	"Motion sickness in physical and virtual systems" Thomas Stoffregen | *Professor of Kinesiology, University of Minnesota*	
4:30 pm 4:40 pm	CLOSING REMARKS - *Antipolis Auditorium*	

EXHIBITION

The posters are presented during posters breaks in the Exhibition Area.

Toward the use of Dynamic Driving Simulator for Autonomous Driving Control Law Design
Deborne (Renault), C. Guo, Z. Fang

Use of a motorcycle simulator in a rider thermal comfort study
Symeonidis (CERTH-HIT), E. Bekiaris

GNSS Receiver Selection Challenges related to Automotive Positioning
R. Grech (Spirent Communications PLC)

Evaluation of Motion Cueing Algorithms for High Transient Effects in Longitudinal Dynamics
M. Scheffmann (FKFS), T. Miunske, C. Holzapfel, H-C. Reuss

Efficient modelling of highway tracks for test case creation
U. Noyer (German Aerospace Center), M. Scholz, H. Hungar, M. Fischer

Validation of the Dynamic Vehicle Road Simulator
A. Hafner (Technische Universität Braunschweig), R. Henze, F. Küçükay

Road Safety Audit Guideline Development Using a Driving Simulator Based on Digital Twin Technology
Y. Jun (University of Seoul), J. Go, C. Yeom

Influence of engine sound on the evaluation of simulator driving
E. Kraft (Technische Universität Darmstadt), O. Pasnicu, J. Vogt, S. Rinderknecht

A bicycle simulator for the evaluation of traffic control strategies in urban environments
A. Keler (Technical University of Munich), G. Grigoropoulos, H. Kaths, S. A. Hosseini, P. Malcolm, J. Kaths, F. Busch, K. Bogenberger

Immersive Room, the next breakthrough in VR training
J. Garrido (Virtualware), A. Otaola

Posters

Coupled simulator for research on the interaction between pedestrians and (automated) vehicles
P. Bazilinskyy (Delft University of Technology), L. Kooijman, D. Dodou, J. de Winter

Scalable Platform for virtual Powertrain development
G. François (ETAS GmbH)

It's a challenge! Motivating drivers to drive energy efficient
S. Trösterer (VIRTUAL VEHICLE Research GmbH), P. Mörtl

Isn't a Driver-In-The-Loop-Study just a serious version of a video game? – A comparative analysis on the application of game design methods on simulator experiments
J. Wegener (German Aerospace Center), M. Fischer, K. A. Ihme, E. J. Bosch
Assessment of acoustic comfort in electric autonomous vehicles

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AVSIMULATION

Accelerating automotive innovation, thanks to simulation.

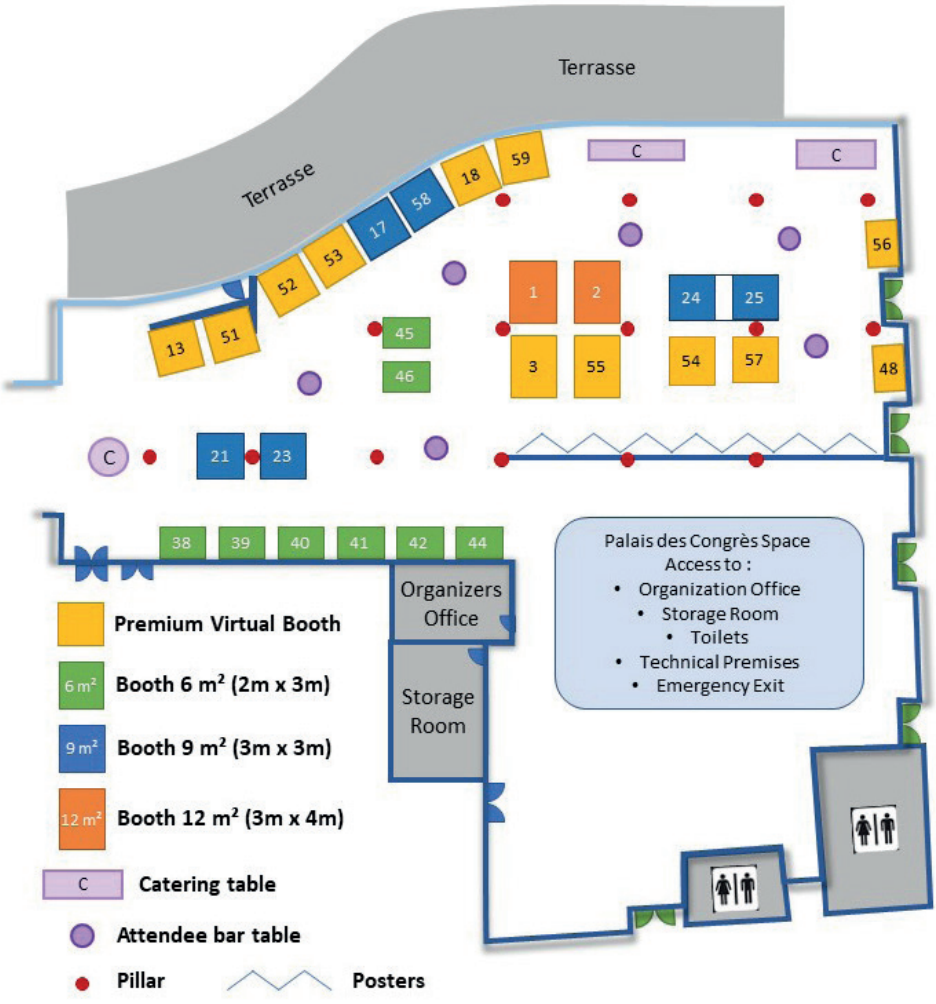
To guarantee reduced time-to-market to its customers, AVSimulation offers a complete simulation platform called **SCANeR™** a wide range of simulators adapted to specific use case and value-added services.

SCANeR is the most complete platform that simulates traffic, road environment, 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, expandable and open, meeting the needs of researchers and engineers.

AVSIMULATION leverages 25 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 and total immersion.

More details on www.avsimulation.com

Floor Plan



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DSC 2020 EUROPE VR

Driving Simulation & Virtual Reality Conference & Exhibition

9-11 September 2020 | Antibes

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Ansys	#24 & #25
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AVSIMULATION

AVSimulation is a fast-growing company dedicated to helping the automotive industry accelerate innovation, thanks to simulation.
To guarantee reduced time-to-market to its customers, AVSimulation offers:
– A complete simulation platform called SCANeR™
– A wide range of simulators adapted to specific use case
– Value-added services.
SCANeR™ is the most complete platform 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, expandable and open, meeting the needs of researchers and engineers.
AVSimulation leverages 25 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 et 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 handing, pre-dimensioning in the project planning phase.
Benefits include:
– Shortened development cycles and time-to-market
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www.avsimulation.fr

Premium Sponsor

If you've ever seen a rocket launch, flown on an airplane, driven a car, used a computer, touched a mobile device, crossed a bridge, or put on wearable technology, chances are you've used a product where ANSYS software played a critical role in its creation. ANSYS is the global leader in engineering simulation. We help the world's most innovative companies deliver radically better products to their customers. By offering the best and broadest portfolio of engineering simulation software, we help them solve the most complex design challenges and engineer products limited only by imagination.

www.ansys.com

Premium Sponsor

At Rexroth, we move. It's what we do since more than 200 years. And you know… we love that! That's why we will keep on moving offering solutions that are safe, efficient, intelligent and powerful. In order to keep you competitive. And that's a promise!

www.boschrexroth.com

Premium Sponsor

Unreal Engine, created by Epic Games, is the world's most open and advanced real-time 3D creation tool. Continuously evolving to serve not only its original purpose as a state-of-the-art game engine, today it gives creators across industries the freedom and control to deliver cutting-edge content, interactive experiences, and immersive virtual worlds.

www.unrealengine.com

Silver Sponsor

ASAM e.V. (Association for Standardization of Automation and Measuring Systems) is actively promoting standardization within the Automotive Industry. Together with its more than 280 member organizations worldwide, the association develops standards that define protocols, 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. ASAM standards are applied internationally with the purpose to enable easy integration of tools into existing value chains and to enable a seamless data exchange.

In 2018, the ASAM portfolio was extended by the standards ASAM OpenCRG®, ASAM OpenDRIVE® and ASAM OpenSCENARIO®, constituting the new standardization domain "Simulation". These so-called "OpenX" standards describe static road networks and dynamic driving scenarios. They are used for driving and traffic simulation and serve to validate highly automated driving systems. Since 2019, ASAM OSI, a generic interface that enables simple linkage of the many driving simulation frameworks for the development of automated driving functions, is complementing the Simulation portfolio. Further ideas like OpenLABEL and OpenX Ontology are under consideration to be standardized within ASAM.

ASAM has established a very active member base in the area of highly-automated driving: Technical experts from ASAM member companies worldwide work together to commonly (further) develop the standards mentioned above. This collaboration ensures a high level of quality and industry-wide acceptance of the standards. ASAM ensures their independent, long-term development and maintenance in a professional setting.

www.asam.net

Silver Sponsor

VR Connection is the first collaboration hub dedicated to the democratization of immersive technologies. It promotes and organises the expertises of the ecosystem with the goal to fully address major industry immersive projects. Its role covers advising large corporations on their digital strategy, gathering the best studio members, organizing the content collaborative productions, accelerating the most promising startup, and supplying a standardized distribution solution. The VR Connection Group creates value to develop and accelerate French, and soon European, immersive technology startups. The group has already brought together more than 90 company members (400 experts) in the field of VR & AR.

www.vr-connection.com

With the cooperation and support of:

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www.liv.institutimage.fr

The Gustave EIFFEL University was born out of the merger of Université Paris-Est Marne-la-Vallée and IFSTTAR, the Institute for European Research on Cities and Regions, Transport and Civil Engineering. It includes a school of architecture, EAV&T, and three engineering schools, EIVP, ENSG Géomatique and ESIEE Paris. By creating for the first time in France a three-way partnership between a university, research organisations and schools of architecture and engineering , it will have the specific purpose of fostering national and international partnerships to meet the major societal challenges generated by the profound changes in urban areas, which are already home to 55% of mankind.

www.univ-gustave-eiffel.fr

Since 1927, the "Société des Ingénieurs de l'Automobile" (Automotive Engineers Society) brings together all the specialists and enthusiasts of the automotive industry and its technologies. It has more than 1,800 individual or group and relies on a database of more than 18,000 car experts and our aim is to promote the development and knowledge sharing of engineers, managers and technicians in the automotive field.
SIA is built on its diverse communities of experts covering all areas of new technologies in product engineering as well as quality, purchasing and production from the automotive and reflects on the vast stakes of the second automotive revolution, with the 21st century in the spotlight: autonomous vehicle, hyper connected vehicle, revolution towards affordable zero emission and electrification, Big Data and cybersecurity or the emergence of artificial intelligence.
SIA is renowned in the world of automotive engineering for its conferences, workshops and congresses of international level through more than thirty annual scientific meetings.
SIA participates actively in the French automotive industry in connection with the main professional organizations and on an international level as a member of the FISITA.

www.sia.fr

Exhibitors

Booth n°1

3D Mapping Solutions GmbH is one of the leading experts in the fields of high-accuracy kinematic surveying of public roads, proving grounds, race tracks and rough road test tracks of any kind, railway tunnels or subway. We create high-precision reference maps as a basis for user-specific developments, advanced ADAS or driving development, testing and validation applications for autonomous driving.

www.3d-mapping.de

Virtual Booth n°54

AB Dynamics is a leading specialist in automotive test systems, from large scale virtual testing in simulation all the way through to proving ground automation of physical testing, and a consistent toolchain throughout.
Offering a range of advanced driving simulators, AB Dynamics has with a solution to cater for all your vehicle simulation needs, whether it be for general automotive testing or specialised motorsport applications.
Capable of accurately representing the smallest changes to a vehicle's configuration, notably via the ability to accommodate hardware-in-the-loop (HiL), software-in-the-loop (SiL) and driver-in-the-loop (DiL) testing, the line-up of innovative compact simulators can be tailored to users' requirements with a choice of high-performance platform and cockpit options along with bespoke enhancements like active seat, pedals and a user configurable LCD instrument cluster.
The aVDS is a state-of-the art system designed to reduce new vehicle development timescales and costs by allowing meaningful testing far earlier in the process. The system has a high-performance motion platform and high specification audio and visual hardware with industry-leading virtual content from rFpro. The result is a simulator capable of accurately representing the smallest changes to a vehicle's configuration and an ideal instrument for the future of vehicle development.
Contact us today to arrange a test drive: simulatorenquiries@abdynamics.com

www.abdynamics.com

Booth n°24 & 25

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www.ansys.com

Virtual Booth n°53

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www.asam.net

Booth n°1

VIRTUAL DEVELOPMENT PLATFORM aSR advanced Simulated Reality GmbH is a startup based in Stuttgart, Germany. aSR provides an innovative platform for virtual vehicle development. Our products are automotive driving simulators and software solutions with the aim to close the gap between simulation and real prototype testing, accelerating the development process and reducing physical prototypes. The aSR Driving Simulator is a professional solution with compact dimensions for a wide range of applications in Driver-in-the-Loop simulation. The aSR Simulation Framework is an innovative simulation environment for collaborative engineering. With its open architecture it enables the integration of simulation tools already existing in the company. By bringing together developers, suppliers and service providers using a shared virtual vehicle, dynamic collaboration is achieved and processes become more efficient.

www.asr-simulator.com

Virtual Booth n°48

atlatec is a "Mapping as a Service" company that creates digital twins of real-life routes. Our 3D road models come with inch-perfect object annotation and are provided in native/generic formats for simulation tools such as CarSim, CarMaker, dSpace, Vires VTD etc. or in geometry formats such as OBJ or FBX. For a free sample map, visit atlatec.de/getsampledata.html.

www.atlatec.de

Booth n°21

AVSimulation is a fast-growing company dedicated to helping the automotive industry accelerate innovation, thanks to simulation.

To guarantee reduced time-to-market to its customers, AVSimulation offers:

– A complete simulation platform called SCANeR™

– A wide range of simulators adapted to specific use case

– Value-added services.

SCANeR™ is the most complete platform 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, expandable and open, meeting the needs of researchers and engineers.

AVSimulation leverages 25 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 et 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 handing, pre-dimensioning in the project planning phase.
Benefits include:
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www.avsimulation.fr

BARCO

Virtual Booth n°56

For highly effective and realistic training, it's essential to have the right simulation visualization technology that can visually reproduce accurate, real-world scenarios at high speeds. Barco, a global visualisation company, is at the forefront of technological advancements in high resolution projectors, LED and LCD panels to the simulation industry. Offering exceptional image quality, and dedicated simulation features our range of products all reflect and share the same philosophy – conceived to offer the best possible performance for their intended application at a better price-to-performance ratio than competing products.

www.barco.com

concurrent REAL-TIME

Booth n°39

Concurrent Real-Time is the industry's foremost provider of high-performance real-time computer systems, solutions and software for commercial and government markets. Its real-time Linux solutions deliver hard real-time performance in support of the world's most sophisticated hardware in-the-loop and man-in-the-loop simulation, high-speed data acquisition, process control and low-latency transaction processing applications. Concurrent's flagship products include the SIMulation Workbench real-time modeling environment, RedHawk Linux real-time operating system with guaranteed low-latency response, and iHawk multiprocessing platforms, With over 50 years of experience in real-time solutions, Concurrent Real-Time provides sales and support from offices throughout North America, Europe and Asia.

www.concurrent-rt.fr

domeprojection.com®

Virtual Booth n°55

domeprojection.com® develops high-end automatic projection alignment and calibration technologies for visual display systems for professional simulation and training environments: the ProjectionTools guarantee a perfectly warped and blended projection combined with meticulously precise correction of color and black level. project: syntropy creates high-end visual display technologies for professional simulation- and training environments. project: syntropy offers full service and turnkey visual display solutions, fulldome systems and simulators with vibration- or motion platform.

www.domeprojection.com

dSPACE

Booth n°42

dSPACE develops and distributes integrated hardware and software tools for developing and testing electronic control units. As a one-stop supplier, dSPACE is a sought-after partner and solution provider in many development areas of the automotive industry, from electromobility to vehicle networking to autonomous driving. The company's customer base therefore includes virtually all major vehicle manufacturers and suppliers. dSPACE systems are also used in the aerospace and other industries. With approximately 1,800 employees worldwide, dSPACE is headquartered in Paderborn, Germany; has three project centers in Germany; and serves customers through regional dSPACE companies in the USA, the UK, France, Japan, China, and Croatia. dSPACE is a key player for ADAS and Autonomous Driving development and test. Many dSPACE systems are being used in those domains by Automotive EOMs and TIER1s throughout the world. Visit our booth and discover our comprehensive tool suite for the design, development and test of ECUs for Autonomous Driving. See how our models and our virtual test technology are used to drive through huge numbers of scenarios. Discover comprehensive cutting edge sensor models for Camera, Radar, Lidar. Use the latest technologies to generate raw sensor data out of a real time simulations. Take that simulated raw data to bypass real sensor input on the ECU, and get your sensor ECU to react in real time to the simulated sensor input. Also more to see on: Scenario based testing, Scenario Generation, Data Logging, etc.

www.dspace.com

eyeware

Booth n°40

Eyeware is a Swiss computer vision company that develops 3D eye-tracking software that uses affordable, consumer-grade, depth-sensing cameras to track gaze accurately in 3D. The software works in low light conditions, with automatic user-calibration and without the need for headgear.

www.eyeware.tech

Booth n°2

As a global leader in virtual test driving technology, IPG Automotive develops innovative simulation solutions for vehicle development. Designed for seamless use, the software and hardware products can be applied throughout the entire development process, from proof-of-concept to validation and release. The company's virtual prototyping technology facilitates the automotive systems engineering approach, allowing users to develop and test new systems in a virtual whole vehicle. IPG Automotive is an expert in the field of virtual development methods for the application areas of Autonomous Vehicles, ADAS, Powertrain, and Vehicle Dynamics, committed to providing support to master the growing complexity in these domains. Together with its international clients and partners, the company is pioneering simulation technology that is increasing the efficiency of development processes. By taking real test driving into the virtual world as a complement to on-road testing, IPG Automotive contributes significantly to technical progress and shares in shaping the mobility of tomorrow with regard to comfort, safety, economic efficiency and environmental friendliness. In addition to the company headquarters in Karlsruhe, Germany, IPG Automotive provides innovative development services to its clients and partners at the national offices in Braunschweig, Frankfurt and Munich as well as in China, France, Japan, Korea, Sweden, UK and the USA.

www.ipg-automotive.com

Virtual Booth n°51

SIMUSAFE is a H2020 research project. SIMUlation of behavioural aspects for SAFEr transport. SIMUSAFE aims to improve driving simulator and traffic simulation technology to safely assess risk perception and decision making of road users. Live demos of the multi-user simulator with car, motorcycle, bicycle and pedestrian at: www.gotomeet.me/SimuSafe/itcl-dsc2020-live-demos. Currently, driving simulators and traffic simulation models have limited use in safety studies due to the limited realism of road users' behaviours in models. Using a three-phase research cycle, SIMUSAFE will bridge this gap by collecting and integrating sources of road user behaviour to build more realistic simulation environments. Data collected from simulations will be correlated with naturalistic driving tests, such that the simulation and model aspects are the closest possible to real world data.

From the developed models, contributing factors causing an event (crash, near-collision, infractions) will be identified and studied further. SIMUSAFE Impacts Direct application of project results: -Standardisation in road safety and devices, incl. autonomous vehicles -Development of new safety devices -Implementation of simulator training modules by driving schools Research: -Usage of simulators and models in different transport research fields -Continued research on further improvement of simulators and road user models Economic: -Commercialisation of new safety devices, simulators, trainings Social: -Safer behaviour by road users! Project Coordinator: ITCL Intitute of Technology. Consortium: IBM, Université Gustave Eiffel, BrainSigns, EFA, MDH, AIPSS, Senseair, Prometeo Innovations, TMSi, Coventry University, Universidade do Porto, Link Innova, Aptiv, University of Iowa, Università Cattolica del Sacro CuoreSIMUSAFE Impacts Direct application of project results: -Standardisation in road safety and devices, incl. autonomous vehicles -Development of new safety devices -Implementation of simulator training modules by driving schools.

http://simusafe.eu/

Booth n°41

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www.liv.institutimage.fr

Booth n°46

Since 1997, industries including automotive, aerospace, power electronics and power generation have increasingly turned to OPAL-RT, transforming the company into a world leader in real-time simulation and Hardware-in-the-Loop (HIL) testing equipment for electrical, electro-mechanical and power electronics systems.
OPAL-RT empowers engineers and researchers with accessible, cutting-edge, real-time simulation technology to accelerate the development of better products and more reliable energy transmission.

www.opal-rt.com

Booth n°18

SENSODRIVE Simulators. Perfect Simulations – Perfect Results.
SENSODRIVE is a spin-off from the German Aerospace Center (DLR).
The company was founded in 2003 by researchers from the DLR.
SENSODRIVE is specialized in torque technology as well as in high-performance simulators.
SENSODRIVE develops and produces tens of thousands of torque sensors and torque-controlled actuators every year for renowned companies worldwide. It was the first company to launch specialized torque sensors for robot drives.
In addition to its leading role in drive technology, SENSODRIVE is known for its state-of-the-art force feedback products. The sophisticated simulators stand out due to sensitive force feedback and impressive realism.
From the steering wheel to pedals, to rotary and push buttons, or an entire simulator cockpit – the SENSODRIVE simulators enable high-end simulations in research and development.
You're not just anybody. And our products aren't just any products.
Welcome to SENSODRIVE.

www.sensodrive.de

Booth n°23

Bridging the gap between man and machine since 1999. Smart Eye develops artificial intelligence (AI) powered eye-tracking technology that understands, assists and predicts human intentions and actions.
By studying a person's eye, face and head movements, our technology can draw conclusions about an individual's alertness, attention, focus and gain insights into a person's awareness and mental status.
Today, our eye tracking technology is embedded in the next generation of vehicles, helping the automotive industry take another step towards safer and more eco-friendly transportation.
Our research instruments offer unparalleled performance in complex, real-world situations, paving the way for new insights in aerospace, automotive, aviation, psychology, communication, neuroscience, medicine and clinical research.
The flagship Smart Eye Pro is currently in use at hundreds of universities and research sites around the world, customized and tuned to specific situations and demands at almost every location. Because to us, tracking, measuring and analyzing human eye movements is an art.
Our newest addition, the XO, is a remote eye tracking system that combines the durability of a true dual camera solution and the high performance of our Smart Eye Pro software. Connect it to any analysis or visualization tool and discover the flexible way to track, measure and analyze.

www.smarteye.se

ST Engineering

Virtual Booth n°52

ST Engineering Antycip, is the Europe's leading provider of VR solutions, Visual Displays, Simulation tools and Engineering services. Since 1996, ST Engineering Antycip (formerly Antycip Simulation) has supported customers across the globe, in defence, automotive, academia, commerce and industry, to become better at what they do. ST Engineering Antycip combines its in-house technical expertise with an unrivalled range of products from software and hardware providers. ST Engineering Antycip is a subsidiary of the Electronics arm of ST Engineering, a global technology, defence and engineering group based in Singapore that specialises in the aerospace, electronics, land systems and marine sectors.

www.steantycip.com.

TEA

Booth n°38

TEA develops and supplies high-end research solutions for human behavior analysis in HMI and transportation research, for real world, simulation and VR studies: – Remote and wearable eye-tracking systems, – Wireless 3D Motion tracking sensors (IMUs) with unchallenged robustness, – Unobtrusive wireless sensors for in-depth assessment of physiological constraints, reactions and mental load, – Unmatched capabilities for simulation and VR with real-time logging of interactions with both vehicle and objects in the scene, – CAPTIV software platform enabling the recording and analysis of above multiple modalities (videos, measurements, VR and simulator data, etc) – all in perfect sync.

www.teaergo.com

TEAM CÔTE D'AZUR

www.investincotedazur.com

Booth n°38

SVCA supported by Team Côte d'Azur, the Local Economic Development Agency, is promoting the Côte d'Azur region as an attractive land for smart vehicle players. At SVCA we act so that the connected and autonomous vehicle players are in favorable conditions to perform their R&D faster, cheaper and more efficiently for an optimal societal adoption of the new Mobility use cases and to Create a market-oriented scientific ecosystem, one that is driven by industry players present today and new entrants attracted by this ecosystem.

www.investincotedazur.com

THIERRY CLÉMOT
SIMULATOR ENVIRONMENTS

Booth n°45

Thierry CLEMOT's company creates 3D environments for cars simulators.
Real environments are created from high accuracy 3d Laser scan.
Available quickly, our 200 km urban model allows us to create every exercices needed in fictive environments.
Today, our models are used by cars manufactures in the US, Asia or Europe, what about you?

www.thierryclemot.com

TRIANGRAPHICS
Intelligent Terrain Solutions

Virtual Booth n°28

TrianGraphics 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 road networks with junctions. The software supports databases of arbitrary size, fully featured and ready to be used in driving simulations. Trian3DBuilder supports OpenDrive Import and Export, it's a comfortable OpenDrive generation and editing tool and comes with a ready to use database of Here road networks.

www.triangraphics.de

VIOSO®

Virtual Booth n°3

Fascinating projection technology solutions
The projection magicians of VIOSO provide you with fascinating software solutions for your multi projector / multi display setups. Our products make the setup of installations like panorama displays, projections and projection mapping incredibly easy and reliable – including our famous patented VIOSO autoalignment technology.

www.vioso.com

VIRES
Simulationstechnologie GmbH
A Member of the MSC Software Group of Companies

Booth n°44

VIRES Simulationstechnologie GmbH provides simulation solutions for the automotive, railroad, aerospace, shipping, mining, and farming industries. VIRES is a member of the MSC Software Group of companies and is owned by Hexagon, a leading global provider of information technology solutions. VIRES is located in Southern Germany, and the 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 for shaping the future of mobility by providing the development tools to customer base worldwide. VIRES is one of the driving forces behind open standards for automotive simulator technology that enables the exchange of data and comparison of results. By using the latest technologies combined with modular design and open interfaces of our software, we offer the perfect development environment.

www.vires.com

Driving Simulation Association

The *Driving Simulation Association* aims to:

- **promote and encourage driving simulation in all its aspects:** research, studies, developments, applications and products;
- **facilitate communication between people** involved or interested in driving simulation;
- **contribute to the organization of scientific conferences in the area of driving simulation,** Driving Simulation Conference (DSC) Europe, DSA seminars
- **organize special interest groups** (SIG) Driving Simulation Experience (SIGDSEP)
- **inform** about recent events new and trends

Our Donating Members

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Join the association, register now!

driving-simulation.org

PICK UP AND KEEP YOUR PASS FOR ALL EVENTS & DINNER PARTY!

THURSDAY

COCKTAIL DINNER PARTY

You are cordially invited to a cocktail dinner party on the Sept. 10th 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

23 boulevard Baudoin
06160 Juan les Pins

Get directions:
https://goo.gl/maps/LkniN1xRqfQ2

DSC 2020 EUROPE VR

Driving Simulation & Virtual Reality Conference & Exhibition

GROUPE RENAULT

UNIVERSITÉ CÔTE D'AZUR

SIA SOCIÉTÉ DES INGÉNIEURS DE L'AUTOMOBILE

Arts et Métiers Sciences et Technologies

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