Andras Kemeny
Stéphane Espié
Frédéric Mérienne

**Editors**

# NEW DEVELOPMENTS IN DRIVING SIMULATION DESIGN AND EXPERIMENTS



**Driving Simulation Conference Europe 2014 Proceedings**

Arts et Métiers ParisTech, Paris, France

September 4-5, 2014

# Actes

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# AND EXPERIMENTS

Driving Simulation Conference
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# Direction

**Andras Kemeny**     andras.kemeny@renault.com
Renault, Technical Center for Simulation
1 Avenue du Golf, 78288 Guyancourt
Arts et Metiers ParisTech
2 rue Thomas Dumorey, 71100 Chalon-sur-Saône

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**Andras Kemeny**, Renault, Arts et Metiers ParisTech
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# PREFACE

The DSC Europe conference held this year again for the 3<sup>rd</sup> time at the Arts et Métiers ParisTech on September 4<sup>th</sup> and 5<sup>th</sup> 2014, is a gathering event between two communities: scientific researchers interested in driver's behavior and perception and developers of technologies for the rendering of the behavior and environment of vehicles.

These proceedings contain the full paper versions of the oral presentation given at the conference and short summaries of the posters presented at the conference. Papers are listed in the same order as at the conference, according the different session: Perception and Human Factors, Simulation Architecture and Design, including a new sub-session - Connected Simulation, Motion Rendering, Simulation Design and Architecture and Product Solutions and Posters.

Authors of the best papers were asked to submit an extended version to the SCS journal, Special Issue in Driving Simulation. In addition an electronic version of the conference papers are available on line on the DSC Europe website, two years after the conference, thus in September 2016 the electronic versions of the papers presented in September 2014.

These DSC Europe 2014 proceedings bring again a panorama of recent developments in simulation rendering techniques and virtual prototyping applications as well as of perception and human factors studies in the field of driving simulation.

**The DSC Europe Organization Committee**

# PROGRAMME

## Introduction

- **Virtual reality and Driving Simulation at the benefit of automotive engineering**
  Olivier Colmard, Andras Kemeny

## Perception and Human Factors

- **Are we there yet? An objective mechanism to support the assessment of driving simulator utility**
  Erwin R. Boer, A. Hamish Jamson, Sunjoo K. Advani, Anthony J. Horrobin
- **Real vs virtual driving or how to improve the realism of a dynamic driving simulator**
  Anca Stratulat, Emmanuelle Diaz, Philippe Vars, Stephane Masfrand, Laurent Leblond, Guillaume Gruel, Marcelo Martins Meira, Florian Savona, Christophe Bourdin
- **Presence studied in a driving simulator**
  Christophe Deniaud, Vincent Honnet, Benoît Jeanne, Daniel Mestre
- **Validating On-the-limit properties of a driving simulator**
  M. Hjort, S. Kharrazi, O. Eriksson, M Hjälmdahl, J. Andersson Hultgren
- **Colour-Difference Assessment for Driving Headlight Simulation**
  Quentin Vidal, Sylvain Michelin, Baptiste Laborie, Andras Kemeny
- **Variable Roll-Rate Perception in Driving Simulation**
  Paolo Pretto, Alessandro Nesti, Suzanne Nooij, Martin Losert, Heinrich H. Bülthoff
- **Simulation sickness comparison between a limited field of view virtual reality head mounted display (Oculus) and a medium range field of view static ecological driving simulator (Eco2)**
  Baris Aykent, Zhao Yang, Frédéric Merienne, Andras Kemeny
- **How much visual attention does braking require? A study of the effect of memory of the scene on driver's braking behavior**
  Mehdi Saffarian, John W. Senders
- **Roll tilt thresholds for 8 DOF driving simulators**
  Zhou Fang, Florent Colombet, Jean-Christophe Collinet, Andras Kemeny
- **The influence of lateral tilt/translation, roll and yaw scale factors on driving performances on an advanced dynamic simulator**
  Florian Savona, Anca Stratulat, Emmanuelle Diaz, Vincent Honnet, Gilles Houze, Philippe Vars, Stéphane Masfrand, Vincent Roussarie, Christophe Bourdin
- **Coping with complex driving scenarios: Exploratory Scenario Design**
  Julian Schindler, Tobias Hesse
- **Effects of haptic versus visual modalities when combined with sound in forward collision warnings**
  Mikael Ljung Aust
- **Driver Distraction among Commercial Vehicle Operators: A Study Using a Driving Simulator to Enhance Control**
  Ronald W. Tarr, Eric Paul Totten

## Motion Rendering

- **An Algorithm for False Cue Reduction and Prepositioning**
  IG Salisbury, DJN Limebeer
- **The Effect of Motion Cueing on Simulator Comfort, Perceived Realism, and Driver Performance during Low Speed Turning**
  Gary Bertollini, Yi Glaser, Joseph Szczerba, Ron Wagner
- **An MPC approach to the design of motion cueing algorithms for a high performance 9 DOFs driving simulator**
  Mattia Bruschetta, Fabio Maran, Alessandro Beghi, Diego Minen
- **Review and prospects of Renault's MPC based motion cueing algorithm for driving simulator**
  Zhou Fang, Andras Kemeny
- **Subjective Evaluation of Different Motion Cueing Algorithms Implemented on ATMOS Driving Simulator**
  Imad Al Qaisi, Daniel Zimmermann, Andreas Kohlstedt, Sandra Gausemeier, Ansgar Trächtler

## Simulation Design and Architecture

- **Real vs. simulated surrounding traffic – Does it matter?**
  Dominik Muehlbacher, Lena Rittger, Christian Maag
- **A Networked Multi-Drivers Simulation Platform for Interactive Driving Behavior Study**
  Jing Xu, Yingzi Lin
- **Scalable and Detail-Preserving Ground Surface Reconstruction from Mobile Laser Systems for Driving Simulators Engines**
  Daniela Craciun, Jean-Emmanuel Deschaud, François Goulette
- **Steerable Video: Generating Video-Based Environments for Driving Simulation**
  Michael Brogan, Charles Markham, Sean Commins, Catherine Deegan
- ***Development and Validation of a Safety Architecture of a Wheeled Mobile Driving Simulator***
  Alexander Betz, Paul Wagner, Torben Albrecht , Hermann Winner
- **Comfort analyses of the Hydractive suspension using a driving simulator**
  S. Barale, P. Vars, J. Guillet, M. Alirand, J. Lagnier, P. Toulemont

## Product Solution and Posters

- **Design and Performance of the VTI Sim IV**
  Jonas Jansson, Jesper Sandin, Bruno Augusto, Martin Fischer, Björn Blissing, Laban Källgren
- **Modular and scalable driving simulator hardware and software for the development of future driver assistance and automation systems**
  Martin Fischer, Andreas Richter, Julian Schindler, Jens Plättner, Gerald Temme, Johann Kelsch, Dirk Assmann, Frank Köster
- **OpenDriving: An Open Source Driving Simulation Software**
  Zhitao Xiong
- **SleepNoise - a simulator based study of the effects of noise on driver sleepiness**
  Eva Lahti, Anders Genell, Anna Anund
- **Small-scale traffic demonstrator with driving simulator**
  Oleksandr Goloborodko, Georg-Peter Ostermeyer

- **Combined motion of a hexapod with a XY-table system for lateral movements**
  Jürgen Pitz, Minh-Tri Nguyen, Gerd Baumann, Hans-Christian Reuss
- **Effect of simulated rumble strips in static driving simulator – Pre-study**
  Plouzeau Jérémy, Paillot Damien, Aykent Baris, Mérienne Frédéric
- **Robot based Driving and Operation Simulation with a spherical fixed Screen**
  Eduardo Pena Vina, Andrey Gizatullin, Manuel Schiewe, Michael Kleer, Klaus Dreßler
- **Nissan's New High Performance Driving Simulator for Vehicle Dynamics Performance & Man-Machine Interface Studies**
  Yoshiki Yasuno, Eiichi Kitahara, Takashi Takeuchi, Masashi Tsushima, Haruki Saitou, Masayuki Imamura, Erina Ueno
- **HDR simulation of intelligent LED road studs**
  Nguyen-Thong Dang, Fabrice Vienne, Roland Brémond

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*Andras Kemeny*, *Director, LIV, Renault-Arts et Métiers ParisTech, Head of VR and Immersive Simulation, Renault, Engineering Direction*

*Frédéric Mérienne*, *Professor and Director of Image Institut and Carnot Institut, Arts et Métiers ParisTech, France*

*Stéphane Espié*, *Director of Research, LEPSIS, Ifsttar, France*

*Photo couverture* : Courtesy of General Motors

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