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Welcome to ESV2019

TECHNOLOGY: ENABLING A SAFER TOMORROW

We are pleased to invite you to the 26th International Technical Conference and Exhibition on the Enhanced Safety of Vehicles (ESV). This conference will be held in Eindhoven, the Netherlands, June 10-13th 2019.

For the second time RDW, the Vehicle Authority of the Netherlands, is the proud host of the 26th Enhanced Safety of Vehicles Conference and Exhibition (ESV). The inspirational programme of ESV2019 is made by the United States Department of Transportation, National Highway Traffic Safety Administration (NHTSA) in cooperation with participating ESV member countries. This international conference which focusses on research & development in vehicle safety brings together almost 1200 visitors including members of governments, automobile manufacturers and their suppliers, safety researchers and other vehicle safety professionals, medical, insurance, legal and policy professionals, consumers, academia, students and international media. The ESV conference is unique and invaluable to the global community. It provides opportunities to share innovative advances in vehicle safety and encourage international cooperation.

Technical Organization
U.S. Department of Transportation
National Highway Traffic Safety Administration (NHTSA)

ESV Government Focal Point Chairman/
ESV 2019 General Chair

Tim Johnson
Acting Associate Administrator,
Vehicle Safety Research

NHTSA Organization Committee

Cem Hatipoglu
Acting Associate Administrator, National Center for Statistics and Analysis

Stephen Summers
Division Chief
Structural and Restraints Research
ESV Technical Program Lead

Dee Williams
Deputy Associate Administrator
Vehicle Safety Research

Arthur Carter
Student Safety Technology Design Competition Coordinator

Matthew Craig
Division Chief
Human Injury Research

Kevin Moorhouse
Division Chief
Applied Biomechanics

Chris Monk
Division Chief
HF/Engineering Integration

Robert Kreeb
Division Chief
Intelligent Technologies Research

Don Wilke
Vehicle Research & Test Center (VRTC)

Frank Barickman
Vehicle Research & Test Center (VRTC)
Deanna Barbour
Office of Communications & Consumer Information (OCCI)

Carla Young
Vehicle Safety Research

Lisa Floyd
Vehicle Safety Research

Yvonne Clarke
Vehicle Safety Research

Debbie Sweet
Vehicle Safety Research

**RDW Organization Committee**

Peter Striekwold
Global Focal Point the Netherlands

Maarten de Ridder
Project Manager ESV 2019

Marina Olexenko
Team ESV 2019, Executive Coordinator and Exhibition

Thierry van Twist
Team ESV 2019, Communication/Press

Paula Luxen
Team ESV 2019, Communication

Peter van der Wijk
Team ESV 2019, Procurement and Finance

Cees van Tienhoven
Team ESV 2019, Finance

Jan Sybren Boersma
Team ESV 2019, Fieldtrip Coordinator

Margriet Bargerbos
Team ESV 2019, Administration Support

**Supported by**
**Obsession Events & Communication**
# ESV 2019 Program

## Sunday - June 9

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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</thead>
<tbody>
<tr>
<td>16:00 - 18:00</td>
<td>Pre-Registration</td>
</tr>
</tbody>
</table>

## Monday - June 10

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>08:30 - 09:30</td>
<td>Registration &amp; Coffee</td>
</tr>
<tr>
<td>09:30 - 11:45</td>
<td>Opening Session</td>
</tr>
<tr>
<td></td>
<td>Opening Ceremony</td>
</tr>
<tr>
<td></td>
<td>U.S. Government Awards</td>
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<td></td>
<td>ESV Member Countries: Government Status Reports.</td>
</tr>
<tr>
<td></td>
<td>DOME RING 2/3</td>
</tr>
<tr>
<td>11:45 - 12:00</td>
<td>Exhibition Opening Ceremony</td>
</tr>
<tr>
<td>12:00 - 13:00</td>
<td>LUNCH</td>
</tr>
<tr>
<td>13:00 - 14:30</td>
<td>Plenary Session: Enhancing Future Traffic Safety with Advanced Technologies, a Multimodal Perspective DOME RING 2/3</td>
</tr>
<tr>
<td>14:30 - 15:00</td>
<td>BREAK</td>
</tr>
<tr>
<td>15:00 - 16:00</td>
<td>Special session on What happens when everyone has a high-tech vehicle? DOME RING 2/3</td>
</tr>
<tr>
<td>16:00 - 16:30</td>
<td>BREAK</td>
</tr>
<tr>
<td>16:30 - 17:30</td>
<td>Special Session on Getting there safely together - the integration of human and machine DOME RING 2/3</td>
</tr>
<tr>
<td>18:00 - 20:00</td>
<td>WELCOME RECEPTION</td>
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### Exhibition

11:45 – 18:00

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## Tuesday - June 11

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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</thead>
<tbody>
<tr>
<td>08:00</td>
<td>Registration</td>
</tr>
<tr>
<td>08:30 - 12:30</td>
<td>TRACK A NEPTUNE</td>
</tr>
<tr>
<td>Coffee Break</td>
<td>Protection of Vulnerable Road Users (Sweden/Japan)</td>
</tr>
<tr>
<td>10:00 - 10:30</td>
<td>TRACK B PHILIPS HALL</td>
</tr>
<tr>
<td></td>
<td>Safety Performance in Frontal and Rear Crashes (Korea/U.S.)</td>
</tr>
<tr>
<td>12:30 - 14:00</td>
<td>LUNCH</td>
</tr>
<tr>
<td>14:00 - 18:00</td>
<td>TRACK A NEPTUNE</td>
</tr>
<tr>
<td>Coffee Break</td>
<td>Biomechanics: Advances in Experimental and Mathematical Biomechanics and Human Injury Research (U.S./Germany)</td>
</tr>
<tr>
<td>16:30 - 17:00</td>
<td>TRACK B PHILIPS HALL</td>
</tr>
<tr>
<td></td>
<td>Safety Performance in Side Impact and Rollover Crashes (Australia/Canada)</td>
</tr>
<tr>
<td>18:00 - 20:00</td>
<td>TRACK C DOME RING 2/3</td>
</tr>
<tr>
<td></td>
<td>Crash Avoidance: Automated Driving Systems Lvl 3-5 Product Evolution, Evaluation and Real-World Deployment Challenges (Netherlands/Korea)</td>
</tr>
</tbody>
</table>

### Exhibition

08:30 – 18:00
### WEDNESDAY - JUNE 12

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
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<tbody>
<tr>
<td>08:00</td>
<td>Registration</td>
</tr>
<tr>
<td>08:30 - 12:30</td>
<td>TRACK A NEPTUNE</td>
</tr>
<tr>
<td>Coffee Break</td>
<td>Biomechanics: Advances in Crash Test Dummies, Instrumentation and Data Analysis (France/U.S.)</td>
</tr>
<tr>
<td>10:30 - 11:00</td>
<td>TRACK B PHILIPS HALL</td>
</tr>
<tr>
<td></td>
<td>Restraint System Design and Performance Challenges:</td>
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<td></td>
<td>Addressing the Needs of Diverse Populations (Age, Gender, Stature)</td>
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<td></td>
<td>(Netherlands/Sweden)</td>
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<tr>
<td>12:30 - 14:00</td>
<td>LUNCH</td>
</tr>
<tr>
<td>14:00 - 18:00</td>
<td>TRACK A NEPTUNE</td>
</tr>
<tr>
<td>Coffee Break</td>
<td>Student Safety Technology Design Competition, Finalist Oral Presentations (U.S./Germany)</td>
</tr>
<tr>
<td>15:45 - 16:15</td>
<td>TRACK B DOME RING 2/3</td>
</tr>
<tr>
<td></td>
<td>Consumer-Focused Approaches in Vehicle Safety to Drive the Automotive Market on a Global Scale (Germany/Netherlands)</td>
</tr>
<tr>
<td>18:00 - 23:00</td>
<td>CONFERENCES DINNER</td>
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<td></td>
<td>Location DAF MUSEUM</td>
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### THURSDAY - JUNE 13

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
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<tbody>
<tr>
<td>08:00</td>
<td>Registration</td>
</tr>
<tr>
<td>08:30 - 12:30</td>
<td>TRACK A PHILIPS HALL</td>
</tr>
<tr>
<td>Coffee Break</td>
<td>Adapting Safety Evaluation Approaches for Vehicles with Automated Driving Systems (U.K./Netherlands)</td>
</tr>
<tr>
<td>10:30 - 11:00</td>
<td>TRACK B DOME RING 2/3</td>
</tr>
<tr>
<td></td>
<td>Automated and Integrated Crash Safety (Netherlands/Germany)</td>
</tr>
<tr>
<td>12:30 - 13:00</td>
<td>Closing Ceremony, Student Competition Winners Announced, Declaring ESV2019. DOME RING 2/3</td>
</tr>
<tr>
<td>13:15 - 14:00</td>
<td>LUNCH</td>
</tr>
<tr>
<td>14:00 - 18:00</td>
<td>Field Trips</td>
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<tr>
<td></td>
<td>Fieldtrip A: TNO/ TASS: Simulation as a tool for real-world high risk traffic situations</td>
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<td></td>
<td>Fieldtrip B: TU Delft - Human Behaviour and the effects on safety</td>
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<td></td>
<td>Fieldtrip C: VDL ETS - New fuel, new hazards?</td>
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</tbody>
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**Exhibition**
08:30 – 18:00
**Conference app**

**DOWNLOAD THE CONFERENCE APP**

**App download URL:** [https://crowd.cc/s/2G9kM](https://crowd.cc/s/2G9kM)
When entered into a mobile browser, this will take you to the CrowdCompass Attendee Hub app in stores. Download this app and search for the event: ESV 2019.

**Event URL:** [https://crowd.cc/esv2019](https://crowd.cc/esv2019)
This link allows Blackberry and Windows users to view the event content. The event can be viewed in any web or mobile browser using this URL.

**Download Steps:**

- Download the app by clicking here [https://crowd.cc/s/2G9kM](https://crowd.cc/s/2G9kM)
  Or search in CrowdCompass Attendee Hub app for ESV or ESV 2019
- Open the app and tap on ESV 2019

**Password:** congressesv2019

In the app you can read the abstracts, make your personal program, and network with other attendees. General information such as maps and travel information is also available.

**Proceedings and social media**

**CONFERENCE PROCEEDINGS**

Access and download the conference proceedings:

**SOCIAL MEDIA**

Follow the ESV conference in social media and get instant updates of when news are published and other information regarding the conference!

- **Twitter:** [twitter.com/esv2019](https://twitter.com/esv2019) and #esv2019
- **Facebook page:** [www.facebook.com/ESV2019/](https://www.facebook.com/ESV2019/)
- **LinkedIn:** [www.linkedin.com/company/19144633/](https://www.linkedin.com/company/19144633/)
In recognition of and appreciation for exceptional scientific contributions in the field of motor vehicle safety engineering and for distinguished service to the motoring public.

Bernie Frost  
Principal Engineer  
Department for Transport  
United Kingdom

Bernie has been a significant contributor to improving road vehicle safety for at least the last 30 years.

One of his first tasks upon joining the UK Department for Transport (DfT) was to develop regulations for Anti-Lock Braking systems (ABS) and then for the introduction of Electronic Braking Systems (EBS) for heavy duty vehicle. Bernie led the research, tested vehicles and analyzed results, in addition to handling ministerial advice and policy guidance. His leadership of the UK activity in these areas culminated with adoption of the internationally harmonized amendments to the UNECE regulation No13.

He led the UK secondary/passive safety team where he seized the opportunity to develop a new and ground-breaking safety rating scheme for Motorcyclist Safety Helmets (SHARP). This was a challenging activity and required commitment and energy to see the new initiative introduced into the mainstream activities. His personal experience of racing and rider safety provided that added level of personal knowledge.

Bernie then became DfT lead on passive safety and also took on the UK lead director for Euro NCAP and the ESV Government Focal Point: roles that he held until moving to head the UK activity on primary/active safety. In his current role he leads the UNECE group of technical experts GRRF from 2013 to 2018 and, in autumn 2018 was appointed as the Chairman of the GRVA global group. He is a member of the UNECE World Forum on vehicle regulation (WP29) and a recognized expert to the Global Forum on road safety (WPI).

Bernie continues to lead innovative research on a varied technical portfolio including such diverse applications as tire aging and driver display screens, applying his usual science and engineering robustness to decisions and outcomes.

Hans Ammerlaan  
Senior Engineer  
RDW (Netherlands Vehicle Authority)  
Netherlands

Hans Ammerlaan has been involved in the field of vehicle safety for over 40 years. Currently he is a Senior Engineer at the Vehicle Standards Development dept. of RDW, in the Netherlands.

Early in his career Hans worked in the field of vehicle type-approval, both at national and international level. He participated in international meetings concerning regulatory development, for both EU (Brussels) and UN (Geneva) vehicle legislation. In 1996 Hans made his first appearance, as the Dutch delegate, in the UN Working Party for Passive Safety (GRSP). He quickly became head delegate for the Netherlands and has held this position till today.

Through his active involvement in GRSP (UN) Hans has contributed a lot in the introduction of ‘Isofix’ and the improvement of safety helmet requirements. He also worked arduously for many years to increase the height of headrests and resulting from comparison tests of various dummies, anti-rotational devices are now compulsory. Furthermore, Hans has made important contributions to the international harmonization of legislation in the field of safe vehicles, inter alia through IHRA and was one of the co-organizers of the ESV in the Netherlands, in 2001.
**Martin Magnusson**  
Manager Autonomous Drive Functions  
Volvo Car Corporation  
Sweden

Martin Magnusson has been dedicated to the automotive area for his full career with main focus on active safety functionality. Martin has been part of the development of Volvo Cars’ driver support function program from the beginning and all the technology steps taken thereafter. The program has been an evolution in functionality growth and a revolution for car safety. Martin had the overall responsibility of the function which he continued over the years and with an increasing function scope. With his leading role as a function owner, Martin and four other key persons were awarded the Ford Technology Award 2009 for the groundbreaking functionality Collision warning with full auto-brake and pedestrian detection.

Martin holds a leading role within the complete development team and created driver support functionality and made it available to all Volvo owners through the standard functionality City Safety. As an important part of his leading role within development, Martin has over the years also interacted with different authorities, active safety rating institutes, significantly contributed in standardization and guideline discussions.

**Dr. Nils Lübbe**  
Director of Research  
Autoliv  
Sweden

Dr. Lübbe has made an exceptional contribution to integrated protection for Vulnerable Road Users, combining the benefits of active and passive or pre-crash and in-crash protection.

While the integrated assessment is yet to be implemented in regulatory and consumer testing, one part of his work, improving the pedestrian upper leg protection assessment, has found its way into Euro NCAP’s 2015 revision of the pedestrian protection protocols, well supported by an ACEA Task-Force he chaired. He was also active in shaping the so far standalone assessment of Pedestrian AEB through his involvement in the EU FP7 project AsPeCSS, substantially contributing to the assessment in Euro NCAP that started in 2016. He extended his research to motorcyclist protection with the fundamental work on Injury Risk Curves conducted with colleagues at Autoliv and the Swedish Transport Administration and published in 2019. This work is the foundation to evaluate speed reducing technologies on motorcycles and a cornerstone to develop an integrated assessment of active and passive protection implemented on motorcycles.

Dr. Lübbe has not only worked to improve the protection of Vulnerable Road Users in Europe, but also in India and China, the countries with most road traffic fatalities. He worked with colleagues on real world crash data from India. This demonstrated the benefits, that improved vehicle front end design would bring to India. As well as real world crash data from China developing relevant and practical scenarios for assessment of AEB, aiming at protecting e-bikes from being hit by vehicle into C-NCAP.

He is contributing to improved road safety not only through scientific publications and work with regulatory and consumer testing, but he also lectures and supervises at Chalmers University of Technology, educating new generations of road safety engineers.

**Adam McNeill**  
Department Leader for Vehicle Safety Concepts)  
BMW Passive Safety  
Germany

Adam McNeill has been working in Vehicle Safety for 26 years and is currently the department leader for Vehicle Safety Concepts at BMW Passive Safety. Adam has a number of technical highlights throughout his career. He was responsible for the safety development of the Mini in 2000. Together with EuroNCAP and other OEM’s they were able to develop the first major amendment to the Knee Mapping protocol and the first requirements for hazardous airbag deployment. The first head thorax airbag at BMW for Mini Cabrio was developed through his hard work. Adam was very involved in
organizing the initial plan to solve the Takata problem for BMW. His current work includes developing new restraint systems and vehicle concepts which could be used with highly automated vehicles.

Bernd Lorenz  
**Head of the Section Passive Vehicle Safety, Biomechanics**  
**German Federal Highway Research Institute**  
**Germany**

Since 2008 Bernd has been the Head of the Section Passive Vehicle Safety, Biomechanics at the German Federal Highway Research Institute. Bernd was elected as General Secretary of the European Enhanced Vehicle-safety Committee (EEVC) in 2014. Bernd revived the organization, bringing together important governmental entities and industry in the field of vehicle safety research. He restarted research close to regulation and transferred important results to the United Nations’ work towards global harmonization of vehicle regulations.

Bernd significantly contributed to the finalization of the BioRID2 dummy, its injury criteria, test procedures and implementation within Global Technical Regulation No.7 (GTR7 Head Restraints). Being key member of the German Delegation of the Working Party on Passive Safety (GRSP) since 2008, he furthermore promotes important research results in all fields related to the passive safety of vehicles.

Daniel Smith  
**Senior Regulatory Counsel**  
**Waymo**  
**United States**

Daniel Smith is currently the Senior Regulatory Counsel at Waymo, LLC. He provides legal advice on the wide range of federal and state regulatory issues faced by Waymo. Mr. Smith also manages Waymo’s regulatory compliance program and serves on various standards-setting groups, including the SAE group that is considering a safety assessment performance standard for highly automated vehicles and the SAE task force responsible for recommending standardized definitions on matters related to automated driving systems.

While serving as Senior Regulatory Advisor for Public Policy and as Government Relations Counsel for Google’s Self-Driving Car Project, Mr. Smith analyzed and provided advice to the Self-Driving Car Project’s leadership and staff on current and proposed federal, state, and international legislation, regulations, guidance, and interpretations related to automated and self-driving vehicles, including how to ensure compliance with those laws.

Prior to joining Waymo/Google, Mr. Smith spent 10 years at NHTSA in key safety roles. Most recently, he managed NHTSA’s Office of Vehicle Safety as Senior Associate Administrator for Vehicle Safety, where he was responsible for all federal vehicle safety, fuel economy, and new car safety rating programs. Mr. Smith joined NHTSA in 2005 after 27 years serving at the Federal Railroad Administration, where he distinguished himself in a variety of safety capacities, including as Associate Administrator for Safety and Assistant Chief Counsel for Safety. He also created a Rail Safety Action Plan that resulted in the reduction of crash frequency.

David Zuby  
**Executive Vice President & Chief Research Officer**  
**Insurance Institute for Highway Safety**  
**United States**

David Zuby is executive vice president and chief research officer for the Insurance Institute for Highway Safety. Working out of the Vehicle Research Center (VRC), he oversees and coordinates all vehicle, human factors, statistical and insurance-based research at the Institute and the Highway Loss Data Institute. David Zuby’s research helped lead to significant crashworthiness improvements, and most recently helped launch the Insurance Institute for Highway Safety’s front small overlap crash test. Zuby helped lead unique research assessing the effects of
various crash avoidance technologies on insurance claims and police-reported crashes. David Zuby’s research helped launch the Insurance Institute for Highway Safety’s consumer ratings tests of autonomous emergency braking, headlight performance and most recently pedestrian detection and emergency braking. Zuby’s work within RCAR led to international adoption of the first consumer test of seats and head restraints to mitigate neck injuries in rear crashes.

Mr. Zuby is the author of numerous research papers published by the Institute on topics such as the biomechanics of injury, pedestrian protection, crashworthiness and crash avoidance technology effectiveness. Zuby is highly sought to speak on the areas of autonomous vehicles and efforts to ensure autonomous vehicle safety.

U.S. Government Award for Engineering Excellence

**Tom Hollowell**
**Director Office of Crashworthiness Research (retired)**
**National Highway Traffic Safety Administration**
**United States**

Dr. Hollowell worked in United States Department of Transportation’s National Highway Traffic Safety Administration (NHTSA) from 1975 until 2007. He retired after serving 5 years as the Director of the Office of Applied Vehicle Safety Research. Throughout his 35 years, Dr. Hollowell contributed to research on all aspects of crash safety, and was instrumental in building the scientific foundation which resulted in new and updated Federal motor vehicle safety standards. Dr. Hollowell made invaluable scientific and technological contributions toward NHTSA’s crashworthiness research programs in vehicle compatibility. He was a leader in efforts to make government crash test and research results broadly available.

Dr. Hollowell is the author of numerous landmark scientific papers on vehicle structures and occupant restraint systems, human injury/biomechanics, crash avoidance, and heavy truck safety. He is also a longtime supporter, contributor, and organizer for the ESV Conference.

Dr. Hollowell has been a prolific author in crash safety, and to date has published over 50 technical papers on vehicle crashworthiness, crash modeling, crash testing, accident statistics, and impact biomechanics. In recognition of his accomplishments, Dr. Hollowell was elected as a Society of Automotive Engineering (SAE) Fellow in January 2005. Upon retirement from NHTSA, Dr. Hollowell continued to be active in motor vehicle safety. He served as an associate editor of the Journal for Traffic Injury Prevention and is active in the SAE.

Looking back over a career dedicated to improving the safety of motor vehicle occupants, it is clear that Dr. Hollowell is an accomplished researcher and an important leader in vehicle crash safety at NHTSA. For this distinguished career of accomplishments, he merits recognition by NHTSA at the Eindhoven ESV Conference.

**Dr. Mikael Ljung Aust**
**Human Factors Expert in Crash Avoidance**
**Volvo Cars**
**Sweden**

Dr Mikael Ljung Aust is a Human Factors expert at Volvo Cars Safety Centre, with a specialty in Driver Cognition Analysis. At Volvo Cars Safety Centre he provides leadership in the analysis and research required to achieve Volvo Vision 2020. He supports development of safety requirements and strategies and drives human related aspects of safety into the design of new active safety- and autonomous driving systems.

Dr. Mikael Ljung Aust is a recognized expert in driver behavior in relation to crash causation, active safety function development and HMI design issues within Volvo cars and in Swedish as well as in international fora.

His experiences and knowledge is mainly based
on research projects targeting crash contributing factors and analyses of the influence of active safety functions on driver behavior in various experimental settings, with focus on how this translates into real world safety. The crash causation analysis methodology DREAM, developed by Mikael Ljung Aust, was adopted as a standard for European crash causation investigation projects. Dr Ljung Aust’s current work focus is on crash causation analysis, devising guidelines for safe interaction with infotainment systems (e.g. eye-glance performance testing), design of collision warning systems and mapping out the role and responsibilities of the driver with regard to future autonomous driving functionality. He has close to 20 years work experience in crash causation investigations, design and evaluation of collision avoidance systems and design and evaluation of safe infotainment solutions.

Anders Kullgren
Head of Research
Folksam
Sweden

Anders research has to a large extent been focused on analyses of real-world crashes, covering all from a system approach to detailed analyses of for example specific injuries. Anders has been working as a researcher at Folksam insurance company in Sweden since 1989, and since 1995 the head of the research department. Since 2011 he is also an adjunct professor at Chalmers University of Technology. The research group at Folksam has served the industry with data and concepts that have helped in producing safer products.

The focus of Anders research, such as the car model safety ratings, has since the beginning been to study the performance regarding reduction of injuries leading to long-term consequences. The road traffic safety approach in Sweden, the Vision Zero, is to a large extent developed according to this philosophy.

Anders led the development of the Folksam crash pulse recorder in the early 90s. The crash pulse recorder was the first in the world to be widely fitted in cars. In 2008 a new electronic crash recorder (ECR) was developed (Anders was leading the developments). The Folksam crash pulse

recorders have been fitted in more than 300 000 cars in Sweden since the start in 1992. Another area of research has been car model safety ratings based on real-world crashes. The method developed by Folksam rates the risk of fatality or long-term injury. The results have been used by many car manufacturers to learn how their car models perform in real-world conditions, but is primarily published to guide consumers.

Kyongsu Yi
Professor, Seoul National University
Park Chan Wook
Korea

Prof. Yi’s work with novel integrated risk management techniques for both vehicle stability and safety are synthesized with insights into the vehicle dynamics to produce generalizable control methodologies that enable highly-safe and comfortable autonomous driving. His research efforts at SNU (Seoul National University, Seoul, Korea) have yielded inspiring and pioneering risk-assessment and management methods and approaches.

Probabilistic Threat Assessment with Environment Description and Rule-based Multi-traffic Prediction for Integrated Risk Management Systems for application to autonomous driving control is a novel concept of automated vehicle control developed by Prof. Yi. In 2016, he developed a fully autonomous driving passenger car and successfully demonstrated automated driving on motorways up to speed range of 90 km/h. The technology developed and implemented on passenger cars has been recognized with 2017 SAE Bendix Automotive Engineering Awards.

His research work has resulted in 120 journal articles and 185 conference papers published at top journals and premier conferences, and 5 patents, which have been cited for more than 1,500 times. His research and scholarly contributions have been internationally recognized as reflected by several prestigious international, national, and SNU research awards including two times SAE Vincent Bendix Automotive Electronics Engineering Awards, IFAC CEP Best Paper Awards, FAST Zero Best Paper Awards, and AVEC Best Paper Awards.
Dr. Yasuhiro Matsui  
Chief Researcher of Vehicle Safety Research Division  
National Traffic Safety and Environment Laboratory  
Japan

Dr. Matsui has conducted research in the areas of motor vehicle safety for 25 years. Dr. Matsui has been the Chief Researcher of Vehicle Safety Research Division at National Traffic Safety and Environment Laboratory (NTSEL) in Japan since 2006 had worked at the Japan Automobile Research Institute (JARI) during 1994 - 2006. Dr. Matsui has contributed to international transportation safety significantly through outstanding outcomes involving his activities in NTSEL and JARI for pedestrian protection. Dr. Matsui established the passive safety test methods for pedestrian protection as international test methods for the EU regulation, the International Organization for Standardization (ISO), the International Harmonized Research Activities (IHRA), and the United Nations (UN) Regulation. Japan’s new car assessment program (J-NCAP) has employed the pedestrian headform impactors since 2003.

Dr. Matsui has been involved in development of car safety evaluation test methods in passive and active safety; as well as in the design of current passenger cars in European and Japanese markets. Meanwhile, research projects to address development of new injury criteria for diffuse axonal injuries in brain are in progress, for which Dr. Matsui provides the great leadership. Dr. Matsui is now contributing to making the safety rules as a chairperson in the UNECE/ WP29/GRSG informal group on awareness of vulnerable road users proximity in low speed maneuvers. Thus, Dr. Matsui’s excellent leadership, technical expertise and scientific experiences in the area of impact biomechanics, and development technology for safety assessment of injury thresholds, test tools, test protocols, safety evaluation and safety concepts, are highly respected and well acknowledged by those in the government, research organizations and automobile industries.

He is an excellent researcher, team leader, delegate, and his findings and outcomes have enormously contributed to the remarkable decrease in severe and fatal injuries in traffic accidents all over the world.

Sue Bai  
Principal Engineer  
Honda R&D Americas, Inc.  
United States

Sue Bai is a principal engineer for Honda R&D Americas where she leads much of Honda’s work in connected vehicle technology. Ms. Bai joined Honda in 2004 as a development engineer focusing on advanced safety and mobility systems. From 2006 to 2017, Ms. Bai served as Honda’s lead representative to the Collision Avoidance Metric Partnership (CAMP). During this period, Ms. Bai played a pivotal role both at Honda and at CAMP in developing and maturing vehicle-to-vehicle communications.

Over the last 8 years Ms. Bai has worked collaboratively with NHTSA staff to conceive and execute leading edge V2V research that has played an important role in helping NHTSA shape its policies for connected vehicle technology. It involves integrating advanced communication technologies, working with multiple OEMs and contractors, and completing research under challenging time and budget constraints to meet NHTSA and the industry’s research objectives. Ms. Bai took a leadership role in several task areas and completed this work in a highly professional manner that demonstrates both her deep technical knowledge as well as her ability to manage sometimes changing programmatic schedules, resources and project deliverables. Ms. Bai’s engineering and program management skills have been recognized not just by NHTSA but by her automotive industry colleagues as well. She has been elected as the SAE DSRC Technical Committee Chairperson for multiple terms where she leads the automotive industry efforts in developing standards that support connected vehicle technology.
Government Focal Point

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Director, Vehicle Research and Test Center
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THE NETHERLANDS | Peter Striekwold
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Vehicle Safety Standards | Surface Transport Policy
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CANADA | Peter Burns
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Canada
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EUROPEAN ENHANCED VEHICLE-SAFETY COMMITTEE | ESV MEMBER

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GERMANY | Stefan Strick
President and Professor 3, Federal Highway Research Institute (BASt)
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ITALY | Antonio Erario
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SWEDEN | Matteo Rizzi
Analyst, PhD.
Road Safety Department, Swedish Transport Administration (STA)
Email: matteo.rizzi@trafikverket.se
PLENARY PANEL: Enhancing Future Traffic Safety with Advanced Technologies, a Multimodal Perspective

In keeping with the conference theme, the plenary session will discuss what panelists see as key future technologies for enhancing traffic safety in the light vehicle, commercial vehicle, transit, and infrastructure sectors.

Monday, June 19, 2019
Time: 13:00 – 15:00
Location: Dome

Moderator
Jack Danielson
NHTSA Executive Director

Panelists
Governor Matt Blunt
President, American Automotive Policy Council (AAPC)

Jack Weast
Sr. Principal Engineer at Intel and VP Autonomous Vehicle Standards at Mobileye

Maurice Geraets
Executive Board Member NXP Netherlands & Vice President Innovation

Malin Ekholm, Vice
Vice President
Volvo Cars Safety Centre
Special Session 1: What happens when everyone has a high-tech vehicle?

Monday, June 10, 2019
Time: 15:00 – 16:00
Location: Dome

This session will identify and discuss issues that may rise in importance when most vehicles sold are “high tech” in terms of sensors, technologies, automation and connectivity.

Moderator
Cem Hatipoglu
NHTSA Acting Associate Administrator, National Center for Statistics and Analysis, United States

Panelists
Dr. Kay Stepper
VP of Engineering, Head of Regional Business Unit Driver Assistance and Automated Driving, BOSCH

Jeremy McClain
Director, Systems & Technology, North America Chassis & Safety Division, Continental AG

David Zuby
Executive Vice President and Chief Research Officer, Insurance Institute for Highway Safety

Prof. Klaus Kompass
Vice President Vehicle Safety, BMW Group, Germany

Special Session 2: Getting there safely together - The interaction of human and machine

Monday, June 10, 2019
Time: 16:30 – 17:30
Location: Dome

This session will identify and discuss how human-vehicle interaction will change and evolve as vehicles become more automated and connected.

Moderator
Tim Johnson
NHTSA Acting Associate Administrator, Vehicle Safety Research/Director, Vehicle Research and Test Center

Panelists
Oliver Carsten
Professor Transport Safety, Institute for Transport Studies, Leeds University, UK

David Abbink
Full Professor of Haptic Human- Robot Interaction, TU Delft, Netherlands

Peter Burns
Chief of the Human Factors & Crash Avoidance Division, Transport Canada

Tom Gasser
Head of Section Automated Driving, German Federal Highway Research Institute (BASt)
**Lunch Speaker**

Tuesday, June 11, 2019  
Time: 12 p.m. – 1:00 p.m.  
Location: Restaurant

**Description:** Bicycle/Pedestrian Interaction with Automobiles – Netherlands Perspective  
Speaker discusses Netherlands experience with pedestrian/bicyclist interaction with vehicles and shares some lessons learned and best practices

**Speaker**

Dr. Gert Jan Wijlhuizen  
SWOV Senior Researcher, the Netherlands

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**Lunch Speaker**

Wednesday, June 12, 2019  
Time: 12 p.m. – 1:00 p.m.  
Location: Restaurant

**Description:** Speaker will discuss an international perspective on Advanced Vehicle Technology Deployment

**Speaker**

David Ward  
President and Chief Executive Officer of the Towards Zero Foundation (TZF)  
UK registered charity
Protection of Vulnerable Road Users
Tuesday, June 11, 2019 | 08:30-12:30
Chair: Rikard Fredriksson, Sweden
Co-Chair:
Yasuhiro Matsui, Japan

TRACK A

Paper No.19-0151-O PEER REVIEW
Pedestrian Accident situations involving vehicles at low speeds in Japan

Yasuhiro Matsui
National Traffic Safety and Environment Laboratory, Japan
Shoko Oikawa
National Institute of Technology, Tokyo College, Japan

Paper No.19-0016-O PEER REVIEW
The Potential of Vehicle and Road Infrastructure Interventions in Fatal Bicyclist Accidents on Swedish Roads - What Can In-Depth Studies Tell Us?

Anders Kullgren, Helena Stigson; Anders Ydenius, Amanda Axelsson, Emma Engström
Folksam Research, Sweden
Matteo Rizzi
Swedish Transport Administration, Sweden

Paper No.19-0277-O
Improving the Effectiveness of Active Safety Systems to Significantly Reduce Accidents with Vulnerable Road Users - The Project Prospect (Proactive Safety for Pedestrians and Cyclists)

Ilona Cieślik
IDIADA Automotive Technology, Spain
Jordanka Kovaceva
Chalmers University of Technology, Sweden
Marie-Pierre Bruyas
Institut Français des Sciences et Technologies des Transports, de l’Aménagement et des Réseaux (IFSTTAR), France
David R. Large
University of Nottingham, United Kingdom
Martin Kunert
Robert Bosch GmbH, Germany
Sebastian Krebs
Daimler AG, Germany
Maxim Arbitmann
Continental Teves AG & Co.OHG, Germany

Paper No.19-0048-O PEER REVIEW
Forward Collision Warning Based on a Driver Model to Increase Drivers’ Acceptance

PABLO PUENTE GUILLEN
Toyota Motor Europe, Belgium
Irene Gohl
University of Bundeswehr Munich, Germany

Paper No.19-0340-O
Detection of Cyclist and Pedestrians Around Heavy Commercial Vehicles

Dominique Charlebois, Peter Burns, Eric Meloche
Transport Canada, Canada
**Effect of Subaru EyeSight on Pedestrian-Related Bodily Injury Liability Claim Frequencies**

Kay Wakeman, Matt Moore, Laurie Hellinga  
Highway Loss Data Institute, United States  
David Zuby  
Highway Loss Data Institute, United States and Insurance Institute for Highway Safety (IIHS), United States

**Handling of Child Restraint Systems (CRS) with Special Focus on Misuse**

Matthias Kühn, Thomas Hummel  
German Insurers Accident Research, Germany  
Gerd Müller  
Technische Universität Berlin, Germany  
Wolfgang Fastenmeier  
Institute for Applied Psychology Munich, Germany

**Responses of the Scaled Infant Human Body Model in Simulated Frontal Motor Vehicle Crashes**

Sophia Tushak, Jalaj Maheshwar, Aditya Belwadi  
Children’s Hospital of Philadelphia, United States

**Development and Evaluation of a Thorax Injury Prediction Tool (TIPT) and Possibilities for Incorporation within improved Test and Assessment Procedures – Results from SENIORS**

Oliver Zander, Marcus Wisch, Julian Ott  
Federal Highway Research Institute (BASt), Germany  
Mark Burleigh  
Humanetics Innovative Solutions, Inc., Netherlands  
Alba Fornells  
IDIADA Automotive Technology, Spain  
Christer Lundgren  
Autoliv, Sweden

**Research of Pedestrian Injury Reduction Mechanism Between the Beginning of the Collision and Fall of the Ground**

Hidetoshi Nakamura, Kenyu Okamura, Masaki Umezawa, Osamu Ito, Hiroyuki Asanuma  
Honda R&D Co., Ltd. Automobile R&D Center, Japan  
Masato Sasaki  
Honda R&D Americas, Inc, United States

**Safety Performance in Frontal and Rear Crashes**

Tuesday, June 11, 2019 | 08:30-12:30  
Chair: Younghan Youn, Korea  
Co-Chair: Stephen Summers, United States  
TRACK B
Paper No.19-0169-O

Evaluation of the Safety Performance and Weight Reduction Using CFRP Modified Automotive Structures in NHTSA’s Frontal Oblique Impact Test

William Hollowell
WTH Consulting LLC, United States
Cing-Dao (Steve) Kan
George Mason University, United States
Chung-Kyu Park, Rudolf Reichert
George Mason University, United States Minor Outlying Islands

Paper No.19-0188-O

Optimization of Front End Structures for IIHS Small Overlap Frontal Crash Test

Guofei Chen, Ming F. Shi
United States Steel Corporation, United States
Tau Tyan
Ford Motor Company, United States

Paper No.19-0232-O

Injury Mechanism and Evaluating Methods for Small Overlap and Oblique Frontal Crashes

AKIHIRO ISHIDA
Honda R&D Co., Ltd. Automobile R&D Center, Japan

Paper No.19-0201-O

Assessing Injury Risk of Car Occupants on Rearward Facing Seats in a Full Frontal Impact – Sled Tests in a Generic Test Environment

Harald Zellmer, Felix Manneck
Autoliv, Germany

Paper No.19-0137-O

Role of Traumatic Seatbelt Fat Stranding in Automotive Crash Injury Analysis

Tchandrashekhar thorbole
Thorbole Simulation Technologies LLC, United States
Prashant Naik
SKN Medical College, India

Paper No.19-0128-O PEER REVIEW

Banging Heads Onboard Buses: Rating Scheme to Improve Injury Mitigation for Bus Passengers

Mervyn Edwards, Alix Edwards, Josh Appleby, Dean Beaumont
TRL Ltd., United Kingdom

Paper No.19-0028-O

Hearing Loss Analysis in Full Scale Accident Reconstruction

Johannes Holtz, Gerd Müller
Technische Universität Berlin, Germany
Heiko Johannsen, Andreas Büchner
Medical School Hannover, Germany
Marcus Wisch, Daniel Huster
Federal Highway Research Institute (BASt), Germany
Trends in Aggressivity and Driver Risk for Cars, SUVs, and Pickups: Vehicle Incompatibility From 1988-2016

Samuel Monfort, Joe Nolan
Insurance Institute for Highway Safety (IIHS), United States

Relationship Between Frontal Car-To-Car Test Result and Vehicle Crash Compatibility Evaluation in Mobile Progressive Deformable Barrier Test

Taisuke Watanabe, Ippei Kuroda, Mitsutoshi Masuda
Japan Automobile Manufacturers Association, Inc. (JAMA), Japan
Taichi Nakajima
Japan Automobile Research Institute (JARI), Japan

Front Seatback Strength Improvements Study in Rear Crash Events

Velayudham Ganesan, Praneshkumar Jayakumar, James Davies, Wade Bridges
EDAG Inc., United States

The Analysis and Experimental Development of Aspirated Airbags for Conventional and Autonomous Vehicles

David Breed
Automotive Technologies International, United States
Nina Yurchenko, Pavlo Vynogradskyy, Konstantin Kuzmenko
Institute of Hydromechanics, Nat. Academy of Sci. of Ukraine, Ukraine
Shawe Zhang, Bo Li
Shanghai East Joylong Motor Airbag Co., China, People’s Republic of
Crash Avoidance: Driving Automation Systems Level 0, 1, and 2. Product Evolution; Evaluation; and Real-World Deployment Challenges

Tuesday, June 11, 2019 | 08:30-12:30
Chair: Jost Gail, Germany
Co-Chair: Lori Summers, United States

**TRACK C**

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**Paper No.19-0143-O**

**Tolerability of Unexpected Autonomous Emergency Braking Maneuvers on Motorcycles - A Methodology for Experimental Investigation**

Nora Leona Merkel, Raphael Pleß, Hermann Winner
Technische Universität Darmstadt, Germany
Thomas Hammer, Norbert Schneider, Sebastian Will
Würzburger Institut für Verkehrswissenschaften, Germany

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**Paper No.19-0315-O**

**Assessing the Case for Requiring AEB on City Buses and Developing Technical Requirements and Test Procedures**

Iain Knight, Martin Dodd
Apollo Vehicle Safety, United Kingdom
Alix Edwards
TRL Ltd., United Kingdom

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**Paper No.19-0088-O**

**Future potential of Automatic Emergency Braking Systems for Heavy Trucks**

Daniel Schmidt, Thomas Lich, Andreas Georgi
Robert Bosch GmbH, Germany

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**Paper No.19-0089-O PEER REVIEW**

**Intersection AEB Implementation Strategies for Left-Turn Across Path Crashes**

Ulrich Sander
Veoneer AB, Sweden
Nils Lubbe
Autoliv Development AB, Sweden
Sylvia Pietzsch
Zenuity AB, Sweden

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**Paper No.19-0076-O PEER REVIEW**

**Characteristics of Rear-End Crashes Involving Passenger Vehicles with Automatic Emergency Braking**

Jessica Cicchino, David Zuby
Insurance Institute for Highway Safety (IIHS), United States
Paper No.19-0272-O

**Typical Pre-crash Scenarios Reconstruction for Two-wheelers and Passenger Vehicles and Its Application in Parameter Optimization of AEB System Based on NAIS Database**

Yi Cao, Pingfei Li  
Xihua University, China, People’s Republic of China  
Lingyun Xiao, Honglei Dong, Yan Wang  
SAMR Defective Product Administrative Center, China, People’s Republic of China  
Xiaobo Wu  
China National Institute of Standardization, China, People’s Republic of China  
Yuanchao Qiu  
Shanghai University of Engineering Science, China, People’s Republic of China

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Paper No.19-0223-O


Matteo Rizzi, Per Hurtig, Simon Sternlund  
Swedish Transport Administration, Sweden  
Anders Lie  
Swedish Transport Administration and Chalmers University of Technology, Sweden  
Claes Tingvall  
AF Consult, Sweden

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Paper No.19-0176-O

**Car-To-Car Accidents at Intersections in Europe and Identification of Use Cases for the Test and Assessment of Respective Active Vehicle Safety Systems**

Marcus Wisch, Adrian Hellmann, Markus Lerner  
Federal Highway Research Institute (BASt), Germany  
Thomas Hierlinger, Volker Labenski  
Audi AG, Germany  
Michael Wagner, Harald Feifel  
Continental Teves AG & Co.OHG, Germany  
Oana Robescu  
Denso Sweden AB, Sweden  
Pauline Renoux  
Renault, France  
Xavier Groult  
Valeo, France

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Paper No.19-0046-O PEER REVIEW

**Towards Harmonizing Prospective Effectiveness Assessment for Road Safety: Comparing Tools in Standard Scenario Simulation**

Michael Düring  
Volkswagen AG, Germany  
Peter Wimmer  
Virtual Vehicle Research Center, Austria  
Henri Chajmowicz  
LAB PSA / RENAULT, France  
Fredrik Granum  
Volvo Car Corporation, Sweden  
Julian King  
ZF Friedrichshafen AG, Germany  
Harald Kolk  
Graz University of Technology, Austria  
Olaf Op den Camp  
TNO, Netherlands  
Paolo, Scognamiglio  
FCA Italy, Italy  
Michael Wagner  
Continental Teves AG & Co., OHG, Germany
An Assessment Approach to Assisted Driving Systems

Colin Grover, Matthew Avery, Dominic Tough
Thatcham Research, United Kingdom

Hydroplaning Avoidance – A Holistic System Approach

Bernd Hartmann
Continental AG - Division Chassis & Safety, Germany

Safety Evaluation of Automated Vehicle Through Actual Vehicle Tests in Cut-In and Lateral Overlap Cut-In Situation

Seohang Lee, Jayil Jeong
Kookmin University, Korea, Republic of
Yunseog Hong, Jaekon Shin, Inseong Choi
Korea Automotive Testing & Research Institute (KATRI), Korea, Republic of

Quantifying Vision Zero: Crash Avoidance in Rural and Motorway Accident Scenarios by Combination of ACC, AEB and LKA Projected to German Accident Occurrence

Lukas Stark
Volkswagen Group Research Germany, Germany

Crash and Injury Prevention Estimates for Intersection Driver Assistance Systems in Left Turn Across Path / Opposite Direction Crashes in the United States

Max Bareiss
Virginia Tech Center for Injury Biomechanics, United States
John Scanlon
Exponent, United States
Rini Sherony
Collaborative Safety Research Center, Toyota Motor North America, United States
Hampton C. Gabler
Virginia Polytechnic Institute and State University, United States

Biomechanics: Advances in Experimental and Mathematical Biomechanics and Injury Research

Tuesday, June 11, 2019 | 14:00-18:00
Chair: Ellen Lee, United States
Co-Chair: Rainer Hoffmann, Germany
TRACK A

Simulation Assessment of Injury Trends for 50th Percentile Males Using Potential Seating Configurations of Future Automated Driving System (ADS) Equipped Vehicles

Vikas Hasija
Bowhead Systems Management, United States
Erik Takhounts
National Highway Traffic Safety Administration, United States
Posture and Belt Fit in Reclined Passenger Seats

Matthew Reed
University of Michigan, United States
Sheila Ebert
University of Michigan Transportation Institute (UMTRI), United States
Monica Jones
University of Michigan Transportation Institute (UMTRI), United States

The Influence of Reclined Seating Positions on Lumbar Spine Kinematics and Loading in Frontal Impact Scenarios

Dustin Draper, Andreas Huf, Philipp Wernicke
BMW Group, Germany
Steffen Peldschus
Arbeitsgruppe Biomechanik, Institute of Legal Medicine of the LMU, Germany

Passenger Muscle Responses in Lane Change and Lane Change with Braking Manoeuvres Using Two Belt Configurations: Standard and Reversible Pre-Pretensioner

Ghazaleh Ghaaffari, Karin Brolin, Bengt Pipkorn, Lotta Jakobsson, Johan Davidsson
Chalmers University of Technology, Sweden

Validation of a Simplified Human Body Model in Relaxed and Braced Conditions in Low-Speed Frontal Sled Tests

Karan Devane, F. Scott Gayzik
Wake Forest University School of Medicine, United States

Development of a Hybrid Muscle Controller in LS-DYNA for an Active Finite Element Human Body Model Capable of Occupant Kinematics Prediction in Frontal and Lateral Maneuvers

Oleksandr V. Martynenko, Fabian T. Neininger, Syn Schmitt
University of Stuttgart, Germany

A Step Towards Integrated Safety Simulation through Pre-Crash to In-Crash Data Transfer

Abdulkadir Oeztuerk, Christian Mayer
Daimler AG, Mercedes-Benz Cars Development, Germany
Hemanth Kumar, Pronoy Ghosh, Atul Mishra, Ravikiran Chitteti
Mercedes-Benz Research and Development India
Fressmann Dirk
Dynamore GmbH, Germany
Paper No.19-0341-O

A Frame Work to Consider the New Injury Severity Score (NISS) and a Functional Capacity Index (FCI) in Determining Airbag Deployment Threshold

Kihoon Song, Taewung Kim
Korea Polytechnic University, Korea, Republic of

Hyung Yun Choi
HongIk University, Korea, Republic of

Sang-Chul Kim
Chungbuk National University Hospital, Korea, Republic of

Seok Ho Hong, Jang-mook Lim, Seri Shin
Hyundai Motor Group, Korea, Republic of

Paper No.19-0052-O

Development of a Human FE Model for Elderly Female Occupants in Side Crashes

Hisaki Sugaya, Yukou Takahashi, Yasuaki Gunji, Yasuhiro Dokko
Honda R&D Co., Ltd. Automobile R&D Center, Japan

Murthy Ayyagari, Bryant Whitcomb, Craig Markusic
Honda R&D Americas, Inc, United States

Amanda Agnew, Yun-Seok Kang, John Bolte
Ohio State University, United States

Paper No.19-0105-O PEER REVIEW

Elderly Rib Fracture in Nearside Crash in Real-World Crash Data

Susumu Ejima, Sven Holcombe, Peng Zhang, Carla Kohoyda-Inglis, Joel MacWilliams, Stewart Wang
University of Michigan International Center for Automotive Medicine, United States

Paper No.19-0068-O

Evaluation of Thoracic Deflection Criteria in Frontal Collision Using Thoracic Impactor Simulation with Human Body FE Model

Takayuki Kawabuchi, Yasuhiro Dokko
Honda R&D Co., Ltd. Automobile R&D Center, Japan

Paper No.19-0072-O PEER REVIEW

Simulating Cerebral Edema and Delayed Fatality After Traumatic Brain Injury Using Triphasic Swelling Biomechanics

Andrew Basilio, Peng Xu, Gerard Ateshian, Barclay Morrison III
Columbia University, United States

Yukou Takahashi, Toshiyuki Yanaoka, Hisaki Sugaya
Honda R&D Co., Ltd., Japan

Paper No.19-0075-O PEER REVIEW

Prediction of Probability of Fatality Due to Brain Injury in Traffic Accidents

Yukou Takahashi, Toshiyuki Yanaoka, Hisaki Sugaya
Honda R&D Co., Ltd., Japan

Andrew Vasco Basilio, Peng Xu, Gerard Ateshian, Barclay Morrison III
Columbia University, United States

Paper No.19-0154-O

BrIC and Field Brain Injury Risk

Craig Matthew, Erik Takhounts
National Highway Traffic Safety Administration, United States

Vikas Hasija
Bowhead Systems Management, United States
Safety Performance in Side Impact and Rollover Crashes

Tuesday, June 11, 2019 | 14:00-18:00
Chair: Thomas Belcher, Australia
Co-Chair: Suzanne Tylko, Canada

TRACK B

Paper No.19-0036-O

Status of NHTSA’s Ejection Mitigation Research

Aloke Prasad
National Highway Traffic Safety Administration - VRTC, United States
Corinn Pruitt
TRC Inc., United States

Paper No.19-0153-O

Occupant Injuries Related to Rollover Crashes and Ejections using Recent Crash Data

Jingshu Wu, Stephen Summers, Stephen Ridella, Ellen Lee, Thomas Kang, James Myers
National Highway Traffic Safety Administration, United States

Paper No.19-0193-O

Comparison of Higher Severity Side Impact Tests of IIHS-Good-Rated Vehicles Struck by LTVs and a Modified IIHS Barrier with the Current IIHS Side Test and Real-World Crashes

Becky Mueller, Raul Arbelaez, Matthew Brumbelow, Joseph Nolan
Insurance Institute for Highway Safety (IIHS), United States

Paper No.19-0307-O

Real World Accident Analysis of Car-to-Car Intersection Near-Side Impacts: Focus on Pelvis Injury

Chinmoy PAL, Shigeru Hirayama, Shinichi hayashi
Nissan Motor Company, Ltd, Japan
Vimalathithan Kulothungan, Manoharan Jeyabharath
RNTBCI, India

Paper No.19-0330-O

Repeatability of the Carousel Dynamic Stability and Rollover Test Device

Garrett Mattos
Friedman Research, United States
Keith Friedman
Friedman Research, United States
Kennerly Digges
George Washington University - National Crash Analysis Center, United States
Acen Jordan
Jordan & Co, United States
Carl Nash
George Washington University - National Crash Analysis Center, United States

Paper No.19-0336-O

A Framework for Improving of Heavy Truck Cab Crashworthiness Under Rollover Conditions

Garrett Mattos, Keith Friedman
Friedman Research, United States
Crash Avoidance: Automated Driving Systems Levels 3, 4 and 5: Product Evolution; Evaluation; and Real-World Deployment Challenges

Tuesday, June 11, 2019 | 14:00-18:00
Chair: Happee Riender, the Netherlands
Co-Chair: Kyongsu Yi, Korea, Republic of

Paper No.19-0224-O

Accidents Involving Cars in Automated Mode – Which Accident Scenarios Will (Not) Be Avoided By Level 3 Systems?

Matthias Kühn, Jenö Bende
GDV German Insurers Accident Research, Germany

Paper No.19-0280-O

Assessment of Technical Requirements for Level 3 and Beyond Automated Driving Systems Based on Naturalistic Driving and Accident Data Analysis

Philip Feig, Julian Schatz, Volker Labenski, Thorsten Leonhardt
Audi AG, Germany

Paper No.19-0024-O

An Optimization-Based Method to Identify Relevant Scenarios for Type Approval of Automated Vehicles

Thomas Ponn, Frank Diermeyer
Technical University Munich, Germany
Christian Gnandt
TUEV SUED Automotive, Germany

Paper No.19-0129-O

A Method for Scenario Risk Quantification for Automated Driving Systems

Erwin de Gelder, Arash Khabbaz Saberi, Hala Elrofai
TNO - Integrated Vehicle Safety, Netherlands

Paper No.19-0166-O

Prospective Effectiveness Safety Assessment of Automated Driving Functions – From the Method to The Results

Felix Fahrenkrog, Lei Wang, Thomas Platzer, Alexandra Fries, Florian Raisch, Klaus Kompass
BMW Group, Germany

Paper No.19-0192-O

Different Approaches to the New Regulatory Challenges for Connected and Automated Vehicles (CAV)

Ignacio Lafuente, Marta Tobar, Estrella Martinez Rami, Carles Luján Tutusaus
IDIADA Automotive Technology, Spain

Paper No.19-0012-O

Towards a Quantitative “Safety” Metric for Autonomous Vehicles

Arturo Tejada, Michel Legius
TNO - Integrated Vehicle Safety, Netherlands
Paper No.19-0023-O

Intention of Manoeuvre and Motion Prediction of Other Road Users: A Hybrid Approach

Irene Cara, Jeroen Uittenbogaard
TNO - Integrated Vehicle Safety, Netherlands

Paper No.19-0061-O

Development and Implementation of Safety Evaluation Scenarios for Automated Driving Vehicles on Test Bed

Heungseok Chae, Seonwook Kim, Kyongsu Yi
Seoul National University, Korea, Republic of
Myungsu Lee, Kyongchan Min
Korea Automotive Testing & Research Institute (KATRI), Korea, Republic of

Paper No.19-0101-O

Development of an Emergency Control Algorithm for a Fail-Safe System in Automated Driving Vehicles

Lee Jong Min, Yi Kyong Su
Seoul National University, Korea, Republic of
Oh Kwang Seok
Hankyong National University, Korea, Republic of

Paper No.19-0081-O

Estimating Expected Levels of Mutual Interference in Automotive Radars and System Impacts

William Buller, Brian Wilson, Joseph Garbarino, Jack Kelly
Michigan Tech Research Institute, United States

Paper No.19-0286-O

Development of a Safety Assurance Process for Autonomous Vehicles in Japan

Jacobo Antona-Makoshi, Nobuyuki Uchida Kunio Yamazaki
Japan Automobile Research Institute (JARI), Japan
Koichiro Ozawa
Honda R&D, Japan
Eiichi Kitahara
Nissan Motor Company, Ltd, Japan
Satoshi Taniguchi
Toyota Motor Corporation, Japan

Paper No.19-0123-O

Development of Safety Evaluation Scenarios for Infra-Cooperated Automated Valet Parking Systems

Seonwook Kim, Heungseok Chae, Yonghwan Jeong, Kyongsu Yi
Seoul National University, Korea, Republic of
Myungsu Lee, Kyongchan Min
Korea Automotive Testing & Research Institute (KATRI), Korea, Republic of
**Biomechanics: Advances in Crash Test Dummies, Instrumentation, and Data Analysis**

Wednesday, June 12, 2019 | 08:30-12:30  
Chair: Philippe Vezin, France  
Co-Chair: Kevin Moorhouse, United States

**TRACK A**

**Paper No.19-0295-O**

**Q10 Euro NCAP 2020 Update Dummies Compared with Current Q10 in Frontal and Side Impact Sled Tests**

Katarina Bohman, Isabelle Stockman, Lotta Jakobsson, Maria Wimmerstedt  
Volvo Cars Safety Centre, Sweden  
**Dion Kruse**  
Autoliv Research, Sweden  
**Håkan Sundmark**  
Autoliv Sweden AB, Sweden

**Paper No.19-0197-O**

**Biomechanical Validation of a New Biofidelic Dummy**

Andreas Schäuble  
DEKRA Automobil GmbH, Germany  
**Michael Weyde**  
Büro für Unfallrekonstruktion Berlin, Germany

**Paper No.19-0233-O**

**Photogrammetry and Motion Analysis Methodologies for Head Dummy Behavior Observation**

David Company Molina  
Applus IDIADA, Spain

**Paper No.19-0337-O**

**Study on Identification of Characteristics of Thorax of THOR-M50 (Metric)**

Hyunjae Park, AHyun Cho, Taewung Kim  
Korea Polytechnic University, Korea, Republic of  
**Moonkyu Lee**  
Sogang University, Korea, Republic of  
**Minkee Cho, Taehee Lee, Sooyeol Lee, Wook Jin**  
Hyundai Motor Group, Korea, Republic of

**Paper No.19-0236-O**

**Updated Chest Injury Criterion for the THOR dummy**

Xavier Trosseille  
LAB PSA / RENAULT, France  
**Pascal Baudrit**  
CEESAR, France, Metropolitan

**Paper No.19-0266-O**

**Application of Multiple Rib Gages to Improve Chest Injury Measurements**

Kennerly Digges  
Automotive Safety Research Institute, United States  
**Danius Dalmotas**  
D. J. Dalmotas Consulting Inc, Canada  
**Priya Prasad**  
Prasad Engineering, LLC, United States

**Paper No.19-0308-O**

**Improved Thoracic Injury Risk Functions for the THOR-M-50 Developed in a New Simulation-Based Approach**

Andre Eggers, Marcus Wisch, Matthias Schiessler  
Federal Highway Research Institute (BASt), Germany  
**Bengt Pipkorn, Krystoffer Mroz**  
Autoliv Sweden AB, Sweden  
**David Hynd**  
TRL Ltd., United Kingdom
Study of Chest Injury Risk Probability Within the Seniors Project for 45- And 65- Year Old Car Occupants Using Current and Advanced Restraint Systems in Sled Test with THOR Dummy

Alba Fornells Vernet, Núria Parera Sallent, Maria de Odriozola Martínez, Genis Mensa
IDIADA Automotive Technology, Spain

Comparing Restraint System Sensitivity Between The THOR and the Hybrid III, and Potential Implications in Restraint Optimization

Jason Forman, Salvador Montesinos Acosta, Varun Bollapragada, Bronislaw Gepner
University of Virginia, Center for Applied Biomechanics, United States
Philipp Wernicke
BMW, Germany

Comparison of Thorax Responses between the Belted Elderly Occupant Human Body and THOR-50M FE Models under Typical Frontal Crash Test Conditions

Kazuki Hikida
Honda R&D Co., Ltd. Automobile R&D Center, Japan
Kazuki Ohhashi
Honda Techno Fort Co., Ltd, Japan
Kazunori Maehara, Hldenori Mikami, Yasuhiro Dokko
Honda R&D Co., Ltd. Automobile R&D Center, Japan

Test Methodology for Evaluating the Reclined Seating Environment with Human Surrogates

Rachel Richardson, John Paul Donlon, Kalle Chastain, Greg Shaw, Jason Forman, Sara Sochor, Mohan Jayathirtha, Kevin Kopp, Brian Overby, Bronislaw Gepner, Jason Kerrigan
University of Virginia, Center of Applied Biomechanics, United States
Martin Ostling, Krystoffer Mroz, Bengt Pipkorn
Autoliv Sweden AB, Sweden

THOR 50M Suitability for Automated Vehicle Crashworthiness

Zhenwen Wang, Jianying Li, Kartik Pallavajhala, Zaifei Zhou
Humanetics Innovative Solutions, Inc., United States
Jingwen Hu, Kyle Boyle, Mathew Reed
University of Michigan Transportation Research Institute, United States

THOR ATD Response in Oblique and Lateral Far-side Sled Tests

Hans Hauschild, Narayan Yoganandan, John Humm, Klaus Driesslein, Sagar Umale, Frank Pintar
Medical College of Wisconsin, United States
Restraint System Design and Performance Challenges: Addressing the Needs of Diverse Populations (Age, Gender, Stature)

Wednesday, June 12, 2019 | 08:30-12:30
Chair: Riske Meijer, the Netherlands
Co-Chair: Lotta Jakobsson, Sweden

TRACK B

Paper No.19-0289-O

Effectiveness of Seat Belt Reminders Among Children and Teenagers in Real-World Crashes

Amanda Axelsson
Folksam Research, Sweden
Anders Kullgren
Folksam Research and Chalmers University of Technology, Sweden

Paper No.19-0218-O

A Usability Study of Seatbelt Buckle Accessibility for Elderly Occupants

Niharika Bandaru, Christopher Sarros, Aaron Latour
TRQSS Inc., Canada

Paper No.19-0095-O PEER REVIEW

An Examination of the Effectiveness of Seat Belt Assurance Systems: A Naturalistic Driving Study Solution

Shan Bao, Dillon Funkhouser, Mary Lynn Buonarosa, Mark Gilbert, David LeBlanc, James Sayer
University of Michigan Transportation Institute (UMTRI), United States
Julie Kang, Chris Monk
National Highway Traffic Safety Administration, United States

Paper No.19-0057-O

A Parametric Study of an Adaptive Load-Limiting Restraint System with Weight Sensing Considerations

Jon van Poppel
Engineering Systems Inc., United States

Paper No.19-0079-O PEER REVIEW

Frontal Crash Simulations Using Parametric Human Models Representing a Diverse Population

Jingwen Hu, Kai Zhang, Matthew Reed
University of Michigan Transportation Research Institute, United States
Jenne-Tai Wang
General Motors (retired), United States
Mark Neal, Chin-Hsu Lin
General Motors (GM), United States

Paper No.19-0230-O

The Geometrical Relationship Between the Lap Belt and Occupants’ Anterior Superior Iliac Spine

Koji Mizuno, Wataru Hatano, Ryoichi Yoshida
Nagoya University, Japan
Yutaka Nakajima, Yoshihiko Tanaka, Takanari Muorya, Ryota Ishigaki
Autoliv Japan Ltd., Japan

Paper No.19-0275-O

Investigation of Restraint Characteristics for Elderly Occupant Chest injury reduction

Yasuaki Gunji, Takashi Aoki, Kenyu Okamura, Yuichi Ito
Honda R&D Co., Ltd. Automobile R&D Center, Japan
Investigation on Restraint Approach: Reduce Thoracic Injury by Distributing High Restraint Forces in Oblique Crashes

Takayuki Kawabuchi, Takashi Saso, Hiroyuki Ito, Takayuki Shimizu, Osamu Kanno
Honda R&D Co., Ltd. Automobile R&D Center, Japan

New Passenger Restraints with Adaptivity to Occupant Sizes, Seating Positions and Crash Scenarios through Paired ATD-HM Study

Jay Zhao, Pareed Kumar Jakkamsetti, Maika Katagiri, Sungwoo Lee
Joyson Safety Systems, United States

New Approaches in Modeling Belt-Flesh-Pelvis Interaction Using Obese GHBMC Models

Zhaonan Sun, Bronislaw Gepner, Jason Kerrigan
University of Virginia, Center for Applied Biomechanics, United States

Analysis of the Interaction Between Child Occupants and Deploying Frontal Passenger Airbag in Simulated Frontal Crashes

Shreyas Sarfare, Jalaj Maheshwari, Aditya Belwadi
The Children’s Hospital of Philadelphia, United States

Paired Comparison of ATD Responses for the CMVSS 213 Bench and Proposed FMVSS 213 Bench

Suzanne Tylko
Transport Canada, Canada
Kathy Tang, Alain Bussieres, Amanda Starr
PMG Technologies, Canada


Farid Bendjellal
Britax Childcare Group, Germany

Coupling Device for Child Restraint System (CRS) For Infants Affected with Osteogenesis Imperfecta: Design and Numerical Assessment

Miguel Ángel, Martínez Miranda, Christopher René, Torres-San Miguel, Juan Alejandro, Flores Campos, Ivan Lenin, Cruz Jaramillo
Instituto Politecnico Nacional, Mexico
Luis Martínez-Sáez
Universidad Politécnica de Madrid, Spain
**Crash Avoidance: Human-Machine Interface Design and Driver Monitoring Technologies in Vehicles**

Wednesday, June 12, 2019 | 08:30-12:30
Chair: Peter Burns, Canada
Co-Chair: Eric Traube, United States

**TRACK C**

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**Paper No.19-0195-O**

**Development of a Modular Tool for Safety Assessments of Human-Machine-Interaction for Assisted Driving Functions (SAE Level 2)**

André Wiggerich
Federal Highway Research Institute (BASt), Germany

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**Paper No.19-0006-O**

**Benefits of Intuitive Auditory Cues for Blind Spot in Supporting Personalization**

Toshihiro Hashimoto
Honda R&D Co., Ltd. Automobile R&D Center, Japan
Alessia Knauss, Tobias Aderum, Ola Bostrom
Veoneer AB, Sweden
Tetsuya Matsushita
Autoliv Japan Ltd., Japan
Da Wang
Autoliv Sweden AB, Sweden
Elaine KY Chung
Veoneer Japan Ltd., Japan
Toshiya Hirose
Shibaura Institute of Technology, Japan

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**Paper No.19-0050-O PEER REVIEW**

**Improvement of Driver Active Interventions During Autonomous Driving by Displaying Trajectory Pointers – A Driving Simulator Study**

Sayaka Ono, Haruto Sasaki, Hitoshi Kumon, Yoshitaka Fuwamoto
Toyota Motor Corporation, Japan
Shunsuke Kondo, Takuji Narumi, Tomohiro Tanikawa, Michitaka Hirose
The University of Tokyo, Japan

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**Paper No.19-0092-O**

**A New Methodology to Model Driver Behaviour Accounting for the Variation in Driving Manners Using Naturalistic Driving Data**

Niels Ferson, Florent Garnier-Follet, Edoardo Pizzigoni
Toyota Motor Europe, Belgium Clément Val
CEESAR, France

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**Paper No.19-0148-O**

**Distracted Driving Detection using On-Board Sensors**

Shigenobu Saigusa
Honda R&D Americas, Inc, United States

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**Paper No.19-0245-O**

**The Influence of a Gaze Direction Based Attention Request to Maintain Mode Awareness**

Christina Kurpiers, David Lechner, Florian Raisch
BMW, Germany
Paper No.19-0325-O

Driver Workload Estimation based on Realistic In-vehicle Sensors

Florian Ripper, Ardit Dvorani, Christoph Hemprich, Koshan Mahdi, Lukas Sholz
Joyson Safety Systems, Germany
Leonard Cech
Joyson Safety Systems, United States

Paper No.19-0138-O PEER REVIEW

The Detection of Drowsiness Using a Driver Monitoring System

Chris Schwarz, John Gaspar
University of Iowa, United States
Thomas Miller, Reza Yousefian
Aisin Technical Center of America, United States

Paper No.19-0260-O

Driver Alcohol Detection System for Safety (DADSS) – A Non-Regulatory Approach in the Research and Development of Vehicle Safety Technology to Reduce Alcohol-Impaired Driving – A Status Update

Abdulatif (Bud) Zaouk, Michael Willis
KEA Technologies, Inc., United States
Eric Traube
NHTSA, United States
Robert Strassburger
ACTS, United States

Paper No.19-0262-O

Driver Alcohol Detection System for Safety (DADSS) – Pilot Field Operational Tests (PFOT) Vehicle Instrumentation & Integration of DADSS Technology

Michael Willis, Abdulatif (Bud) Zaouk, Kyle Bowers, Chris Chaggaris
KEA Technologies, Inc., United States
Robert Strassburger
ACTS, United States
Eric Traube
NHTSA, United States
George Bahouth, Rebecca Spicer
Impact Research, LLC, United States

Paper No.19-0263-O

Assessing System Implementation Readiness of the Driver Alcohol Detection System for Safety (DADSS) To Reduce Alcohol-Impaired Driving in a Real-World Driving Pilot Deployment Project

Remi Fournier, Abdulatif (Bud) Zaouk, Michael Willis
KEA Technologies, Inc., United States
Robert Strassburger
ACTS, United States
Rebecca Spicer
Impact Research, LLC, United States
Driver Alcohol Detection System for Safety (DADSS) – Human Testing of Two Passive Methods of Detecting Alcohol in Tissue and Breath Compared to Venous Blood

Scott Lukas, Elizabeth Ryan, Jane McNeil, Justin Shepherd, Lucy Bingham, Katharine Davis
McLean Hospital/Harvard Medical School, United States
Kelly Ozdemir, Neeraj Dalal, Kianna Pirooz, Michael Willis, Abdullatif Zaouk
KEA Technologies, Inc., United States

Vehicle Integrated Non-Dispersive Infrared Sensor System for Passive Breath Alcohol Determination

Jonas Ljungblad, Bertil Hök, Martin Åhlenius, Gabriel Eriksson
Senseair Alcohol Sensing AB, Sweden

Development of Portable Breath-Alcohol-Detection System

Masuyoshi Yamada, Hironori Wakana
Hitachi Ltd., Japan

Student Safety Technology Design Competition

Wednesday, June 12, 2019 | 14:00-18:00
Chair: Art Carter, United States
Co-Chair: Bernd Lorenz, Germany

TRACK A

The collegiate Student Safety Technology Design Competition (SSTDC) is hosted by the International Technical Conference on the Enhanced Safety of Vehicles (ESV) the only government-sponsored vehicle safety conference that brings together leading engineering experts from governments, automobile manufacturers, suppliers, safety researchers and other motor vehicle safety professionals. Conceived in 2004 at the 19th ESV Conference in Washington, D.C., the competition began as a way of getting more students involved in vehicle safety. It was an instant success, and the program has grown over the years addressing emerging vehicle safety priorities worldwide, such as distraction mitigation and autonomous vehicle issues.

Consumer-Focused Approaches in Vehicle Safety to Drive the Automotive Market on a Global Scale

Wednesday, June 12, 2019 | 14:00-18:00
Chair: Andre Seeck, Germany
Co-Chair: Michiel van Ratingen, the Netherlands

TRACK B
Developments in Car Crash Safety and Comparisons between Results from Euro NCAP Tests and Real-World Crashes

Anders Kullgren
Folksam Research and Chalmers University of Technology, Sweden
Amanda Axelsson, Emma Engström, Helena Stigson, Anders Ydenius
Folksam Research, Sweden

Guideline for a Vehicle Purchase Policy Aiming at a Safe and Sustainable Vehicle Fleet

Anders Ydenius
Folksam Research, Sweden
Anders Kullgren
Folksam Research and Chalmers University of Technology, Sweden

The Role of Vehicle Age in Road Fatalities and the Community Awareness Activities Employed to Encourage Fleet Renewal and Reduce Road Trauma

James Goodwin, Jason Smith, Rhianne Robson
ANCAP Australasia, Australia

Improvements to ASEAN NCAP Crash Test Rating Sans a Platform Change

Khairil Anwar Abu Kassim, Muhammad Shafiq Ahmad Laili, Yahaya Ahmad, Mohd Hafiz Johari, Siti Zaharah Ishak
Malaysian Institute of Road Safety Research (MIROS), Malaysia

Euro NCAP-New Frontal Impact Test with Mobile Progressive Deformable Barrier (MPDB)

Volker Sandner
ADAC e.V., Germany
Michiel van Ratingen
Euro NCAP, Belgium
James Ellway
Euro NCAP, Netherlands

Euro NCAP Side Impact Working Group Report

James Ellway
Euro NCAP, Belgium
Torsten Kerz
Adam Opel AG, Germany
Karsten Hallbauer
Joyson Safety Systems, Germany

ANCAP Child Occupant Protection Assessment – Performance of Australasian Child Restraints in Full Scale Crash Tests

Mark Terrell, Jason Smith, Donal McGrane
ANCAP Australasia, Australia
Julie Brown
Neuroscience Research Australia, Australia
Thomas Belcher
Australian Government Department of Infrastructure, Regional Development and Cities, Australia
**Consumer Initiatives to Improve Child Safety in Europe**

Michiel van Ratingen  
EURO NCAP, Belgium  
Ronald Vroman  
International Consumer Testing and Research, Netherlands  
Andreas Ratzek  
ADAC, Germany

**Trends in Pedestrian Protection for Vehicles Rated by Australasian NCAP**

Michael Paine, David Paine  
Vehicle Design and Research, Australia  
Andrew van den Berg, Giulio Ponte  
Centre for Automotive Safety Research, Australia

**Development of a Certification Procedure for Numerical Pedestrian Models**

Corina Klug, Florian Feist, Bernd Schneider, Wolfgang Sinz  
Graz University of Technology, Austria  
James Ellway, Michiel van Ratingen  
Euro NCAP, Belgium

**Assessment of New Active Safety Systems Addressing Urban Intersection Scenarios Including Vulnerable Road Users**

Julia Bräutigam  
Bundesanstalt für Straßenwesen, Germany  
Alvaro Esquer  
Applus IDIADA, Spain

**Establishing and Communicating Rules for Automated Driving Vehicles**

Matthew Avery, Dave Baldwin, Colin Grover  
Thatcham Research, United Kingdom

**Crash Avoidance: Continuation Session**

Wednesday, June 12, 2019 | 14:00-18:00  
Chair: Eric Traube, United States  
Co-Chair: Yasuhiro Matsui (Japan)  
TRACK C

**Contrast Between Road and Roadside Material for Road Edge Detection in Vehicle Road Departure Mitigation System**

Qiang Yi, Stanley Chien, Yaobin Chien  
Indiana University-Purdue University Indianapolis, United States  
Rini Sherony  
Toyota Motor North America, United States

**Determine Characteristics Requirement for the Surrogate Road Edge Objects for Road Departure Mitigation Testing**

Stanley Chien, Qiang Yi, Jun Lin, Abir Saha, Lin Li, Yaobin Chen  
Indiana University-Purdue University Indianapolis, United States  
ChiChih Chen  
Ohio State University, United States  
Rini Sherony  
Toyota Motor North America, United States
Societal Benefit of Automatic Emergency Braking and Lane Departure Warning Systems in Large Trucks

Jeffrey Hickman, Matthew Camden, Alejandra Medina-Flintsch, Richard Hanowski
Virginia Tech Transportation Institute (VTTI), United States
Brian Tefft
AAA Foundation for Traffic Safety, United States

Estimation of Potential Safety Benefits for Pedestrian Crash Avoidance/ Mitigation Systems in Light Vehicles

Mikio Yanagisawa, Philip Azeredo, Wassim Najm
U.S. Department of Transportation/Volpe Center, United States
Stephen Stasko
National Highway Traffic Safety Administration, United States

Dynamic Evaluation of Cloud-Based Active Safety Systems

Uwe Gropengießer, Christina Maier, Dr. Roland Kallweit
IAV GmbH, Germany

Amok Safety Lock (ASL) Development and Demonstration of a New Function for the Prevention of Intentional Vehicle Misuse Against Pedestrians

Joao Graciano, Miso Kvesic, Thorsten Scheibe, Dominik Kufer
IAV GmbH, Germany
Roland Kallweit
IAV GmbH, Georgia

Approach for Deriving Scenarios for Safety of the Intended Functionality

Paul Rau
NHTSA, United States
Christopher Becker, John Brewer
U.S. Department of Transportation/Volpe Center, United States

Development of Trailer Identification System for Implementation of Vehicle Safety Communications in Articulated Tractor-Trailers

Alrik Svenson
National Highway Traffic Safety Administration, United States
Loren Stowe
Virginia Tech Transportation Institute (VTTI), United States
Power Requirements for a Redundant Automated Steering System for Trucks
Maximilian Herold, Maximilian Liebler, Hermann Winner
TU Darmstadt/FG Fahrzeugtechnik, Germany

ADAS Testing in Canada: Could Partial Automation Make our Roads Safer?
Eric Meloche, Dominique Charlebois, Benoit Anctil
Transport Canada, Canada
Guillaume Pierre, Annie Saleh
PMG Technologies, Canada

Informed Trust – An External User Interface for Highly Automated Vehicles
Alexander Mankowsky, Stephan Muecke
Daimler AG, Germany

BMW’s Safety Guidelines for the Testing and Deployment of Automated Vehicles
Paul Daman, Martin Goetze, Christian Gold, Klaus Kompass
BMW AG, Germany

Occupant Protection for AD – The Paradigm Shift in Crash Safety?
Lotta Jakobsson, Katarina Bohman, Bo Svanberg, Trent Victor
Volvo Cars Safety Centre, Sweden

Euro NCAP’s First Step to Assess Automated Driving Systems
Richard Schram
Euro NCAP, Belgium

Assessment, Evaluation, and Approaches to Technical Translations of FMVSS and Test Procedures That May Impact Compliance of Innovative New Vehicle Designs Associated with Automated Driving Systems
Myra Blanco, Michelle Chaka, Clay Gabler, Loren Stowe, Vikki Fitchett
Virginia Tech Transportation Institute (VTTI), United States
Ellen Lee
NHTSA, United States
A Framework for Automated Driving System Testable Cases and Scenarios
Paul Rau
NHTSA, United States
Eric Thorn
Southwest Research Institute, United States

Certification of Highly Automated Vehicles for Use on Public Roads
John McDermid, Rob Alexander
University of York, United Kingdom
Philip Torr
University of Oxford, United Kingdom
Andrew Blake
Turing Institute, United Kingdom
Philip Koopman
Carnegie Mellon University, United States
Subramanian Ramamoorthy
University of Edinburgh, United Kingdom
Robert Hierons
Brunel University, United Kingdom
Siddartha Khastgir
WMG, University of Warwick, UK, United Kingdom
John Clark
University of Sheffield, United Kingdom
Michael Fisher
University of Liverpool, United Kingdom
Kerstin Eder
University of Bristol, United Kingdom
Geoff Barrett
Broadcom Limited, United Kingdom

Challenges for Occupant Safety in Highly Automated Vehicles across Various Anthropometries
Bronislaw Gepner, Katarzyna Rawska, Rachel Richardson, Shubham Kulkarni, Kalle Chastain, Junjun Zhu, Jason Forman, Jason Kerrigan
University of Virginia, Center for Applied Biomechanics, United States

Research of Minimize Steering Grasping to Take over Driver from System in Advance Safety System
Shotaro Odate
Honda R&D Co., Ltd., Japan

Multi-Agent Traffic Simulations to Estimate the Impact of Automated Technologies on Safety
Sou Kitajima, Keisuke Shimono, Jacobo Antona-Makoshi, Nobuyuki Uchida
Japan Automobile Research Institute (JARI), Japan
Jun Tajima
Misaki Design, Japan

Development and Application of an Expert Assessment Method for Evaluating the Usability of SAE Level 3 ADS HMIs
Frederik Naujoks, Sebastian Hergeth, Andreas Keinath
BMW Group, Germany
Katharina Wiedemann, Nadja Schömig
Würzburg Institute for Traffic Sciences, Germany
A Framework for Definition of Logical Scenarios from an Egocentric Perspective for Safety Assurance of Automated Driving

Institute for Automotive Engineering (ika), RWTH Aachen University, Germany
Jan Sauerbier, Jens Klimke, Adrian Zlocki
fka Forschungsgesellschaft Kraftfahrwesen mbH, Aachen, Germany

Fault Tree-Based Derivation of Safety Requirements for Automated Driving on the Example of Cooperative Valet Parking

Valerij Schönemann, Hermann Winner
Technische Universität Darmstadt, Germany
Bert Boeddeker, Sebastian vom Dorff
DENSO AUTOMOTIVE Deutschland GmbH, Germany
Thomas Glock, Eric Sax
FZI Research Center for Information Technology, Germany
Geert Verhaeg
TNO - Integrated Vehicle Safety, Netherlands
Fabrizio Tronci
Magneti Marelli, Italy
Gustavo G. Padilla
Hella Aglaia Mobile Vision GmbH, Germany

Research on Skillful Drivers’ Merging Behaviors and Statistical Analysis of Traffic Lane Flow for an Investigation of Automatic Merging Assessment Method

Eiji Nunobiki, Kota Harada, Yoichi Kondo, Koei Minami
Toyota Motor Corporation, Japan

Functional Decomposition - A Contribution to Overcome the Parameter Space Explosion during Validation of Highly Automated Driving

Christian Amersbach, Hermann Winner
TU Darmstadt, Germany

Automated and Integrated Crash Safety

Thursday, June 13, 2019 | 08:30-12:30
Chair: Jac Wismans, the Netherlands
Co-Chair: Marcus Wisch, Germany
TRACK B

ESF 2019 - Experimental Safety Vehicle Meets Automated Driving Mode

Rodolfo Schöneburg, Martin Hart, Jochen Feese, Stephan Mücke, Julien Richert
Daimler AG, Mercedes-Benz Cars Development, Germany

Calculation of the Point of No Return (PONR) from Real-World Accidents

Florian Spitzhüttl, Henrik Liers
VUFO - Institute for Traffic Accident Research at Dresden University of Technology, Germany
Paper No.19-0083-O

**Occupant Activities and Sitting Positions in Automated Vehicles in China and Sweden**

Martin Östling
Autoliv Research, Sweden
Annika Larsson
Veoneer AB, Sweden

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Paper No.19-0177-O

**Integrated Safety: Establishing Links for a Comprehensive Virtual Tool Chain**

Linus Wågström, Alexandros Leledakis, Jonas Östh, Magdalena Lindman, Lotta Jakobsson
Volvo Cars Safety Centre, Sweden

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Paper No.19-0182-O

**Euro NCAP’s First Step Towards Scenario-Based Assessment by Combining Autonomous Emergency Braking and Autonomous Emergency Steering**

Richard Schram
Euro NCAP, Belgium

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Paper No.19-0204-O

**Injury Risk-Based Criteria for the Application of Adaptive Logic to ADAS Systems**

Dario Vangi, Antonio Virga, Michelangelo-Santo Gulino
Università degli Studi di Firenze, Italy

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Paper No.19-0210-O

**New Driver Safety Concept for Automated and Manual Driving Mode**

Claus Geisler, Prof. Dr. Rodolfo Schöneburg, Jochen Feese, Eric Gärtner, Abdulkadir Öztürk, Dr. Julien Richert, Jürgen Warwel
Mercedes Benz, Germany

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Paper No.19-0248-O

**Collision Detection Using ADAS Sensor and its Effect on Occupant Injury**

Kenyu Okamura, Hajime Ohya, Shinsuke Odai
Honda R&D Co., Ltd. Automobile R&D Center, Japan

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Paper No.19-0321-O

**Evaluation of the Protective Performance of a Novel Restraint System for Highly Automated Vehicles**

Tetsuya Matsushita, Hiro Saito
Autoliv, Japan
Abhiroop Vishwanatha, Avinash Tabhane
Autoliv, India
Martin Östling, Cecilia Sunnevång
Autoliv, Sweden
Effect of Automated Versus Manual Emergency Braking on Rear Seat Adult and Pediatric Occupant Pre-Crash Motion

Valentina Graci, Ethan Douglas, Thomas Seacrist, Kristy Arbogast
Children’s Hospital of Philadelphia, United States
Jason Kerrigan
University of Virginia, Center of Applied Biomechanics, United States
Julie Mansfield, John Bolte
Ohio State University, United States
Rini Sherony, Jason Hallman
Toyota Collaborative Safety Research Center, United States

Development of a Side Impact Crash Using Integrated System

raeick jang, seokmin lee, baeyoung kim, yoohoon choi, doowon yang
Hyundai Mobis, Korea, Republic of

Research of Bicyclist Detection by Enhanced Pedestrian Detection System with ADAS

Masaki Umezawa, Kenyu Okamura, Hidetoshi Nakamura, Hiroyuki Asanuma, Hyejin Bae
Honda R&D Co., Ltd. Automobile R&D Center, Japan

Evaluation of the Threshold for Dispatching the Doctor to the Accident Site Being Used in AACN

Tomoyuki Miyoshi
Toyota Motor Corporation, Japan

Assessment of New and Improved Field Data Collection, Analysis and Benefits Assessment Methods

Thursday, June 13, 2019 | 08:30-12:30
Chair: Cem Hatipoglu, United States
Co-Chair: Rob Eenink, the Netherlands
TRACK C

The Residual Road Departure Crash Problem after Full Deployment of LDW and LDP Systems

Luke Riexinger, Hampton Gabler
Virginia Polytechnic Institute and State University, United States
Rini Sherony
Collaborative Safety Research Center, Toyota Motor North America, United States

The Effect of P-AEB System Parameters on the Effectiveness for Real World Pedestrian Accidents

Michael Gruber, Harald Kolk, Ernst Tomasz, Florian Feist, Corina Klug
Graz University of Technology, Austria
Anja Schneider, Franz Roth, Volker Labenski
Audi AG, Germany
Magdalena Lindman, Karthikeyan, Shanmugam, Anders Fredrikson
Volvo Cars Corporation, Sweden
Applying Lane Keeping Support Test Track Performance to Real-World Crash Data

Christopher Wiacek, Garrick Forkenbrock, Mark Mynatt
National Highway Traffic Safety Administration, United States
Kellen Shain
Alpha Technology Associate, Inc., United States

Evaluation of AEB Effectiveness Using Counterfactual Simulations of SHRP2 Naturalistic Crashes

Thomas SEACRIST, Ridhi Sahani, Ethan Douglas, Valentina Graci, Helen Loeb
The Children's Hospital of Philadelphia, United States
Gregory Chingas
Duquesne University, United States

Real-World Evaluation of Driver Assistance Systems for Vulnerable Road Users Based on Insurance Crash Data in Sweden

Irene Isaksson Hellman
P&C Insurance, Sweden
Magdalena Lindman
Volvo Cars Corporation, Sweden

Detecting Potential Vehicle Concerns Using Natural Language Processing Applied to Automotive Big Data

Monica Eboli, Ian Gibbs, Catherine Mayberry, Ramsi Haddad
General Motors (GM), United States

Investigating Accidents Involving Highly Automated Vehicles: Concept of a Data Trustee and Data Model for Future Homologation

Christoph Lauterwasser, Melanie Kreutner, Johann Gwelenberger
Allianz Center for Technology, Germany

Speeding in Crashes in the United States of America: A Pilot Study Using Event Data Recorder Information from NASS-CDS

Sam Doecke, Craig Kloeden
Centre for Automotive Safety Research, Australia
Michael Paine
Vehicle Design and Research Pty Ltd, Australia

Estimated Benefit of Automated Emergency Braking Systems for Vehicle-Pedestrian Crashes in the U.S.

Samantha H. Haus, Hampton C. Gabler
Virginia Polytechnic Institute and State University, United States
Rini Sherony
Toyota Collaborative Safety Research Center, United States
Written Papers

Protection of Vulnerable Road Users
Chairperson: Rikard Fredriksson, Sweden
Yasuhiro Matsui, Japan

Paper No.19-0030-W
Analysis of Kinematics and Head Injury Mechanisms in Car to Child Cyclist Collision Simulation using Human FE Model
Tadasuke Katsuhara
Toyota Motor Corporation, Japan

Paper No.19-0031-W
Prediction of Pedestrian Protection Performance Using Machine Learning
Osamu Ito, Jun Shiraishi, Kazuo Imura
Honda R&D Co., Ltd. Automobile R&D Center, Japan
Takeshi Yamatoda, Yasuhiro Kumatani
IDAJ Co., Ltd., Japan

Paper No.19-0055-W
Responses of a 6-Year-Old ATD Restrained in a Booster Child Seat on the FMVSS 213 Test Bench, Proposed Upgraded Test Bench and a Vehicle Seat in Simulated Frontal Impacts
Jalaj Maheshwari, Shreyas Sarfare, Aditya Belwadi
Children’s Hospital of Philadelphia, United States
Nhat Duong
Drexel University, United States

Paper No.19-0070-W
Investigation of Strain-induced Brain Injury Mechanism in Simulated Car Accidents
Toshiyuki Yanaoka, Yukou Takahashi, Hisaki Sugaya, Takayuki Kawabuchi
Honda R&D Co., Ltd., Japan

Paper No.19-0080-W
Heavy Truck Crashes Involving Pedestrians in Comparison to Bicyclists
Axel Malczyk, Jenö Bende
GDV German Insurers Accident Research, Germany

Paper No.19-0114-W
Passive Safety Improvements in Child Restraint Systems Placed in Rear Seats of Vehicles by Introducing a New ISOFIX Accessory
Guillermo Ramos, Jose Lagunar, Jesus Casado, Cristina Calvillo
RiveKids Technology SL, Spain

Paper No.19-0205-W
New Safety Standards for Motorised Mobility Devices in Australia
Michael Paine, David Paine
Vehicle Design and Research, Australia

Paper No.19-0217-W
Advanced Rear Seat Sensing – Further Improving Occupant Safety, Using RF Technology
Peter Larsen, Thierry Mousel
IEE S.A., Luxembourg
Safety Performance in Frontal and Rear Crashes
Chairperson: Younghan Youn, Korea, Republic of; Stephen Summers, United States

Development of an FE Model for FlexPLI With Upper Body Mass for Enhanced Pedestrian Safety Assessment
Chirag Shah
Humanetics Innovative Solutions, Inc., United States
George Hu
Humanetics China, China, People’s Republic of
Mark Burleigh
Humanetics Innovative Solutions, Inc., United Kingdom

Objectifying and Predicting Motorcycle Accident Risk through Riding Dynamics
Andreas Hula, Klemens Schwieger, Peter Saleh
AIT - Austrian Institute of Technology, Austria
Horst Ecker, Manfred Neumann
Technische Universität Wien, Austria

GVTR: A Generic Vehicle Test Rig Representative of the Contemporary European Vehicle Fleet
Florian Feist, Nisha Sharma, Corina Klug
Graz University of Technology, Austria
Franz Roth
Audi AG, Germany
Stefan Schinke, Alexander Besch
Volkswagen AG, Germany
Florian Dornbusch
Bertrandt Ingenieurbüro GmbH, Germany

Are Wisconsin Pedestrian Crashes Representative of National Trends?
Dale Halloway
Medical College of Wisconsin, United States

Development of Adaptive Supplemental Restraint System (ASRS)
Yefim Kriger
Fairfield University or UNH, CT, United States

Driver Airbag Design to Mitigate Neck and Chest Injuries for US-NCAP and Optimization Methods with a Dynamic Meta Model
Wonsuk Park
General Motors (GM), United States

Interior and Restraint Systems Modeling for Oblique Offset Frontal Impact
Velayudham Ganesan, Harjinder Singh, Mahendran Paramasuwm
EDAG Inc., United States

Crash Avoidance: Driving Automation Systems Level 0, 1, and 2. Product Evolution; Evaluation; and Real-World Deployment Challenges
Chairperson: Jost Gail, Germany; Lori Summers, United States;
Evaluation of Autonomous Emergency Braking in Preventing Front-To-Rear Crashes among Three Toyota Models
Rebecca Spicer, George Bahouth, Denis Murakhovsky, Amin Vahabaghaie
Impact Research, LLC, United States

Estimation of Effect of Crossing Scenario AEB System to Help Reduce Traffic Accidents
akitoshi minemura, takashi hasegawa
Toyota Motor Corporation, Japan

Biomechanics: Advances in Crash Test Dummies, Instrumentation, and Data Analysis
Chairperson: Philippe Vezin, France; Kevin Moorhouse, United States

Hertz Contact Model to Estimate Paediatric Head Impact Response Variables
Nagarajan Rangarajan
Gesacinc.com, United States

Restraint System Design and Performance Challenges: Addressing the Needs of Diverse Populations (Age, Gender, Stature)
Chairperson: Riske Meijer, the Netherlands; Lotta Jakobsson, Sweden

A Study of Age Detection System for Application to Elderly Occupant Protection
Jun Shiraishi, Osamu Ito, Kazuo Imura
Honda R&D Co. Ltd. Automobile R&D Center, Japan

Adapting Safety Evaluation Approaches for Vehicles with Automated Driving Systems
Chairperson: Jim Hand, United Kingdom; Michiel Christoph, the Netherlands

Estimating Preliminary Occupant Injury Risk Distributions for Highly Automated Vehicles with Respect to Future Seat Configurations and Load Directions
Felix Ressi, Wolfgang Sinz
Graz University of Technology, Austria
Claus Geisler, Abdulkadir Öztürk
Daimler AG, Germany
Gian Antonio D'Addetta, Heiko Freienstein
Robert Bosch GmbH, Germany

Automated and Integrated Crash Safety
Chairperson: Jac Wismans, the Netherlands; Marcus Wisch, Germany

50 Years of Mercedes-Benz Accident Research - Ready for the Next Level
Heiko Buerkle, Jochen Feese, Heiko Bürkle
Daimler AG, Germany
Assessment of New and Improved Field Data Collection, Analysis and Benefits Assessment Methods

Chairperson: Cem Hatipoglu, United States; Rob Eenink, the Netherlands

Paper No.19-0096-W

Passenger Vehicle-Powered Two-Wheeler Pre-Crash Trajectory Reconstruction and Conflict Analysis Results for Real-World Crashes in the EU and US and its Application to Advanced Crash Avoidance Technologies
R. Michael Van Auken, John Lenkeit, Terry Smith, Scott Kebschull
Dynamic Research, Inc., United States

Paper No.19-0098-W

Simulation of Test Drives by Using Police-Recorded Accident Data and Combining Macroscopic and Microscopic Elements
Pascal Pfitzner, Christian Erbsmehl
Fraunhofer Institute for Transportation and Infrastructure Systems, Germany

Paper No.19-0101-W

Harmonized Pre-Crash Scenarios for Reaching Global Vision Zero
Antonio Lara
Continental AG - Division Chassis & Safety, Mexico
Jeffrey Skvarce
Continental AG - Division Chassis & Safety, United States
Harald Feifel, Michael Wagner
Continental AG - Division Chassis & Safety, Germany
Toshihisa Tengeiji
Continental AG - Division Chassis & Safety, Japan

Paper No.19-0104-W

An Analysis of Factors Driving the Increases in Traffic Fatalities in the United States
Rebecca Spicer, George Bahouth, Amirfarrokh Iranitalab, Jing Chen
Impact Research, LLC, United States
Kristin Kingsley, Robert Strassburger
Alliance of Automobile Manufacturers, Inc., United States

Paper No.19-0147-W

Automatic Identification of Critical Scenarios in a Public Dataset of 6000 Km of Public-Road Driving
Jan-Pieter Paardekooper, Sjef van Montfort, Jeroen Manders, Jorrit Goos, Erwin de Gelder, Olaf Op den Camp
TNO - Integrated Vehicle Safety, Netherlands
Annie Bracquemond, Gildas Thiolon
Vedecom, France

Paper No.19-0269-W

Changes in Crash Protection with Vehicle Model Year
Kennerly Digges
Automotive Safety Research Institute, United States
George Bahouth, Amin Vahabaghaie
Impact Research, LLC, United States

Paper No.19-0293-W

Analysis of Severe Injury in Car to Car Accidents to Improve Crash Test Protocols in KNCAP
Siwoo Kim
Korea Automotive Testing & Research Institute (KATRI), Korea, Republic of
Yohan Park, Seoungki Kim
Samsung Traffic Safety Research Institute, Korea, Republic of
**Social Program**

**WELCOME RECEPTION**

*Date:* Monday, June 10th, 17:30 – 19:30  
*Place:* Restaurant of the Evoluon

Fee: Included in the registration fee  
(pre-registration is mandatory)

RDW is pleased to invite you to attend the Welcome reception after the final special session of the first conference day. You will find ample opportunity to meet old friends, make new acquaintances and share your first impressions of the 2019 ESV! The Reception will take place at the Restaurant of the Evoluon. The Welcome reception includes a mingle plate with a variety of bites and drinks.

**CONFERENCE DINNER**

*Date:* Wednesday, June 12th, from 18:00

*Place:* DAF Museum  
Tongelresestraat 27, 5613 DA Eindhoven

*Time:*  
18:00 – 19:00 Drinks and bites  
Opportunity to discover the museum at your own pace. Various guides will be at your service to tell you about the variety of museum pieces and DAF’s history.

19:30 – 23:00 Word of welcome by the CEO of RDW, Ab van Ravestein, followed by a lovely three course dinner *

Fee: €74,69 excluding VAT  
(pre-registration is mandatory)

Website: [http://www.dafmuseum.nl/en/](http://www.dafmuseum.nl/en/)
The ESV2019 Conference Dinner will take place at a unique venue: the DAF Museum.

DAF's history goes back to 1928, when the brothers Hub and Wim van Doorne laid the foundations for what has now become DAF Trucks. What started as a small engineering business and blacksmith workshop, developed into the fastest growing truck manufacturing business in Europe. A tour of the DAF Museum will take visitors from one surprise to the next. The inventiveness that has been characteristic to DAF vehicles from 1928 through present day will even captivate visitors who have no knowledge of the subject.

The evening includes a 3 course dinner* including beverages, and an atmospheric musical setting.

*) Please note that any dietary requirements or allergies must be specified upfront (during the online registration) to allow us to compose a customized menu which meets your wishes.

Fieldtrips

Fieldtrip A: TNO/TASS – Simulation as a tool for real-world high-risk traffic situations

‘Safety of Connected Automated Mobility’ Simulation has been used for development of safe vehicles for many years. Future automated technology leans heavily on the results of these simulations. In order to make those simulations useful, new methods are necessary to feed real-world relevant simulation cases into virtual environments for testing vehicle(models). TNO and her partners develops and operates different tools that separately or combined offer unique possibilities for these purposes. The technical visit provides a demonstration of the Facilities on the Automotive Campus from TNO, Siemens/Tass, InnovatieCentrale: vehicles, tools and insight into recent results of projects related to applications and methodologies for Connected and Automated Driving (C-AD).

The program consists of a plenary program (safety developments on the Automotive Campus) and four parallel tracks, covering the following topics:

- Streetwise and Prescan: scenario based methodologies and tooling for validation of C-AD applications
- HIL-Facilities for multi-vehicle-interaction and demonstrations, as well as the streetproof safety monitoring approach
- Driving simulator and VeHIL facility with realistic simulations of a true vehicle in a simulated environment
- A visit to the Traffic Control and Traffic Innovation Center as well as a demonstration of the tool Urban Strategy to see how integrated safety strategies can be embedded in a safe system approach.

https://www.tno.nl/en/focus-areas/traffic-transport/
www.tno.nl/ivs
https://innovatiecentrale.nl/en
https://tass.plm.automation.siemens.com/
Fieldtrip B: TU Delft – Human Behavior and the effects on safety

On road safety depends on multiple factors, one of them being the interaction with humans: they are either inside the vehicles occupying the road or are involved as bikers or pedestrians. Because of the large number of people that use roads every day, it is important to develop new technologies that keep these people safe. For this reason both behaviour of the driver and behaviour of others around the vehicles are subject of research at the Delft University of Technology. Prof. dr. Bart van Arem, professor Transport Modelling at Delft University of Technology will give an exclusive presentation about Delft and the technological research programs in The Netherlands. He will further introduce the activities for the remaining part of the day. The aim is to provide you with useful knowledge for future safety considerations in policy, development and other areas.

Dr. ir. Winnie Daamen, associate professor in the chair of Traffic Operations and Management of the Department of Transport & Planning, will give you a one-of-a-kind insight to the research department of Delft. Furthermore, Dr. ir Riender Happee will let you experience first-hand what it is like to actually participate in one of the experiments at the TU Delft. Lastly, ir. Olaf Stroosma and his team at the SIMONA Research Simulator will demonstrate their 6-axle “flight” simulator, that is also used to simulate ground-based vehicles. This is a very intriguing tool, as not all experiments can be performed as easily in real life. [http://cs.lr.tudelft.nl/simona/](http://cs.lr.tudelft.nl/simona/)


Initiated by the desire for more environmental friendly transport, the internal combustion engine is getting serious competition from alternative powertrain concepts. Electric powertrains are the best alternative in the near future. The new department ETS (Enabling Transport Solutions [www.vdlets.nl](http://www.vdlets.nl)) of the company VDL in Valkenswaard develops heavy duty e-mobility solutions for public transport solutions and e-trucks with high power battery-charging and hydrogen fuel-cell technology. The scheduled trips of public transport bus operators and transport companies offer good possibilities to balance energy capacity and charging power.

You will be invited to the production and development department of VDL in Valkenswaard. The visit has a focus on the electric busses that are currently developed for customers. In a 45 minute presentation VDL development engineers will explain the design decisions for the high voltage systems in the vehicles and charging stations from a safety perspective. In the other 45 minutes session you will have a detailed demonstration of three applications with different charging systems, including the hydrogen fuel cell technology. We aim on maximum of 30 participants per group (3x10 for the demonstration) in order to have interactive sessions.

VDL ETS is part of VDL Groep, an international industrial family business headquartered in Eindhoven, The Netherlands, with over 100 operating companies, spread throughout 20 countries, with more than 17,000 employees. The VDL companies break down into four divisions: Subcontracting, Car Assembly, Buses and Coaches and Finished products.
26th ESV 19
NETHERLANDS

FLOORPLAN
EXHIBITION HALL B

1. Siemens PLM Software
2. NHTSA
3. Humanetics
4. Food & Drinks
5. Student Competition 1
6. Student Competition 2
7. Student Competition 3
8. Diversified Technical Systems (DTS)
9. Elemance
10. crashtest-service.com
11. Toyota
12. Additium
13. carhs.training
14. American Chemistry Council
15. Student Competition 4
16. Student Competition 5
17. Applus IDIADA
18. Connekt

DOME
Autoliv Inc.

Our road to Saving More Lives starts with our relentless innovation in vehicle safety technologies in combination with deep insight of traffic situations, human behavior and human-to-machine interaction. We research, develop and engineer solutions with a mindset to better understand real life accidents as well as new risks associated with a world of autonomous driving.

Autoliv is an industry pioneer in occupant protection with 65 years of experience, passive safety technologies are our heritage and the foundation for Autoliv’s strong position in Real Life Vehicle Safety. We have pioneered innovation and incrementally innovate our portfolio to improve protection of the car occupant in todays and tomorrows vehicles. Future cars require new safety solutions. To develop safety solutions that work in real life situations, this is what Autoliv does.

https://www.autoliv.com/

ZF Friedrichshafen AG

ZF is a global technology company and supplies systems for passenger cars, commercial vehicles and industrial technology, enabling the next generation of mobility. With its comprehensive technology portfolio, the company offers integrated solutions for established vehicle manufacturers, mobility providers and start-up companies in the fields of transportation and mobility. ZF continually enhances its systems in the areas of digital connectivity and automation in order to allow vehicles to see, think and act. In 2018, ZF achieved sales of €36.9 billion. The company has a global workforce of 149,000 with approximately 230 locations in 40 countries.

www.zf.com

Global NCAP, Euro NCAP, ANCAP SAFETY & IIHS

The New Car Assessment Programmes promote vehicle safety standards worldwide and aim for a world free from road fatalities and serious injuries. Global NCAP is a project of the Towards Zero Foundation, a UK registered independent charity. Established in 2011 Global NCAP serves as a platform for cooperation worldwide between new car assessment programmes and supports their development in emerging markets by providing financial and technical support. Global also promotes the universal adoption of the United Nation’s most important motor vehicle safety standards.

Euro NCAP has been assessing and comparing the safety of vehicles since 1997 and created the 5-star safety rating system to help consumers identify the safest choice for their needs. Based in Belgium, this independent consortium continuously adapts its test protocols to include the latest safety features.

ANCAP SAFETY is Australasia’s leading independent vehicle safety authority. Since its establishment in 1992, ANCAP has published safety ratings for thousands of vehicle makes and models sold in Australia and New Zealand.

IIHS is an independent, nonprofit scientific and educational organization dedicated to reducing the losses — deaths, injuries and property damage — from vehicle crashes. Established in 1959 and wholly supported by auto insurers and insurance associations, the Institute has been testing vehicles for consumer information since 1995.

https://www.euroncap.com
http://www.globalncap.org/
https://www.iihs.org/
Daimler AG

Daimler AG is one of the world’s most successful automotive companies. The founders, Gottlieb Daimler and Carl Benz, made history with the invention of the automobile in the year 1886. As a pioneer of automotive engineering, it is a motivation and commitment of Daimler to shape safely and sustainably the future of mobility. Its current brand portfolio includes Mercedes-Benz, Mercedes-AMG, Mercedes-Maybach and Mercedes me, the brands smart, EQ, Freightliner, Western Star, BharatBenz, FUSO, Setra and Thomas Built Buses, and Daimler Financial Services’ brands: Mercedes-Benz Bank, Mercedes-Benz Financial Services and Daimler Truck Financial.

Cellbond

Cellbond is an innovative provider of passive safety testing products and equipment within the automotive sector. Cellbond specialise in certified deformable barriers and ATDs. Over the past thirty years we have grown from being early pioneers in the design and manufacture of engineered composite structures to become global leaders in the development and manufacture of deformable barriers, energy absorbers, leg and head forms, crash test dummies and spare parts, testing and test equipment. In 2017, Cellbond was awarded the Queens Award for Enterprise: International Trade. www.cellbond.com

Honda

Honda dreams of a collision-free mobile society where our customers, and everyone sharing the road, can safely and confidently enjoy the freedom of mobility. At Honda, improving safety performance has always been our top priority in product development. We focus on real-world understanding crashes, then using data analysis and other methods to find answers to the toughest safety problems. Aiming ever higher, we strive to develop the world’s most advanced safety technologies. Our Concept is “Caring Safety Technology”. The exhibits are “Omni-directional airbags”, ”Pedestrian motion control airbags” and “Personalized Driver Augmentation simulator”. https://global.honda/

UTAC CERAM

This year UTAC CERAM has launch TEQMO, a new technology center dedicated to automated driving and vehicle connectivity. It features 12 km new test tracks organised in 3 areas (city area, highway and dynamic platform). I invite you to discover TEQMO on our website. https://www.utacceram.com/teqmo

DADSS

The Driver Alcohol Detection System for Safety (DADSS) Program is developing a first-of-its-kind technology that can passively detect when a driver is under the influence of alcohol and prevent the vehicle from moving. The technology can be programmed for any BAC limit up to 0.08%. The DADSS Program brings together the world’s leading automakers and the U.S. federal government in one of the most important public–private partnerships in recent years. Such partnerships have led to GPS, the microchip and wifi. www.dadss.org

Exhibition Hall B

Siemens PLM Software

Siemens Digital Industries Software offers a closed loop model-based engineering process and toolchain for the development, testing and validation of passive and active safety systems. Our physical testing services, engineering and simulation software solutions provide an integrated methodology and framework to realize the development of occupant and vehicle safety.

Siemens Digital Industries Software, a business unit of Siemens Digital Factory Division, is a leading global provider of software, systems and services in the areas of managing the product lifecycle (PLM, Product Lifecycle Management) and management of industrial operations, with over 15 million licenses sold and 140 000 customers worldwide. www.tassinternational.com
NHTSA

The United States Department of Transportation, National Highway Traffic Safety Administration Vehicle Safety efforts are conducted through four interconnected offices, Rulemaking, Enforcement, Vehicle Safety Research and National Center for Statistics and Analysis that work together to make the vehicles on our Nation’s roadways safer. The Enhanced Safety of Vehicles (ESV) program partners with ESV member countries to provide a unique and invaluable forum to the global community to share innovative advances in motor vehicle safety. Attendees include members of governments, automobile manufacturers and their suppliers, safety researchers and other motor vehicle safety professionals, medical, insurance, legal and policy professionals, consumers, academia, students and international media.

https://www.nhtsa.gov/

Humanetics

Humanetics is the world’s leading supplier in the design and manufacture of sophisticated crash test dummies, associated test equipment and laboratory services, development of Finite Element (FE) software dummy models for virtual crash test simulations, and specializes in development, manufacture, and integration of a comprehensive array of sensors and Data Acquisition Systems (DAS). Since 2018 Humanetics has new active safety products including UFO and driving robot.

Diversified Technical Systems (DTS)

Diversified Technical Systems (DTS) is a leading manufacturer of data acquisition systems and sensors designed specifically for automotive passive safety and component testing, including crash, blast, rollover, road load, dummy calibration, airbag inflation and pedestrian safety testing. DTS offers complete integrated DAS and sensor solutions for the FLEX PLI Legform, Free Motion Headform, Pedestrian Headform, as well as the complete family of crash ATDs including THOR, WorldSID and Q dummies. DTS is known for miniature, rugged, high-speed measurement solutions, all backed by exceptional worldwide technical support.

www.dtsweb.com

Elemance

Elemance strives to provide truly human-centered design solutions to enhance the protection and quality of life. Established in 2014, Elemance is the sole distributor of the complete family of Global Human Body Model Consortium (GHBMC) finite element (FE) human body models, encompassing variations in stature, posture, and complexity. The virtual human body model is a FE computational model of the human body designed to replicate its biomechanics and kinematics for a wide range of industry applications. These models are ideal for automobile crash simulations. Our models also meet the current standards for use in EuroNCAP Pedestrian Human Model Certification.

crashtest-service.com

Biofidelic crash test dummy

The new cost-effective dummy – exclusively available at CTS. In times of modern accident reconstruction, crash test dummies are frequently used in crash tests. In the case of a precise reconstruction of motion sequences, damages or injuries, the Biofidelic crash test dummy should be used in the future. These Biofidelic crash test dummies are constantly being developed in cooperation with the HTW Dresden and the TU Berlin under the supervision of Prof. Dr. Lars Hannawald, Dr. Michael Weyde and Prof. Dr. Florian Kramer and are produced according to the latest state of the art technology in a specially designed dummy laboratory at CTS.
Applus IDIADA

Applus IDIADA provides test and engineering services for complete vehicle development. Its expert team has a global understanding of both legal and consumer requirements enabling the definition of complete safety development programs for worldwide markets. Recently, IDIADA has reinforced its presence in the USA with the acquisition of KARCO in California, an accredited NHTSA test site, allowing the company to be the bridge between testing both in Europe and the USA. IDIADA is a global partner to the automotive industry, supporting its clients in product development activities by providing design, engineering, testing and type-approval services. IDIADA's success in product development is built on a unique blend of highly experienced and motivated engineers, state-of-the-art facilities, client focus and the constant drive towards innovation. The company has more than 2,500 professionals and an international network of subsidiaries and branch offices in 24 countries, ensuring its clients get customized, added-value solutions.

Toyota

Toyota has released Version 6 of the Total Human Model for Safety (THUMS) virtual human body model. Researched and developed for over 20 years, THUMS simulates human body injuries caused by vehicle collisions. The new version features internal organ modelling and a new muscle model that simulates a variety of occupant postures, including braced and relaxed, permitting a more detailed analysis by anticipating various occupant postures as the widespread deployment of automated vehicles continues to advance. It is expected that THUMS Version 6 will be used in research and development of safety technologies that help protect occupants in a variety of different conditions.

Additium

ADDITIUM is a high technology engineering company formed by professionals with more than 20 years of direct experience on the design, supply and support of custom made Test Systems. ADDITIUM provides turn-key “Active and Passive Safety Testing equipments” with unique innovations that improve the efficiency of testing labs: Full Scale Crash Test Facilities (new nano-trolley), Electrical Launchers for Pedestrian and interior impact test (new family, based on linear motors), Electrical SBA (with new synthetic fiber chains), Electrical HRP, Crash simulation Sleds, RCSI, etc... which are fulfilling all the international passive safety Regulations as well as internal R&D requirements.

carhs.training

Empowering Engineers
Carhs.training offers comprehensive training programs to the worldwide automotive development community. The programs encompass standardised courses, custom in-house seminars and complete educational programs, along with symposia and conferences connecting international experts. Our programs cover the critical aspects of today’s automotive functional development: all aspects of safety, light weighting, autonomous driving and connected vehicles. Our web portal safetywissen.com has set a new standard for the accessibility of worldwide automotive safety regulations and test protocols. Furthermore it offers a wealth of intelligible summaries and infographics for the safety engineer. safetywissen.com is used by engineers worldwide; customised versions have been deployed by the leading OEM’s for innovative knowledge management and communication.
American Chemistry Council

ACC’s www.AutomotivePlastics.com Team are leading auto resin manufacturers. We provide innovative solutions enabling Autonomous, Connected, Electric, & Shared vehicles to enhance safety, improve vehicle performance & reduce weight. ACC engages safety & technical experts, decision makers, and industry thought leaders to inform its industry Materials Roadmap, a trusted resource for the auto industry and NHTSA & DOE for the last 20 years. Join us Tuesday, June 11th from 12:30-14:30 in the Saturn Room to provide valuable input for the 2020 materials & safety roadmap. Help identify actions needed for enhanced mobility safety, environmental sustainability & economic viability. Lunch will be served.

Smart Mobility Embassy

The world’s gateway to smart mobility in the Netherlands. The Netherlands is an advanced society with a successful economy and a highly complex transport infrastructure. It offers an optimized environment for the research, testing and deployment of the transformative mobility technologies that will define the future of mobility. The Smart Mobility Embassy acts as the source of knowledge, innovation, best practices and deployment options for Smart Mobility across the Netherlands. We can locate you to the right contact point and we invite you to share your smart mobility knowledge and experiences with our extensive network of smart mobility experts. (only present on Wednesday)

Venue

Evoluon Eindhoven
Noord Brabantlaan 1a
5652 LA Eindhoven
The Netherlands

ESV2019 will be held in Eindhoven, The Netherlands. The Netherlands and Eindhoven have a long tradition of safety research and development for cars, trucks and roads. This has resulted in them enjoying world-leading status within the area of vehicle and traffic safety. Eindhoven, known in the Netherlands as the ‘city of lights’, is easily accessible from around Europe. Getting around in Eindhoven is also easy and the meeting venue is centrally located within comfortable walking distance of hotels and restaurants.