



Fraunhofer
ICT

Fraunhofer Institute for
Chemical Technology ICT

Program

Airbag 2022

**15th International Symposium and Exhibition
on Sophisticated Car Safety Systems**

November 28-30, 2022

**Convention Center »Rosengarten«,
Mannheim, Germany**

**air²⁰²²
bag**

15th International Symposium on Sophisticated Car Safety Systems

Even with the current dynamic transformation of the automotive industry towards more efficient and sustainable mobility, ensuring the safety of all road users remains the highest priority overall. Within this field, information is the key enabler to innovation and cutting-edge technology to maintain and improve road safety.

Airbag 2022 will once again be the venue for engineers, scientists, legislators, managers and marketing experts to exchange information, to make new contacts and to revive old ones, to stimulate further progress and to promote integral safety for road users on an impartial platform.

The Fraunhofer Institute for Chemical Technology ICT is an independent research and development facility for airbag technologies, testing and simulation. As a division of Fraunhofer, Europe's largest organization for applied and contract research, Fraunhofer ICT offers a unique event for the automobile industry, suppliers and public authorities.

Welcome to Mannheim, Germany and to Airbag 2022.

Dr. Bernd Hefer
Chairman of the Symposium



Program Committee

Pedro Almeida
Volkswagen AG

Dr. Lars-Fredrik Berg
Fraunhofer ICT

Michael Fehring
Mercedes-Benz AG

Alexander Gulde
Autoliv B.V. & Co. KG

Stefan Liepold
AUDI AG

Adam McNeill
BMW AG

Dr. Jochen Neutz
Joyson Safety
Systems GmbH

Bardo Peters
Continental
Automotive GmbH

Georg Schneider
Robert Bosch GmbH

Dirk Schultz
ZF Friedrichshafen AG

Hans Spies
Ingenieurbüro Spies

Dr. Karl-Friedrich Ziegahn
Karlsruhe Institute
of Technology KIT

Chairman of the Symposium

Dr. Bernd Hefer
Fraunhofer ICT

Exhibitors

(registered up to publishing date)



ACS Industries

Lincoln, Rhode Island, USA

Alt Technologies BV

Utrecht, NL

ARC Automotive Inc.

Knoxville, USA

Astotec Automotive GmbH

Hirtenberg, A

Autoliv B.V. & Co. KG

Stockholm, SE

Continental Automotive GmbH

Regensburg, D

Daicel Safety Systems

Zarow, P

Dow Silicones Belgium

Seneffe, B

Dürkopp Adler GmbH

Bielefeld, D

Electrovac AG

Salzweg, D

Elkem Silicones

France SAS

Saint Fons, F

Fraunhofer ICT

Pfinztal, D

Gesellschaft für Umweltsimulation e.V.

Pfinztal, D

GFU-Maschinenbau GmbH

Bitburg, D

Global Safety Textiles GmbH

Bad Säckingen, D

Hyundai Mobis

Seoul, ROK

Italdesign

Moncalieri, IT

**Joyson Safety Systems
Aschaffenburg GmbH**

Aschaffenburg, D

**Kayaku Safety Systems
Europe**

Vsetin, CZ

KSL**Pfaff Industriesysteme
und Maschinen GmbH**

Bensheim, D

Mercedes-Benz AG

Sindelfingen, D

newgentechs

Valladolid, E

PFAFF INDUSTRIAL**Pfaff Industriesysteme
und Maschinen GmbH**

Kaiserslautern, D

Rhodius GmbH

Weissenburg, D

Robert Bosch GmbH

Stuttgart, D

SCHOTT AG

Mainz, D

**Yanfeng Automotive
Safety Systems Co., Ltd.**

Mörfelden-Walldorf, D

Zenna Lasersolutions

Enschede, NL

ZF Friedrichshafen AG

Friedrichshafen, D

General Information

Registration

- Register online: **www.ict.fraunhofer.de/airbag2022**
- You will receive an **invoice**
- Registration fee (incl. proceedings, coffee breaks, lunch, evening receptions): **€ 1.150,--**
- Participation cannot be guaranteed for registrations arriving after November 18, 2022. A fee of € 500,-- will be charged for cancellations after November 19, 2022. No-shows will be charged the complete fee.

Accommodation

- www.ict.fraunhofer.de/airbag2022accommodation

Conference Office

- is located in the foyer of the Conference hall and may be reached from November 28 to November 30 by Phone +49 (0)621-4106-5030

Check in / Welcome Reception

- Please check in at the conference office on **Monday, November 28, between 13.00 and 20.00 h.**
- All participants are cordially invited to the **Welcome Reception** in the foyer of the conference hall on **Monday, November 28, 18.00 – 21.00 h.**

Conference Language

- English, German – **simultaneous interpretation**

Proceedings

- one copy of the proceedings is **included** in the registration fee. Additional copies € 100,--

COVID-19 Policy

- In accordance with the applicable regulations in November
- Information will be updated online:
www.ict.fraunhofer.de/airbag2022



Monday, November 28

Workshop 1 (in GERMAN)

13.30 – 18.00 Workshop »Retten ohne Risiko!« für
Rettungskräfte mit »Airbag-Update«,
Einsatzberichten und Erfahrungsaustausch

POC: Rolf.Erbe@berliner-feuerwehr.de
Teilnahmegebühr: EURO 120,--

Frei für Teilnehmer des airbag-Symposiums.
Begrenzte Teilnehmerzahl, Anmeldung
formlos an manuela.wolff@ict.fraunhofer.de
mit Angabe der Rechnungsadresse.

Workshop 2 (in GERMAN)

13.30 – 17.30 Expertenmeeting »Berliner Erklärung zur
Fahrzeugsicherheit« des VDI:
Straßenverkehrssicherheit 2030 – Wie bringen
sich die Experten der »Berliner Erklärung« ziel-
gerichtet in den »Pakt für Verkehrssicherheit«
des Bundes ein?

Programm und Anmeldung unter
<https://www.vdi-wissensforum.de/01ST400>

Welcome Reception

18.00 – 21.00 Welcome Reception for all participants
(Symposium, Workshops, Exhibition)

Tuesday, November 29

- 08.00 **WELCOME AND OPENING**
B. Hefer
Fraunhofer ICT, Pfinztal, D
- 08.10 **V1 KEYNOTE**
INTERIOR OF THE FUTURE
T. Bachorski, B. Grell, C. Noulette
Volkswagen AG, Wolfsburg, D
- 08.40 **V2 ACTIVE SAFETY SYSTEMS IN THE FIELD**
(RESULTS OF ACCIDENT EVALUATIONS)
H. Steffan
TU Graz, A

1st Session **GLOBAL CHALLENGES AND REQUIREMENTS**
Session Responsible: M. Fehring
Mercedes-Benz AG, Sindelfingen, D

- 09.00 **V3 STRATEGY AND ROADMAP OF EURO NCAP**
M. van Ratingen
Euro NCAP, Leuven, B
- 09.25 **V4 IIHS FUTURE ROADMAP**
J. Jermakian
IIHS, Arlington, USA
- 09.50 **V5 PERFORMANCE DESIGN, DEVELOPMENT AND VERIFICATION OF HONEYCOMB ALUMINUM BARRIER FOR VEHICLE SIDE IMPACT**
Z. Haitao, Y. Jialin, D. Bingxu, Z. Yunlong
CATARC, Tianjin, PRC

10.15 V6 NHTSA'S CRASHWORTHINESS ROADMAP
S. Summers
NHTSA, Washington, USA

10.40 Coffee Break

11.10 POSTER SESSION
Session Responsibles:
H. Spies, Ingenieurbüro Spies, Hohenwart, D
K.-F. Ziegahn, Karlsruhe Institute for
Technology KIT, D

12.00 Lunch Break

2nd Session SYSTEM CHALLENGES AND ANSWERS
Session Responsible: D. Schultz
ZF Friedrichshafen AG, Alfdorf, D

13.20 V7 THE NEW IIHS SIDE BARRIER IMPACT –
THE NEXT CHALLENGE IN SIDE IMPACT
PROTECTION
K. Hallbauer, I. Kalliske, A. Riedel
Joyson Safety Systems, Berlin/Ulm, D

13.45 V8 IMPROVEMENT OF SAFETY IN DEEP
OBLIQUE CRASH
H. Takeshita, S. Okada, T. Hiruta
Mazda Motor Corporation, Hiroshima, JAP

14.10 V9 LARGE TRUCK OCCUPANT INJURIES
IN ROLLOVER CRASHES
A. Ranmal, J. Shaikh
Autoliv India, Bengaluru, IND
N. Lubbe
Autoliv Development, Vargarda, SE

3rd Session

TOOLS AND METHODS

Session Responsible: J. Neutz

Joyson Safety Systems, Aschaffenburg, D

- 14.35 **V10 HyDRA®: PHYSICAL & VIRTUAL
DYNAMIC TEST-BENCH TO APPROACH
INTEGRATED SAFETY**
K.-U. Machens, L. Kübler
ZF Friedrichshafen AG, Friedrichshafen, D
- 15.00 **V11 OPEN TOOL FOR AIRBAG FOLDING WITH
APPLICATION IN VARIATION OF FOLDING
PROCESSES**
L. Aschenbrenner, S. Laue
Volkswagen AG, Wolfsburg, D
- 15.25 **V12 BURN RATE DETERMINATION OF
ARTIFICIALLY AGED GAS GENERATOR
PROPELLANTS AND CONSEQUENCES
FOR AIRBAG FUNCTION**
S. Wurster, M. Heil, T. Burgert,
V. Kuchenreuther-Hummel, L.F. Berg
Fraunhofer ICT, Pfinztal, D
- 15.50 **V13 ARTIFICIAL INTELLIGENCE AND
MACHINE LEARNING ALGORITHM
APPLIED TO AIRBAG DEPLOYMENT
ANALYSIS**
D. Casini, N. Vinci
Italdesign S.p.A., Torino, I
- 16.15 **Coffee Break**

4th Session

COMPONENT TECHNOLOGIES

Session Responsible: A. Gulde
Autoliv, Dachau, D

- 16.45 **V14 EXPERIMENTAL STUDY AND MODELING OF IGNITION OF AIRBAG GAS GENERATOR PROPELLANT**
I. Masquelier, N. Daviot
Autoliv Livbag, Pont de Buis, F
- 17.10 **V15 INFLUENCE OF THE TEMPERATURE ON THE DYNAMIC MECHANICAL PROPERTIES AND LEAKAGE PROPERTIES OF AIRBAG FABRICS**
H. Dörnhoff
Volkswagen AG, Wolfsburg, D
A. Regidor, D. Munoz, A. Camarero
newgentechns, Valladolid, E
- 17.35 **V16 SUMMARY OF AN APPROACH FOR THE ESTIMATION OF INFLATOR SAFE SERVICE LIFE**
B. Schubert
Takata, Auburn Hills, USA
- 18.00 **Poster Awards and Airbag Award**
- 18.20 **Evening Reception in the foyer of the Conference Hall with entertainment by "Balanced Action" (four accomplished saxophonists from the Baden Conservatory play "Cocktail Jazz")**
- 21.30 **End of Day 1**

Wednesday, November 30

5th Session **SIGNAL PROCESSING AND ALGORITHMS I**

Session Responsible: B. Peters

Continental Automotive AG, Regensburg, D

09.00 V17 **AUTONOMOUS VEHICLE HANDLING TO
AVOID OR MITIGATE A CRASH AROUND
THE VEHICLE**

H. Spies

Ingenieurbüro Spies, Hohenwart, D

09.25 V18 **AUTOMATED FRONT COLLISION
AVOIDANCE: A SYSTEM DEVELOPMENT
APPROACH FOR AUTOMATED
EMERGENCY STEERING**

L. Hofmann, G. Baroda Sudhakaran,
P. Nadarajan

ZF Friedrichshafen AG, Friedrichshafen, D

C. Reustle, A. Vater

ZF Mobility Solutions GmbH, Ingolstadt, D

6th Session **SIGNAL PROCESSING AND ALGORITHMS II**

Session Responsible: P. Almeida

Volkswagen AG, Wolfsburg, D

09.50 V19 **IN-CABIN SENSING – ADVANCED DRIVER
DISTRACTION AND OCCUPANT SAFETY
SOLUTIONS**

H. Abel, H.-G. Grundmann

Continental AG, Babenhausen, D

A. Forster, L. Weisgerber, M. Schühler

Continental AG, Regensburg, D

- 10.15 V20 PREPARATION OF AN AI BASED REAL-TIME
INJURY RISK INDEX ESTIMATION
BY DERIVING VRU BEHAVIOR FROM
VIDEO-DOCUMENTED CRASHES
T. Lich, J. Mönnich, D. Schmidt, M. Voss
Robert Bosch GmbH, Stuttgart, D

10.40 Coffee Break

7th Session**ENHANCED RESTRAINT SYSTEMS**

Session Responsible: S. Liepold
AUDI AG, Ingolstadt, D

- 11.10 V21 SPLIT TETHER TO POSITION THE DRIVER'S
AIRBAG BETWEEN THE STEERING WHEEL
AND THE DRIVER'S BODY
Y. Miyajima, T. Hiruta
Mazda Motor Corporation, Hiroshima, JAP
K. Koshikawa, M. Ogawa
Joyson Safety Systems Japan, Tokyo, JAP
- 11.35 V22 PASSENGER AIRBAG PROTECTION FOR
NEXT GENERATION VEHICLES AND
INTERIORS OF THE FUTURE
A. Navarro, E. Core
ZF Group, Boecillo, E
C. Quian
ZF Group, Shanghai, PRC

- 12.00 V23 **SMART AIRBAG: AN INNOVATIVE ADAPTIVE AIRBAG CONSIDERING OUT-OF-POSITION (OOP) FOR RESTRAINT EFFECT OPTIMIZATION AND INJURY MITIGATION**
N. Shirur, C. Birkner
TH Ingolstadt, D
A. Forster
Continental AG, Regensburg, D
T.M. Deserno, R. Henze
TU Braunschweig, D

12.25 **Lunch Break**

8th Session **NEW CONCEPTS FOR FUTURE SAFETY**

Session Responsible: G. Schneider
Robert Bosch GmbH, Stuttgart, D

- 13.30 V24 **HOLISTIC OCCUPANT SAFETY CONCEPT FOR AUTOMATED DRIVING**
T. Polzin, T. Pausch, M. Yan, S. Hoefer,
L. Diwischek
Joyson Safety Systems, Berlin, D
- 13.55 V25 **SCRS SEAT CENTRIC RESTRAINT SYSTEM**
J. Unger, M. Schock
Autoliv, Dachau, D
C. Gailhard, L. Hellot
Autoliv France, Gournay en Bray, F
- 14.20 V26 **NEW OCCUPANT SAFETY CONCEPT FOR RECLINED SEATING POSITIONS DURING AUTOMATED DRIVING**
T. Pausch
Joyson Safety Systems, Berlin, D

9th Session**PASSIVE SAFETY ASPECTS OF AUTONOMOUS DRIVING / NEW APPLICATIONS**

Session Responsible: A. McNeill

BMW of North America, Woodcliff Lake, USA

- 14.45 **V27 AUTONOMOUS DRIVING – FUTURE AIRBAGS BECOME RELEVANT FOR USER EXPERIENCE (UX)**
G. Weller, N. Steinke, I. Kalliske
Joyson Safety Systems, Berlin, D
A. Huf, R. Bichler
BMW Group, München, D
- 15.10 **V28 PERFORMANCE AND COMFORT EVALUATION OF A NEW BAG-ON-BELT CONCEPT**
N. Vinci
Italdesign-Giugiaro S.p.A., Torino, I
E. Core, F. Blanca
ZF Group, Boecillo, E
A. Zocco
ZF Group, Grugliasco, I
- 15.35 **V29 AIRBAG INTEGRATION IN BICYCLE HELMET**
B. Pipkorn, H. Jan
Autoliv, Vargarda, SE
S. Gowda
Autoliv India, Bengaluru, IND
- 16.00 **Closing Remarks**

Poster Program

Posters will be presented in the **Foyer of the Conference Hall** during the Symposium. A special **POSTER SESSION** will be held on **Tuesday, November 29, 11.10 to 12.00 h.** During this time authors should be present for discussion at their posters.

P30 EVALUATION OF LONG-TERM TEMPERATURE MEASUREMENTS INSIDE VEHICLES

C. Jung

ZF Airbag Germany GmbH, Aschau am Inn, D

P31 WINDSCREEN RESILIENCE AGAINST AIRBAG IMPACT: IMPORTANT FACTOR FOR OCCUPANT SAFETY, BUT WIDELY UNKNOWN AND UNSPECIFIED

U. Kippelt, A. Maier, J Büttner

ZF PSS, Alfdorf, D

R. Mirones

TRW Spain, Boecillo, E

P32 OPTIMIZED PERFORMANCE OF AN ASPIRATED INFLATOR OWING TO MINOR NOZZLE MODIFICATION

N. Yurchenko, P. Vynogradskyy

Institute for Hydromechanics, Kiev, UKR

D. Breed

Automotive Technologies International Inc., USA

P33 THORACOABDOMINAL ORGAN INJURY INDEX OF FAR SIDE OCCUPANTS IN SIDE IMPACT

H. Ida, M. Aoki, M. Asaoka

Toyoda Gosei Co. Ltd., JAP

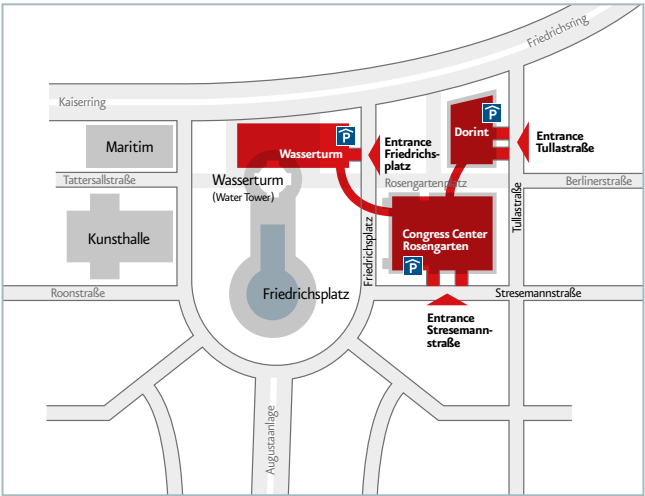
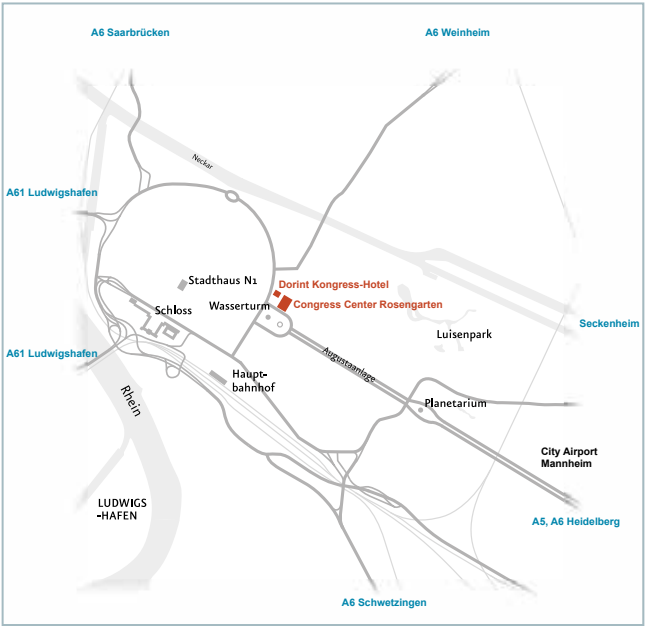
N. Zhang, O. Shiro

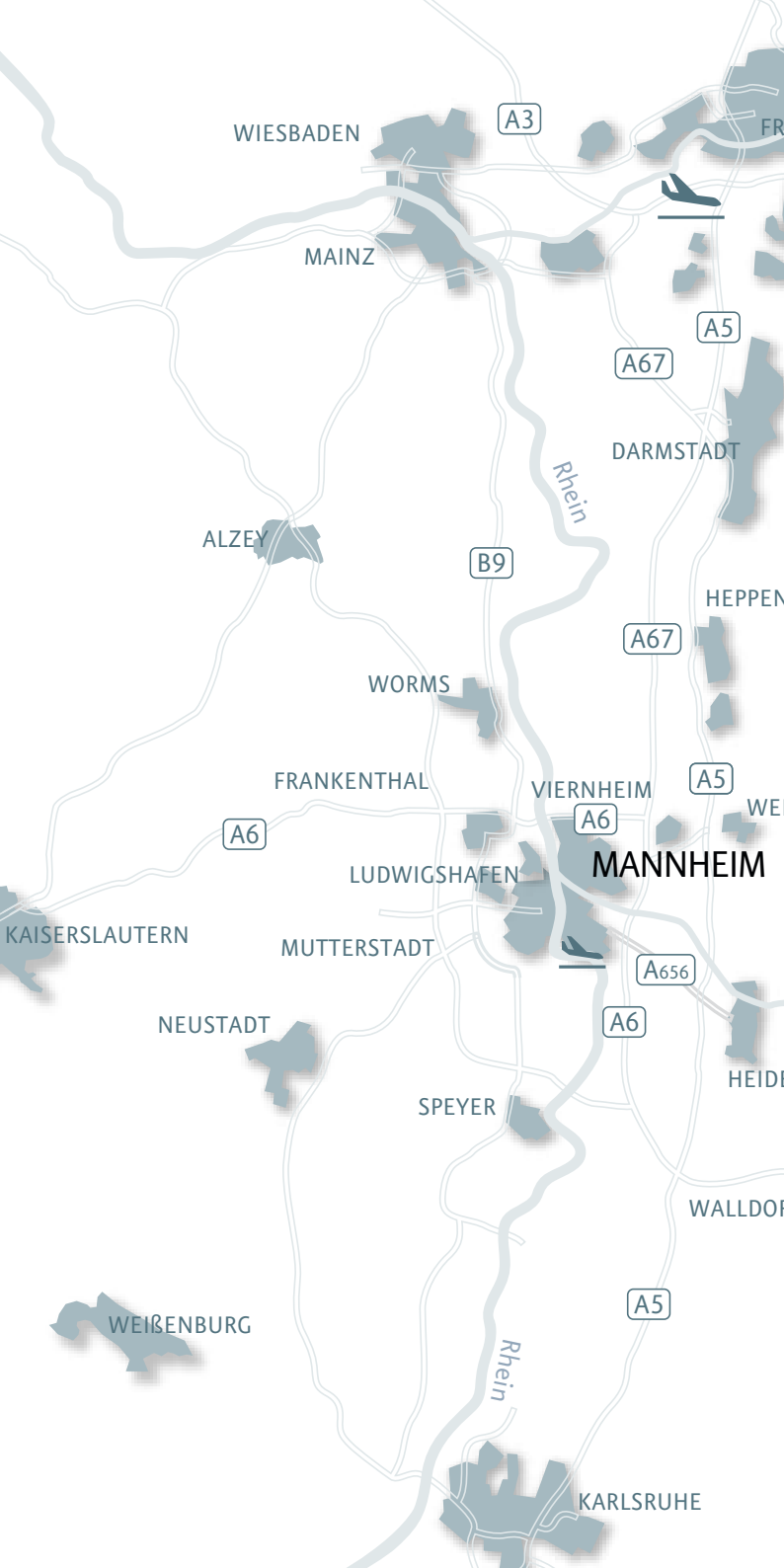
Toyoda Gosei North America Corp., USA

- P34 PILLOW AIRBAG FOR FULL-RECLINED
OCCUPANTS HEAD PROTECTION IN SIDE
COLLISION**
J. Song, J.S. Lee, D. Lee, K.S. Lee, B.Y. Kim, Y.-J. Son
Hyundai, Yongin-si Gyeonggi-do, ROK
- P35 DRIVER INJURY ANALYSIS CONSIDERING
FUTURISTIC STEERING SYSTEM**
S. Ko, M. Song, K. Lee, H. Lee
Hyundai Mobis, Yongin-si Gyeonggi-do, ROK
- P36 THE FRONTAL AND SIDE COLLISION PROTECTION
PERFORMANCE OF SEAT-MOUNTED OCCUPANT
RESTRAINT AIRBAGS**
S. Hwangbo, C. Lee, M. Song, J. Song, K.S. Lee,
B. Ko, B.Y. Kim, I.C. Sung
Hyundai, Yongin-si Gyeonggi-do, ROK
- P37 A STUDY OF PASSENGER BEHAVIOR CONTROL
PRE-SAFE SAB IN VEHICLE SIDE CRASH**
S. Lee, D. Jung, J. Song, K. Lee, R. Jang, B. Kim
Hyundai Mobis, Yongin-si Gyeonggi-do, ROK
- P38 A STUDY OF THE ROOF AIRBAG REGARD TO THE
FACE-TO-FACE SEATING POSTURE OF OCCUPANT
ON THE FRONTAL COLLISION**
B. Min, D.C. Jung, K.S. Lee, K.W. Seo, B.Y. Kim,
I.C. Sung
Hyundai, Yongin-si Gyeonggi-do, ROK
- P39 STRATEGY FOR DEVELOPING FACE-TO-FACE
SEATING AUTONOMOUS VEHICLE'S AIRBAGS:
TWO DIFFERENT APPROACHES**
G. Jeong, S. Hwangbo, K.S. Lee, K. Seo
Hyundai Mobis; Yongin-si Gyeonggi-do, ROK

- P40 A METHOD OF CONTROLLING AIRBAG SYSTEM
USING IN-CABIN MONITORING CAMERA**
W. Cho, B. Kim, C. Lee, J. Yoon, T. Park
Hyundai Mobis, Yongin-si Gyeonggi-do, ROK
- P41 A METHOD OF ESTIMATING PASSENGER
BEHAVIOR USING SIMPLE PASSENGER MODEL
AND IMU SENSOR SIGNALS**
C. Lee, S. Jeong, M. Ha, J. Kim, T. Park, R. Jang
Hyundai Mobis, Yongin-si Gyeonggi-do, ROK
- P42 AIRBAG COATING INNOVATIONS: TOWARDS
A SAFER AND MORE SUSTAINABLE FUTURE**
M. Rosenzweig, A. Kotnis, D. Ahn, T. Starke,
T. Tasaki, L. Ma
Dow Silicones Deutschland GmbH, Wiesbaden, D
- P43 SAVE LIVES & THE EARTH WITH NEW
GENERATION OF AIRBAG FABRICS AND
PRODUCTS**
D. Williamson, P. Gutzeit
Global Safety Textiles GmbH, Bad Säckingen, D
- P44 SUSTAINABLE SILICONE SOLUTIONS FOR
AIRBAGS**
M. Puillet, M. Slaviero
Elkem Silicones, Saint Fons, F
- P45 REDUCTION OF OSTWALD RIPENING WITH
LOW-COST SURFACE TREATMENT OF BASIC
COPPER NITRATE**
B. Schoster, C. Huff, G. Ramminger, R. Hart
The Shepherd Chemical Company, Norwood, USA
- P46 SRS LARGE ANIMAL DETECTION**
P. Nilsson, M. Björklund
Volvo Car Corp., Göteborg, SE

- P47 METHODOLOGY FOR AN ENHANCED AIRBAG
INFLATOR DEVELOPMENT PROCESS IN MOBILITY
SAFETY INDUSTRY**
L. Richter
Autoliv Livbag, Pont de Buis, F
- P48 YARN COUPLING IN FABRIC MODELING –
A NEW STEP TOWARDS PREDICTIVE AIRBAG
SIMULATION**
C. Goertz, M. Benhamadi, S. Horz
Autoliv, Dachau, D
S. Müller, J. Schlosser
ESI Germany GmbH, D
- P49 DEVELOPMENT OF A NOVEL HEAD
ANTHROPOMETRIC TEST DEVICE CAPABLE OF
INTRACRANIAL BRAIN MOTION MEASUREMENT**
Y. Miyazaki, H. Yamamoto, S. Awamori
Tokyo Institute of Technology, Tokyo, JAP
I. Amamori, K. Yoshii
Joyson Safety Systems, JAP





WIESBADEN

A3

FR

MAINZ



A5

A67

DARMSTADT

ALZEY

B9

Rhein

WORMS

A67

HEPPEN

FRANKENTHAL

VIERNHEIM

A5

WE

A6

LUDWIGSHAFEN

A6

MANNHEIM

KAISERSLAUTERN

MUTTERSTADT

A656

NEUSTADT

A6

HEID

SPEYER

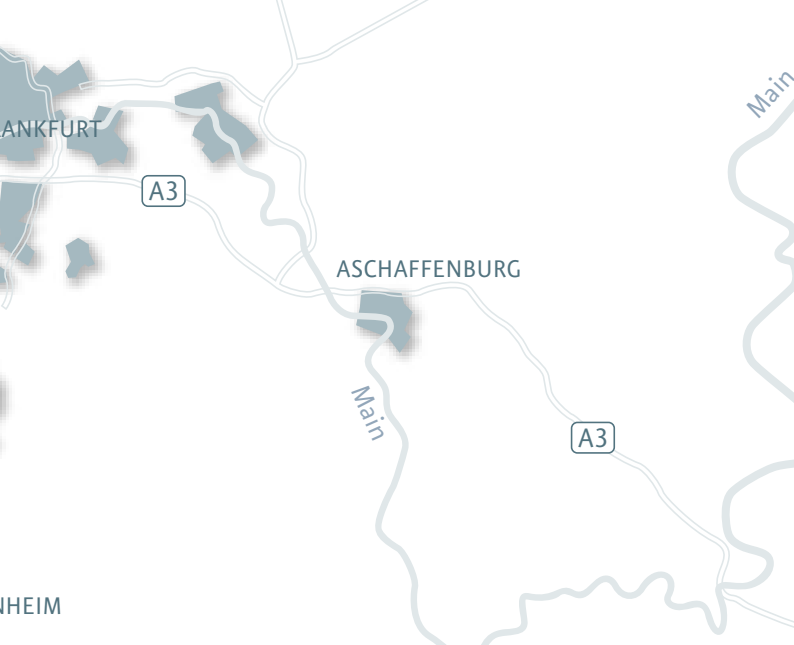
WALLDOF

WEIßENBURG

A5

Rhein

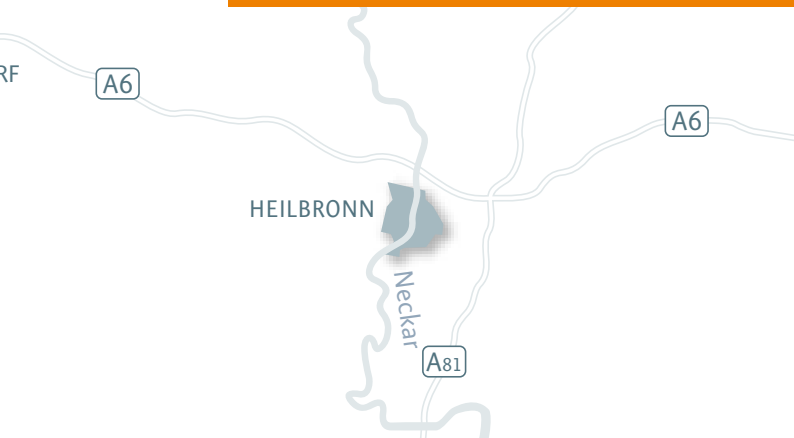
KARLSRUHE



Getting to the Congress Center Rosengarten Mannheim

Travelling by car: From the A6 or A5 at the Mannheim or Heidelberg motorway intersection, continue towards „Mannheim-Mitte“. You will reach the Rosengarten and the Dorint Congress Hotel via the Augustaanlage.

Travelling by train: Mannheim is an ICE/IC junction station. There is a direct ICE connection from Mannheim to Basel, Berlin, Cologne, Düsseldorf, Frankfurt am Main, Frankfurt am Main Airport, Freiburg, Hamburg, Munich, Paris, Stuttgart and many other cities. The Rosengarten is a five minute walk (walking towards the city centre) from the main railway station.



Conference Management

Manuela Wolff

Phone +49 721-4640-121

Fax +49 721-4640-120

manuela.wolff@ict.fraunhofer.de

Exhibition Management

Vera Keplinger

Phone +49 721-4640-511

Fax +49 721-4640-120

vera.keplinger@ict.fraunhofer.de

Fraunhofer Institute for Chemical Technology ICT

Joseph-von-Fraunhofer-Straße 7

76327 Pfinztal (Berghausen)

Germany

Phone +49 721-4640-0

Fax +49 721-4640-111

info@ict.fraunhofer.de

www.ict.fraunhofer.de

