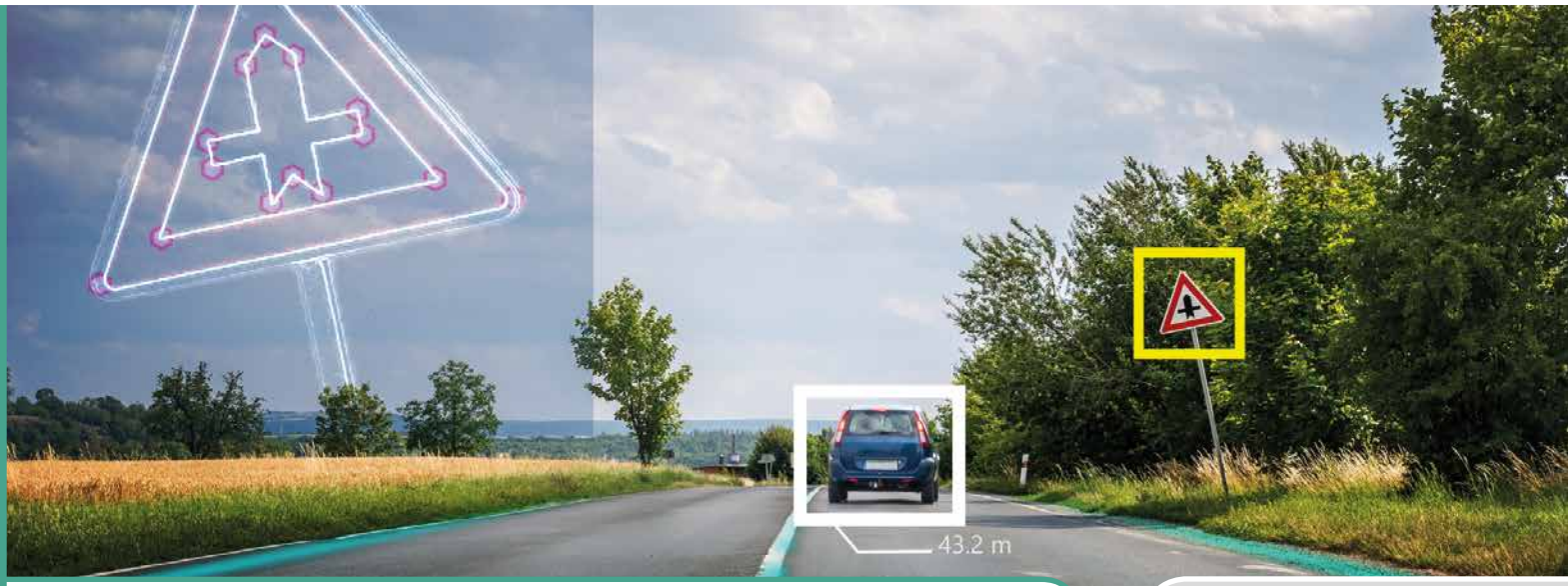
VDI

International VDI Workshop

Imaging and Optical Sensing Technologies

Applications for Autonomous Driving



The following Topics will be discussed:

- **Fundamentals of optical Sensors for Autonomous Driving**
- **Norms, Laws and Standardization**
- **Sensor Composition Basics, Camera Types and Calibration**
- **Testing & Validation, Image Analysis and Computer Vision**
- **Machine Learning for Autonomous Driving**
- **Hands on Session**

Dates and Venues

May 28–29, 2019
Aschheim near Munich

September 4-5, 2019
Bonn

December 9-10, 2019
Berlin

Workshop Chair

Javier Garcia López, Vision Systems Leader, ADAS Business Unit, Barcelona, Spain

Bastian Wandt, Managing Director, Henschel&Wandt Consulting

An event organized by VDI Wissensforum GmbH
www.vdi-international.com
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General Information

Aims and Objectives

This intermediate and advanced level workshop helps participants to understand the fundamentals of optical sensors and sensor analysis in the field of assisted and autonomous driving. Sensor functions, requirements and different camera types are discussed.

The workshop covers topics such as camera calibration and image analysis techniques, as well as recent machine learning approaches. Participants gain insights into the composition of a camera's hardware, including different optics, such as lenses, image sensors and image signal processors. Applications and use cases for camera based sensor interpretation and techniques of transferring data from the sensor to the ECU are introduced. Furthermore, important norms and IT standards are part of the agenda.

Target Group

This workshop is directed at imaging technologists, engineers, designers, architects, specialists and managers from OEMs (passenger and commercial vehicles), suppliers and software providers. It's particularly suited for experts working in:

- Software Design/Architecture
- ADAS/Driver Information Systems
- (Optical) Sensors
- Automotive Camera Systems & Development
- Connectivity/Connected Vehicles
- Electronics, HW & SW, Car-IT

If you are responsible for automotive camera systems, improving image quality or if you are new to the topic, this workshop is relevant for you!

Workshop Documentation
Participants receive a manual on-site as well as a VDI confirmation of participation.

Workshop Chair

Javier Garcia López, Vision Systems Leader, ADAS Business Unit, Barcelona, Spain
Bastian Wandt, Managing Director, Henschel&Wandt Consulting

Javier Garcia López has been working as a technical group leader for intelligent cameras by FICOSA ADAS since 2016. He finished his Diplom in electronical Engineering with intensification in robotics and automatic control in 2012 in the "Universidad Politécnica de Madrid", Madrid (Spain), and then completed a Master of Science inside the T.I.M.E excellence program in electronics and informatics in the Technical University of Munich in 2014. After two and a half years working in Germany by companies like AUDI or the German Aerospace Center (DLR), he started his PhD in Geometric Computer Vision with Deep Learning in the Universitat Politècnica de Catalunya, Barcelona (Spain) together with FICOSA ADAS. There he has the chance to pursue his PhD and work developing camera-based solutions and ADAS systems based on neural networks and image recognition in an international experienced company like FICOSA.

Bastian Wandt studied Mechatronics at the Leibniz Universität Hannover and is now working towards his Dr.-Ing. His main research interest is the application and analysis of various machine learning techniques with a special focus on deep neural networks for 3D human pose reconstruction. He is also the founder and Managing Director of the Henschel&Wandt Consulting GbR.

Workshop Methods

The chair provides theoretical input while participants apply their new knowledge in practical exercises and a hands-on session. Interactive discussions will give plenty of room to exchange experiences.

Learn more about our other workshops:

Automotive Sensor Systems 2019
February 13 and 14, 2019, Munich

Efficient International Negotiation Skills for Sales Engineers
April 11 and 12, 2019, Frankfurt

Automated Driving 2019
July 09 and 10, 2019, Dusseldorf

Workshop Content

1. Day 09:00-17:00
2. Day 09:00-16:00

Introduction
- Automation levels of autonomous driving
- Overview: Sensors for autonomous driving
- Overview and fundamentals of optical sensors

Norms, Laws and Standardization
- Vehicle specific norms
- Norms for standardization of image quality

Camera Types and Sensor Composition Basics
- Characteristics of different camera types
- Overview: Different lenses
- Bundle adjustment basics
- Projective and affine transformations
- Fundamental matrix estimation for stereo cameras
- Time of Flight (ToF) basics
- LiDAR basics
- Block diagram of optical sensors modules and parameter tuning
- Image quality parameters
- Comparison, advantages and disadvantages of optical sensors

Image Analysis
- Introduction to machine learning
- Neural networks & deep learning
- Semantic segmentation
- Object detection and recognition

Sensor Calibration
- Overview: Calibration techniques, requirements and needs
- End-of-line calibration in the OEM production hall
- Service call calibration at the car dealer
- Automatic online calibration
- LiDAR calibration

System Overview
- Surround view systems
- Lane change assist systems
- Autonomous emergency braking systems
- Front camera systems
- Parking camera systems
- Cameras' self-awareness
- Challenges and system limits

Test and Validation
- System testing and validation
- Functional testing
- Unit testing
- Hardware testing
- Simulation
- Image quality

Practical Experiences
- Hands on session for object detection and classification

++ **Live demonstration of camera, LiDAR and ToF camera**

Five Reasons why You should attend

1. Understand the composition and requirements of optical sensors for autonomous driving
2. Discover different camera types, image sensor calibration, testing and validation
3. Benefit from live demonstrations and programming samples
4. Exchange experiences with your peers
5. Discuss your individual questions with our experts

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International VDI Workshop:
Imaging and Optical Sensing Technologies – Applications for Autonomous Driving

VDI Wissensforum GmbH | VDI-Platz 1 | 40468 Düsseldorf | Deutschland

Discover the hottest Topics in Imaging Technology for vision-based ADAS

You need help?
Please contact us!

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✓ **Please register for (Price per Person plus VAT):**

International VDI Workshop		
☐ **May 28–29, 2019** **Aschheim near Munich** (01SE912003)	☐ **September 4-5, 2019** **Bonn** (01SE912004)	☐ **December 9-12, 2019** **Berlin** (01SE912005)
EUR 1.790,–	EUR 1.790,–	EUR 1.790,–

www

☐ Participation Fee VDI-Members **Save 50 € for each Workshop Day.** VDI membership no.* _____

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www.vdi-wissensforum.de/de/agb/

Workshop Venues:
Munich: Innside by Melia München Neue Messe, Humboldtstr. 12, 85609 Aschheim near Munich, Phone: +49 89/94005-0, Mail: innside.muenchen.neuemesse@melia.com
Bonn: Hilton Bonn, Berliner Freiheit 2, 53113 Bonn, Phone: +49 228/7269-0, Mail: info.bonn@hilton.com
Berlin: NH Berlin Alexanderplatz, Landsberger Allee 26-32, 10249 Berlin, Phone: +49 30/422613-0, Mail: nhberlinalexanderplatz@nh-hotels.com

More Hotels close to the workshop venue may be found via our HRS service
www.vdi-wissensforum.de/hrs

HRS Das Hotelportal

Services: The price includes beverages during breaks and lunch. The workshop documents will be handed out on-site.

Exclusive offer: All participants at this event are entitled to a free three-month trial VDI membership. (Offer applies exclusively to new members.)

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