

AUTOMOTIVE INNOVATION WORKSHOP

July 6, 2023, Online

**ADAS Sensor Modelling for Virtual Testing of
Automated Driving Functions**

Zoom ID: 854 6698 1210

Zoom code: 0706



Organized by:



**AUTOMOTIVE
INNOVATION**



Please add your affiliation next to your name in Zoom:
e.g. Dong Li - Automotive Innovation



No recording. Videos will be put online after the event.



Use “chat” to post questions to speakers.



Please mute yourself when you're not speaking

Time: 13:00-15:00 (Central European Summertime)
19:00-21:00 Beijing Time

Moderator

Dr. Arno Eichberger, Associate Professor at Graz University of Technology

Agenda

- 13:10-13:30** **Use of active sensor model in test and validation of ADAS/AD systems**
Leona Hennig, Volkswagen
- 13:35-13:55** **Phenomenological modelling of automotive radar sensors**
Zoltan Magosi, TU Graz
- 14:00-14:20** **ADAS ultrasonic sensor modelling and their detection range**
Jürgen Wille, FrontMod GmbH
- 14:25-14:45** **Evaluation of active sensor model performance using statistical evaluation metrics**
Philipp Rosenberger, Persival

**AUTOMOTIVE INNOVATION
WORKSHOP**

July 6, 2023



Chair & Moderator



Dr. Arno Eichberger

Editorial Board Member of Automotive Innovation,
Associate Professor at Graz University of Technology

Automotive Innovation Workshop

Automotive Innovation Workshop (AUIN Workshop) is established by China SAE and Automotive Innovation to discuss hot topics regarding future vehicle trends and core technologies. Having been held successfully 4 times, this event invites researchers, engineers, journal editors and authors from the automotive and related fields to discuss important topics covered by the journal Scope.

19:05-19:25

Automotive Industry Transformation: Reshaping the Automobile and Further Changing the World -Prof. Frank Zhao

Editor-in-Chief of Automotive Innovation, Honorable Lifetime President of FISITA, Director of Tsinghua Automotive Strategy Research Institute (TASRI), China



19:25-19:30

Q&A

19:30-19:50

Current Status and Strategy of Autonomous Driving Technology -Prof. Kunsoo Huh

Editorial Board Member of Automotive Innovation, Professor at Hanyang University, Korea



19:50-19:55

Q&A

19:55-20:15

Robust, Accurate and Predictive Driver Drowsiness Detection Fusing Vehicle and Biosignals for Application in Automated Driving -Dr. Arno Eichberger

Editorial Board Member of Automotive Innovation, Associate Professor at Graz University of Technology, Austria



20:15-20:20

Q&A

20:20-20:40

Verification and Validation of Unsupervised Driving Functions -Prof. Saber Fallah

Editorial Board Member of Automotive Innovation, Professor at University of Surrey, UK



20:40-20:45

Q&A

AUTOMOTIVE INNOVATION WORKSHOP
March 27, 2022

The Path Towards Automated Vehicles
Prof. Christoph Stiller
Chaired Professor and Director of the Institute for Measurement and Control Systems at Karlsruhe Institute of Technology

Maneuver Coordination of Connected Automated Vehicles at Highway and Urban Road Junctions
Prof. Meng Wang
Professor at TU Dresden, Chair of Traffic Control and Process Automation at the Institute of Traffic Telematics

Human-Lead-Platooning Cooperative Adaptive Cruise Control
Prof. Jia Hu
Professor and ZhongTe Distinguished Chair in Cooperative Automation in the College of Transportation Engineering, at Tongji University

AUTOMOTIVE INNOVATION WORKSHOP
October 14, 2022

20:10-20:50
Vehicle Dynamics and Control: Torque Vectoring
Dr. Basilio Lenzo
Tenure-Track Assistant Professor at University of Padova, Associate Editor-in-Chief of Automotive Innovation

21:00-21:40
Modeling and Control of Tire Blowout for Automated Ground Vehicles
Dr. Yan Chen
Assistant Professor at Arizona State University

Automotive Innovation Workshop

Verification and Validation of Unsupervised Driving Functions
Dr. Saber Fallah
Director of CAV Lab
University of Surrey

Automotive Innovation Workshop, January 2022

Verification and Validation of Unsupervised Driving Functions

Automotive Innovation Workshop

How to achieve Torque-vectoring?

1. Controllable friction braking torques on individual wheels

Basilio Lenzo
Automotive Innovation 副主席
意大利帕多瓦大学副教授

Electronic Stability Control (ESC)

Vehicle Dynamics and Control: Torque Vectoring

China SAE – Basic Intro

February 28, 2023



Founded in 1963

Among Top Three Automotive Societies

1800+

Corporate
members

110,000+

Registered
members

200+ staff

35 years old on average

45% with master's degrees

- **China SAE, SAE International, and SAE Japan is the Top Three automotive societies in the world**
- **Society member of FISITA** (International Federation of Automotive Societies)
- **Sponsor of the Asia Pacific Automotive Engineering Conference (APAC)**

Technical Events

Academic Journals

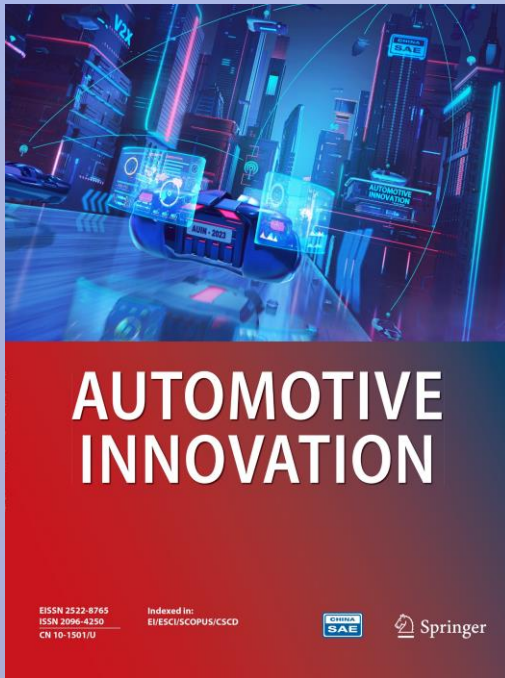
Science Education

Training & Certificate

CSAE Standards

Advisory Service

Innovation Alliances



Indexed in

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Impact Factor₂₀₂₂=6.1

Aims & Scope

Automotive Innovation is the leading peer-reviewed international journal and China SAE's flagship publication. The journal presents innovative findings and influential developments that meet the changing needs of the automotive industry. It provides a high-level platform for automotive scientists and engineers worldwide.

The journal provides a forum for the research of principles, methodologies, designs, theoretical background, and cutting-edge technologies in connection with the development of vehicle and mobility. The main topics cover **emerging vehicle technologies**, including but are not limited to: **electrification, autonomous driving, eco-driving**.

Journal homepage: www.springer.com/42154

Editor-in-Chief



Prof. Jun Li

Academician of China Engineering Academy
Professor at Tsinghua University
President of China SAE

Editor-in-Chief



Prof. Frank Zhao

Honorable Lifetime President of FISITA
Director of Tsinghua Automotive Strategy Research Institute
Professor at Tsinghua University

**Executive
Associate Editor-
in-Chief**



Prof. Xinjie Zhang

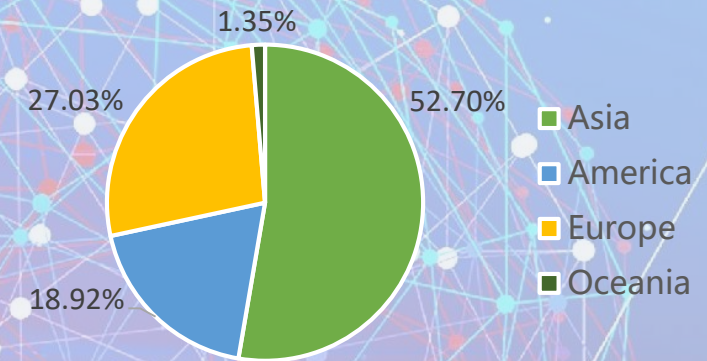
Executive Associate Editor-in-Chief of Automotive Innovation
Vice Director of State Key Laboratory of Automotive Simulation and Control
Professor at Jilin University

International Editorial Board

Editorial Board: 74 experts, from 14 countries

- 2 editors-in-chief and 1 executive associate editor-in-chief
- 10 associate editors-in-chief
- 60 editorial board members
- 39 members are foreign nationality
- 45% members: H-Index > 20

Regional Distribution



Prof. Keqiang Li
Tsinghua University,
China



Prof. Arno Eichberger
Graz University of
Technology, Austria



Prof. Alois Knoll
Technical University
of Munich,
Germany



Prof. Saber Fallah
University of Surrey,
UK

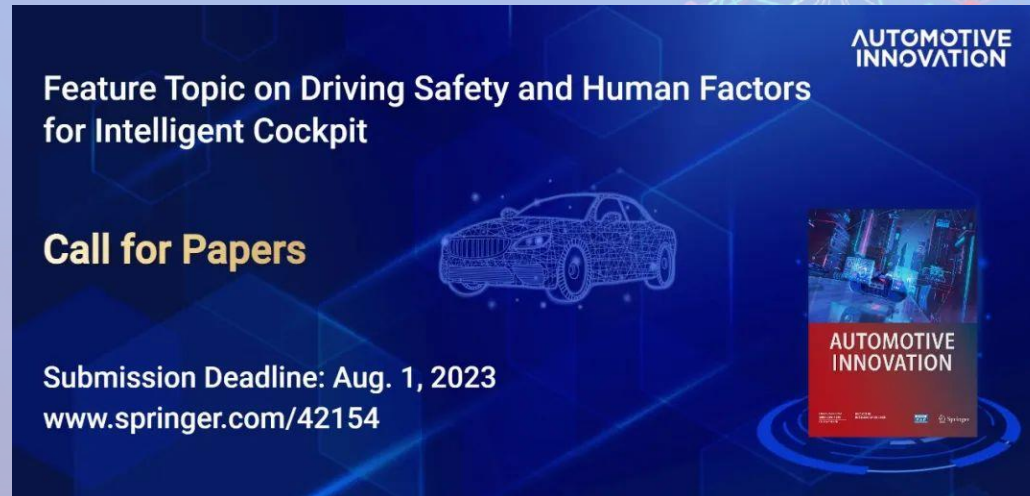


Prof. Levent Guvenc
Ohio State University,
USA



Prof. Amir Khajepour
University of Waterloo,
Canada

Calling for Papers



The graphic features a dark blue background with a glowing wireframe car in the center. To the right is a red and white cover of the 'AUTOMOTIVE INNOVATION' journal. Text on the left includes the feature topic, 'Call for Papers', the submission deadline, and the website URL.

Feature Topic on Driving Safety and Human Factors
for Intelligent Cockpit

Call for Papers

Submission Deadline: Aug. 1, 2023
www.springer.com/42154

AUTOMOTIVE INNOVATION

AUTOMOTIVE INNOVATION

Guest Editors

- **Prof. Jun Ma**, Tongji University
- **Prof. Gang Guo**, Chongqing University
- **Prof. Philipp Heidkamp**, Köln International School of Design

Submission Deadline: **Aug. 1, 2023**



Time: 13:00-15:00 (Central European Summertime)
19:00-21:00 Beijing Time

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Philipp Rosenberger, Persival

How many kilometers to prove a safe AV function?

„Fully autonomous vehicles would have to be driven hundreds of millions of miles and sometimes hundreds of billions of miles to demonstrate their reliability in terms of fatalities and injuries. [1]”



50+

Million km test mileage

30+

Cities public road



30+

Million km test mileage

30+

Billion km in simulation

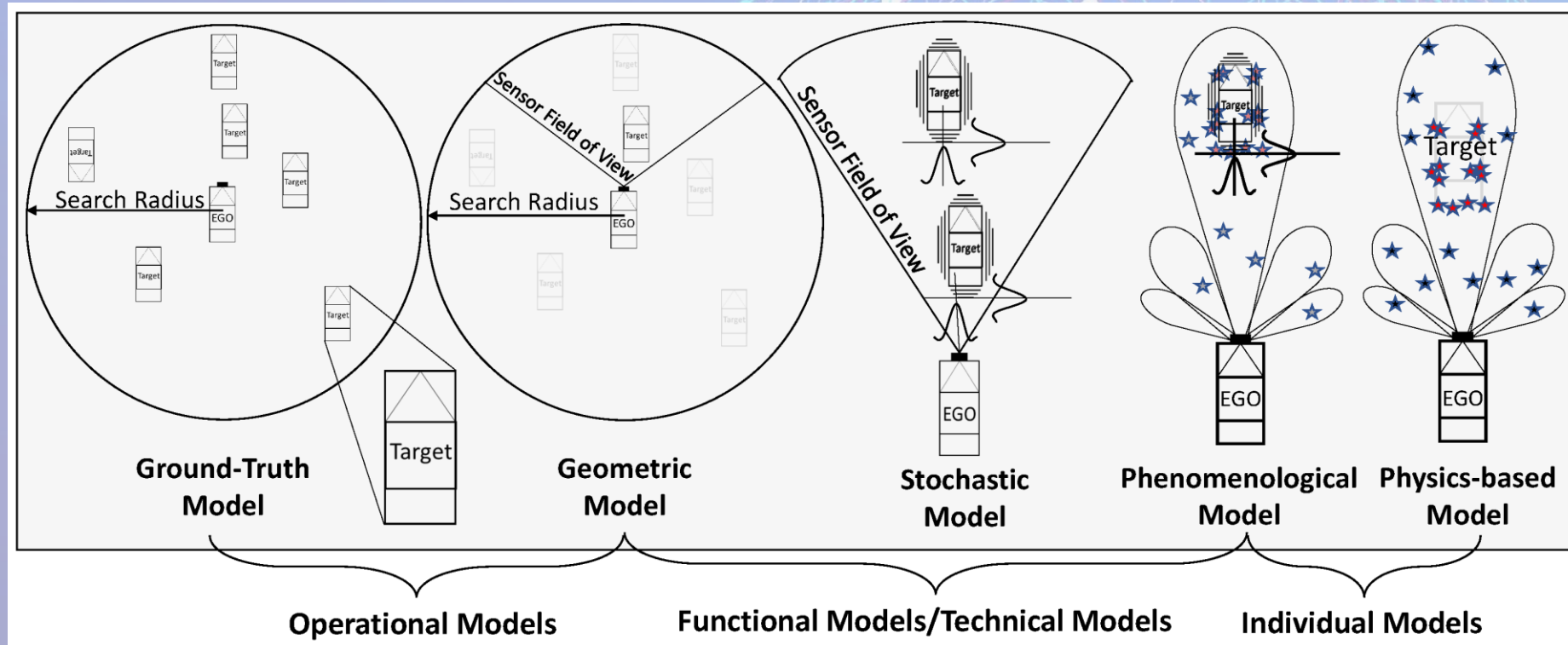
Increasing the complexity of automation increases the complexity in safety validation of AVs exponentially

→ “validation trap” (Prof. Winner)

[1] Kalra, Nidhi, and Susan M. Paddock. "Driving to safety: How many miles of driving would it take to demonstrate autonomous vehicle reliability?." *Transportation Research Part A: Policy and Practice* 94 (2016): 182-193.

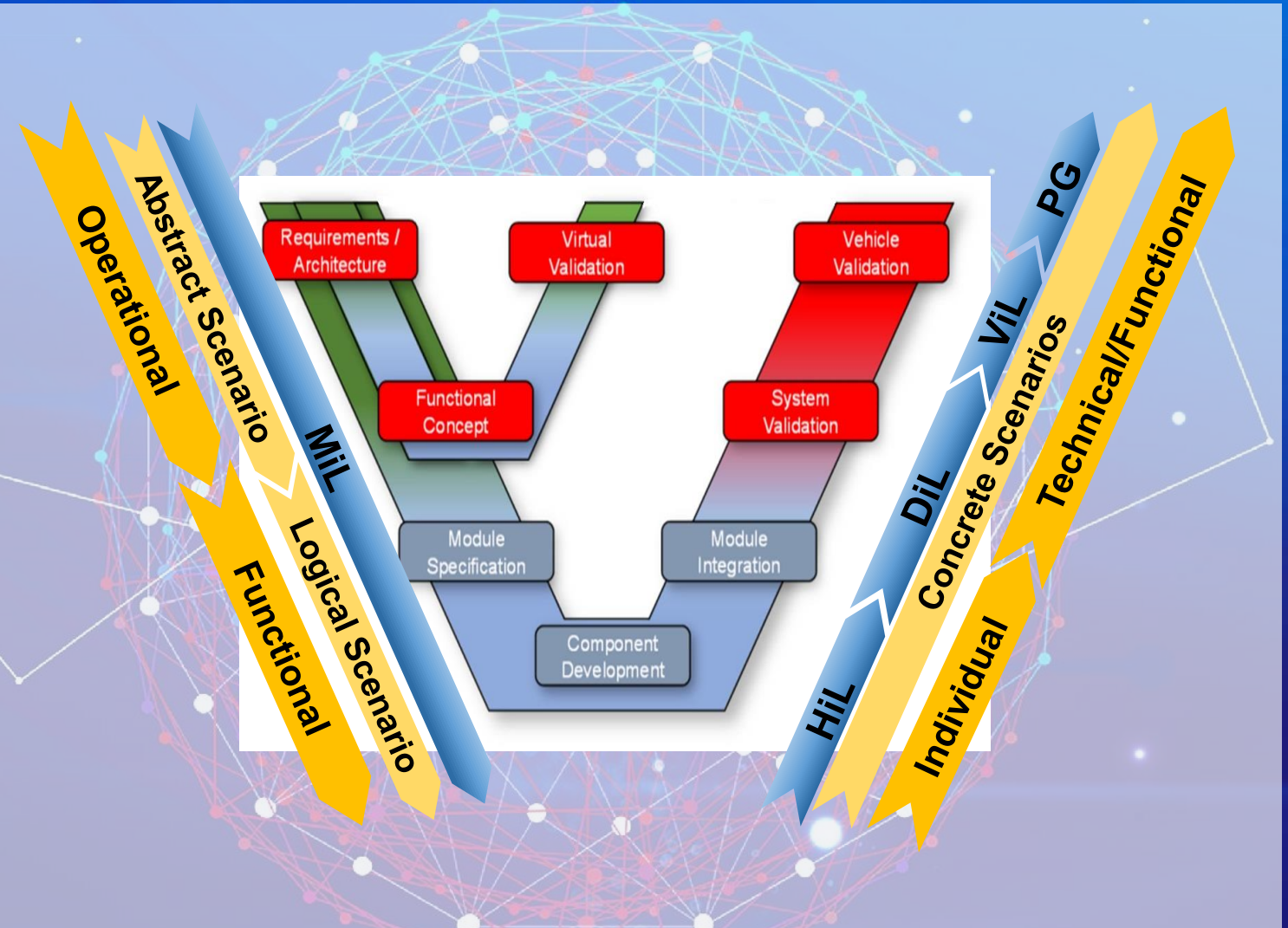
Closing the “validation trap” with simulation

Introduction of **virtual perception sensor models** to achieve the goal of virtual certification of AVs



Closing the “validation trap” with simulation

- Perception sensors need to be **modelled** needed in different complexity in different stages of vehicle development
- Perception sensor models need to be **validated!**





Use of active sensor model in test and validation of
ADAS/AD systems

Leona Hennig

Volkswagen



Leona Hennig

Volkswagen

Bio:

Leona Hennig is a professional with a background in financial mathematics, machine learning, and data science. She holds a Bachelor's degree in Financial Mathematics from the University of Bielefeld and a Master's degree with a focus on machine learning and data science from the Technical University of Braunschweig. During her Master's program, she conducted research on kernel mean embeddings, exploring their applications in machine learning. Currently, she is pursuing a Ph.D. at Volkswagen, specializing in the use of synthetic data for training automated driving functions. Her research focuses on advancing specifications of synthetic data for multiple use cases.

Q & A

Please use "chat" to post questions to speakers



Phenomenological modelling of automotive radar
sensors

Zoltan Magosi

TU Graz



Zoltan Magosi

TU Graz

Bio:

Zoltan-Ferenc Magosi is an experienced engineer and researcher. He obtained his B.Sc. in Electrical and Computer Engineering from the Kandó Kálmán University of Applied Sciences in Budapest in 2005, and his M.Sc. in Electrical Engineering from the Technical University of Győr in cooperation with the Technical University of Graz, Austria, in 2013. He successfully completed his Ph.D. thesis in 2023 at TU Graz.

From 2013 to 2023, he worked as a project researcher at the Institute of Automotive Engineering, where he contributed to the development and validation of automotive radar sensor models, integration of perception sensors into the vehicle network, and the implementation of vehicle measurement setups.

In 2022, Magosi became the head of the laboratory at the Institute of Automotive Engineering at TU Graz. In 2023, he transitioned to the role of Project-Senior Scientist. His research focuses on the modelling of automotive radar sensors for virtual validation and verification of driver assistance systems.

Q & A

Please use "chat" to post questions to speakers



ADAS ultrasonic sensor modelling and their
detection range

Jürgen Wille

FrontMod GmbH



Jürgen Wille

FrontMod GmbH

Bio:

Dipl.-Ing. Juergen Wille, Managing Director at FrontMod GmbH in Sulzbach Murr, Germany, is founder and shareholder. He is responsible for the development of ADAS Simulation tool SensorBench which will soon be introduced to the market.

He received his diploma degree in 1999 from the University of Paderborn. Afterwards he joined Fraunhofer IZM Berlin as simulation engineer. Between 2001 and 2018 he worked for VALEO Bietigheim in RF Simulation and ADAS simulation of sensors and systems. In 2018 he founded FrontMod GmbH. He has several patents.

Q & A

Please use "chat" to post questions to speakers



Evaluation of active sensor model performance using
statistical evaluation metrics

Philipp Rosenberger

Persival



Philipp Rosenberger

Persival

Bio:

Philipp Rosenberger is co-founder and CEO of Persival GmbH, which supports sensor manufacturers and OEMs in the specification, development, and validation of perception sensor models.

He recently finished his PhD thesis on "Metrics for Specification, Validation, and Uncertainty Prediction for Credibility in Simulation of Active Perception Sensor Systems". Until the end of 2022, he has been working for six years as a research associate at the Institute of Automotive Engineering at the Technical University of Darmstadt under the supervision of Prof. Hermann Winner.

He published 18 scientific papers in the field and is also a founding member and part of the Change Control Board of the ASAM OSI standard. Together with his research group at TUDa FZD, he started the PerCOLLECT initiative to collect and provide perception sensor cause-effect chains in a tree-like ontology. Furthermore, he is an active contributor to the open-source perception sensor models of the asc (s e.V. - ENVITED Open Source Model & Simulation Library.



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