AUTOMOTIVE INNOVATION WORKSHOP

July 6, 2023, Online

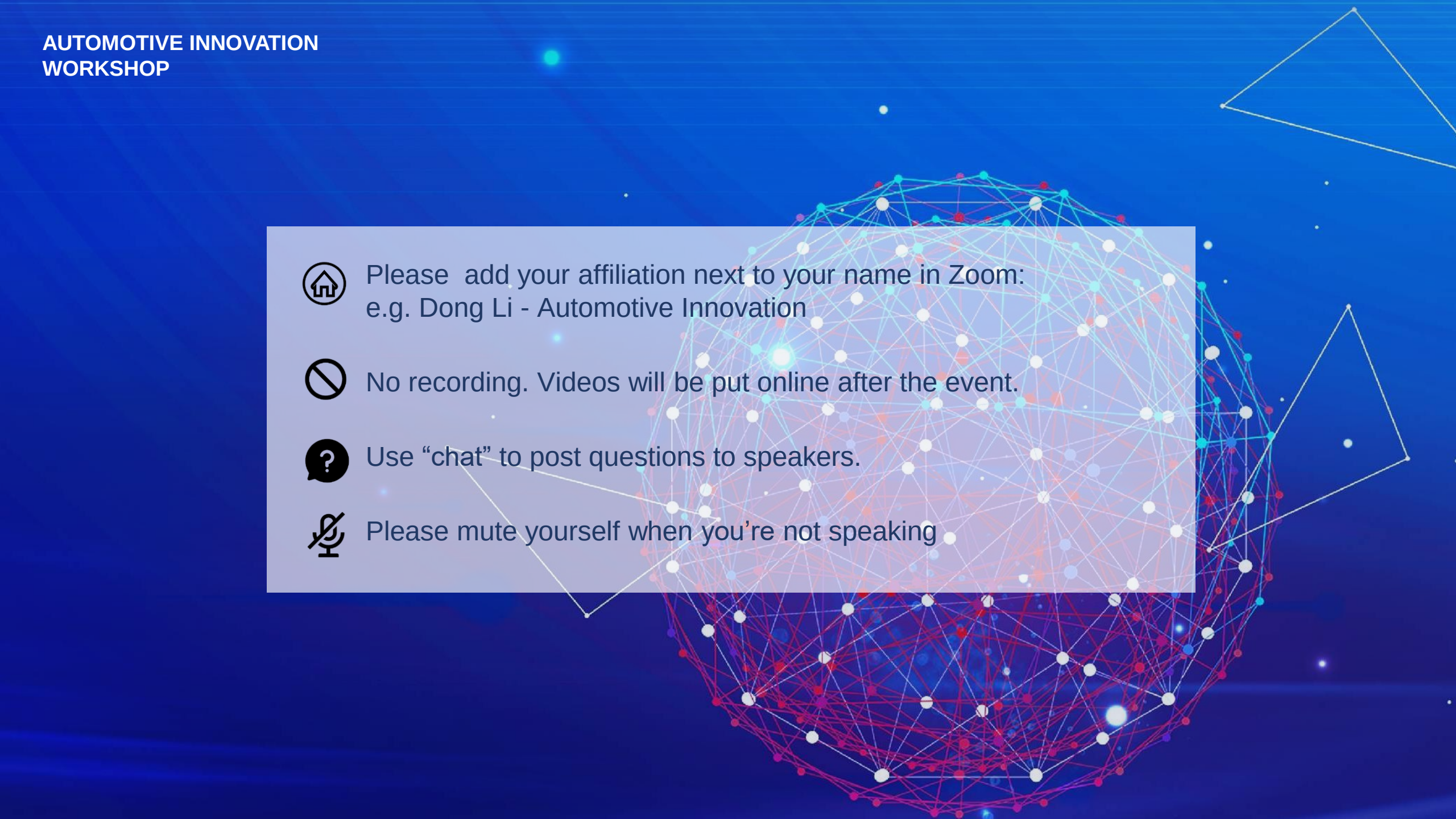
ADAS Sensor Modelling for Virtual Testing of Automated Driving Functions

Zoom ID: 854 6698 1210

Zoom code: 0706

Organized by: CHINA SAE AUTOMOTIVE INNOVATION

AUTOMOTIVE INNOVATION WORKSHOP



- Please add your affiliation next to your name in Zoom:
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AUTOMOTIVE INNOVATION WORKSHOP

Zoom ID: 854 6698 1210
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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 senor model performance using statistical evaluation metrics**
Philipp Rosenberger, Persival

AUTOMOTIVE INNOVATION WORKSHOP

July 6, 2023

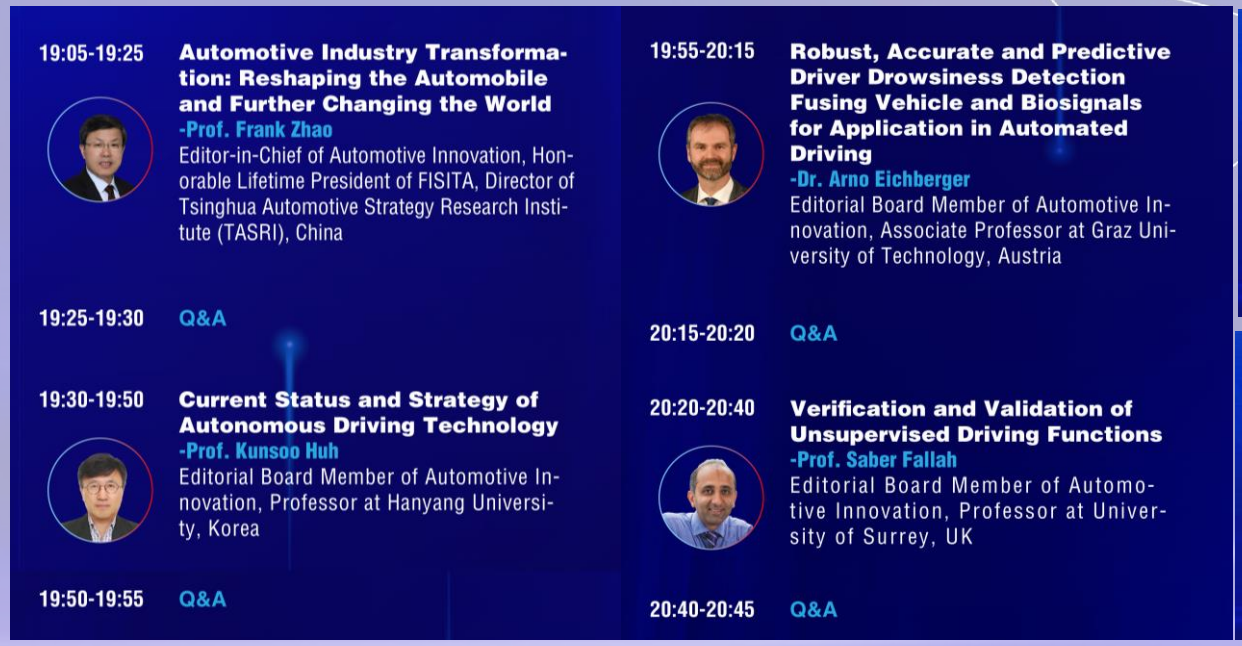
Chair & Moderator

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.



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 Factor$_{2022}$=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

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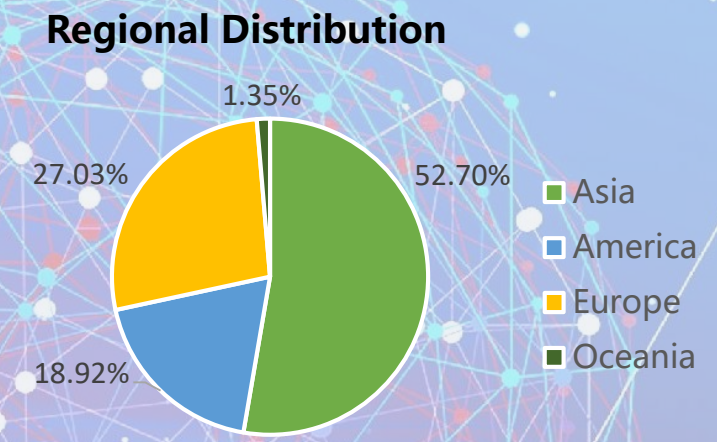
Professor at Jilin University

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



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Calling for Papers

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**

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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+	30+	30+	30+
Million km test mileage	Cities public road	Million km test mileage	Billion km in simulation

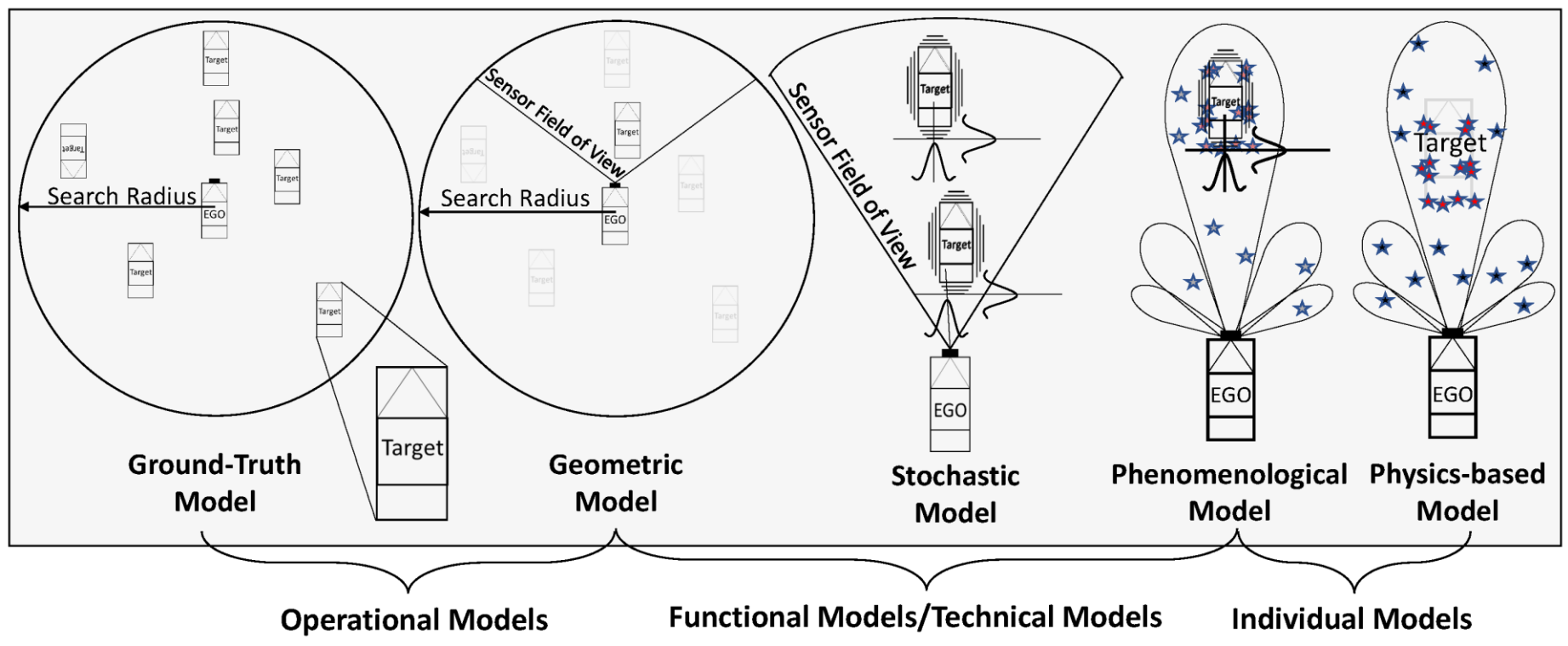
Increasing the complexity of automation increases the complexity in safety validation of AVs exponentially

→ **"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

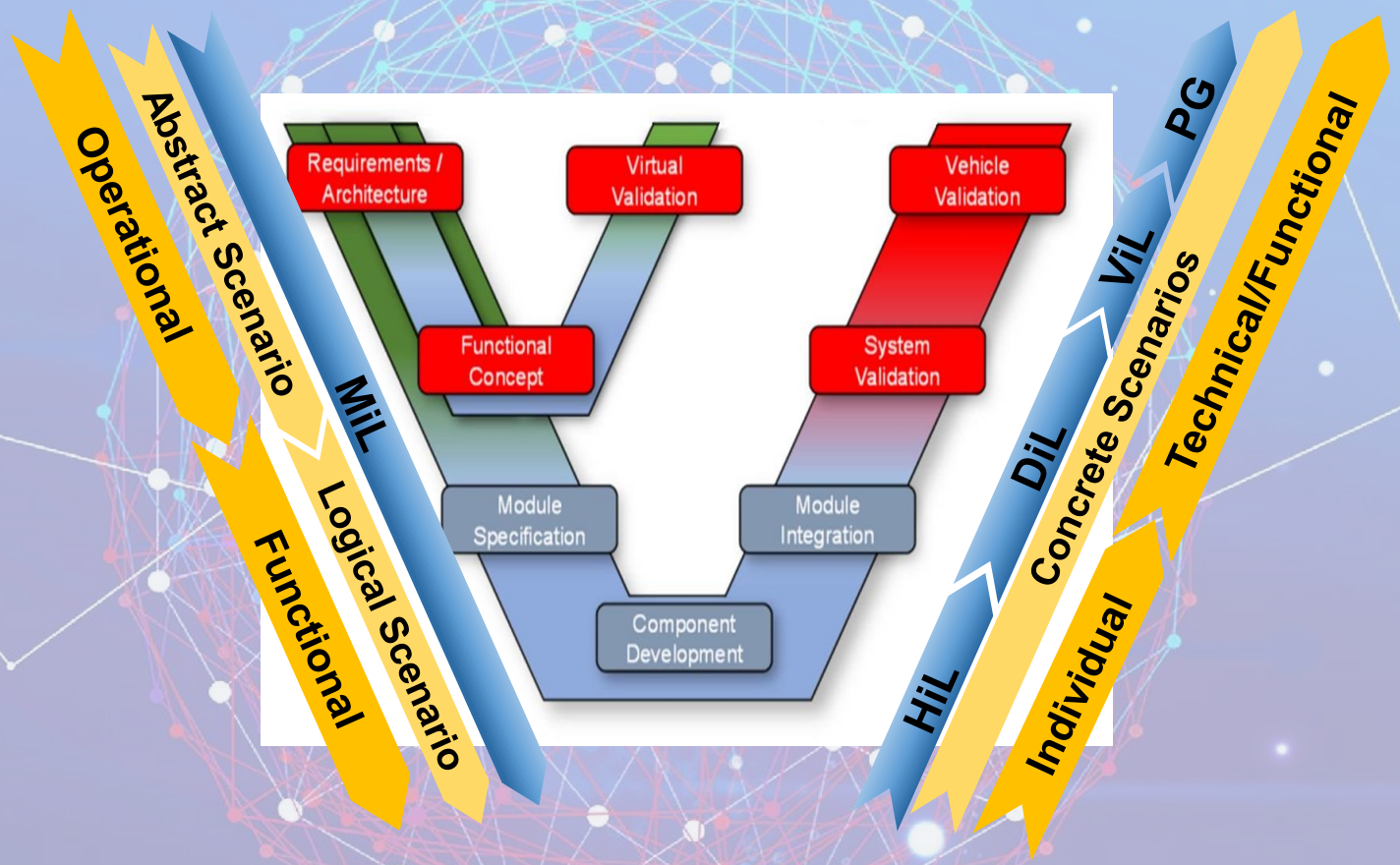
Introduction of **virtual perception sensor models** to achieve the goal of virtual certification of AVs



Magosi, Z. F., Li, H., Rosenberger, P., Wan, L., Eichberger, A. (2022). A Survey on Modelling of Automotive Radar Sensors for Virtual Test and Validation of Automated Driving. Sensors , 22(15), [5693].

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**!



Source: Magosi, Z. F., Li, H., Rosenberger, P., Wan, L., Eichberger, A. (2022). A Survey on Modelling of Automotive Radar Sensors for Virtual Test and Validation of Automated Driving. Sensors , 22(15), [5693].

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

Leona Hennig

Volkswagen

Leona Hennig

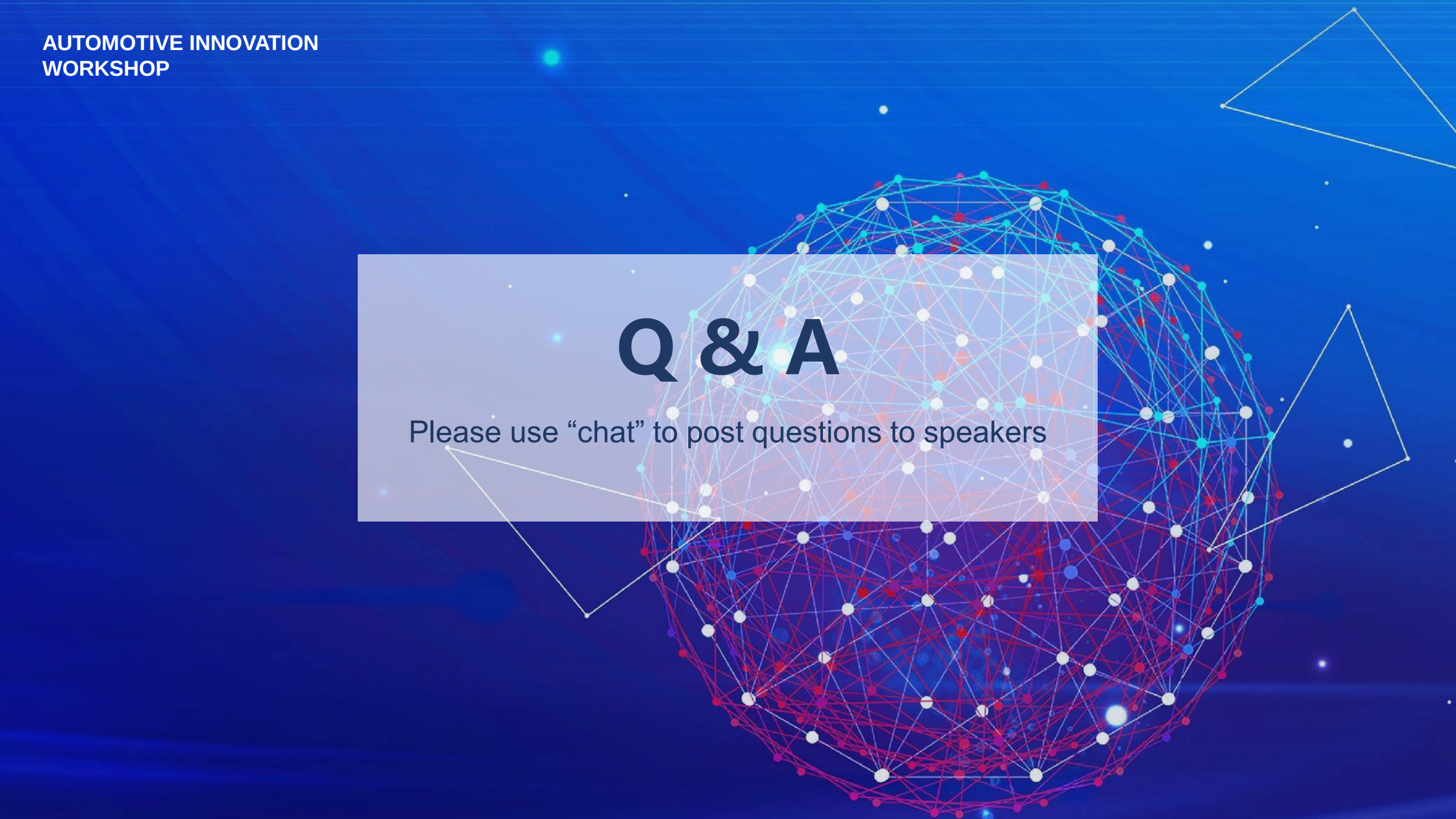
Volkswagen

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

AUTOMOTIVE INNOVATION WORKSHOP

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Phenomenological modelling of automotive radar sensors

Zoltan Magosi

TU Graz

Zoltan Magosi

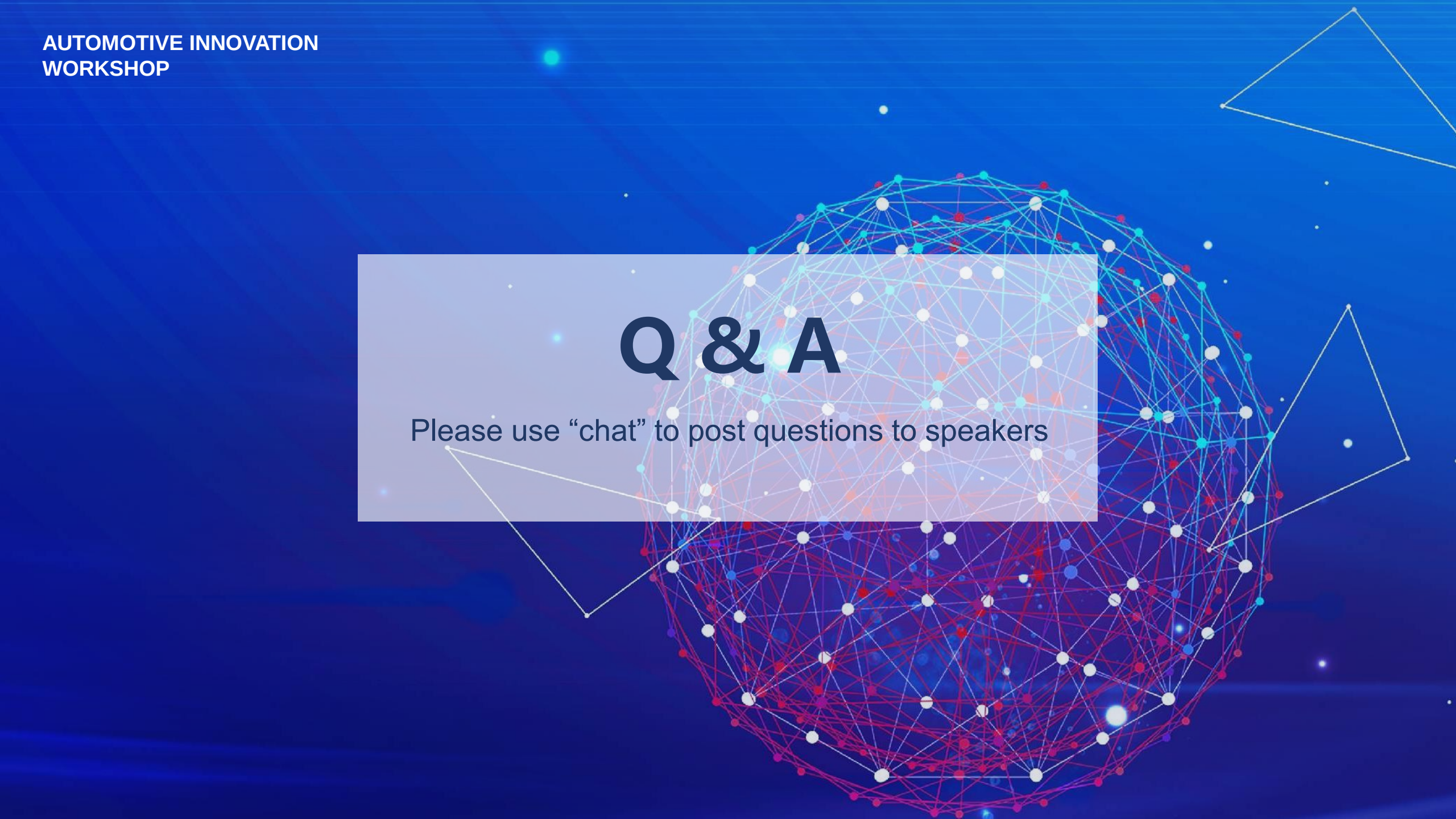
TU Graz

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.



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ADAS ultrasonic sensor modelling and their detection range

Jürgen Wille

FrontMod GmbH

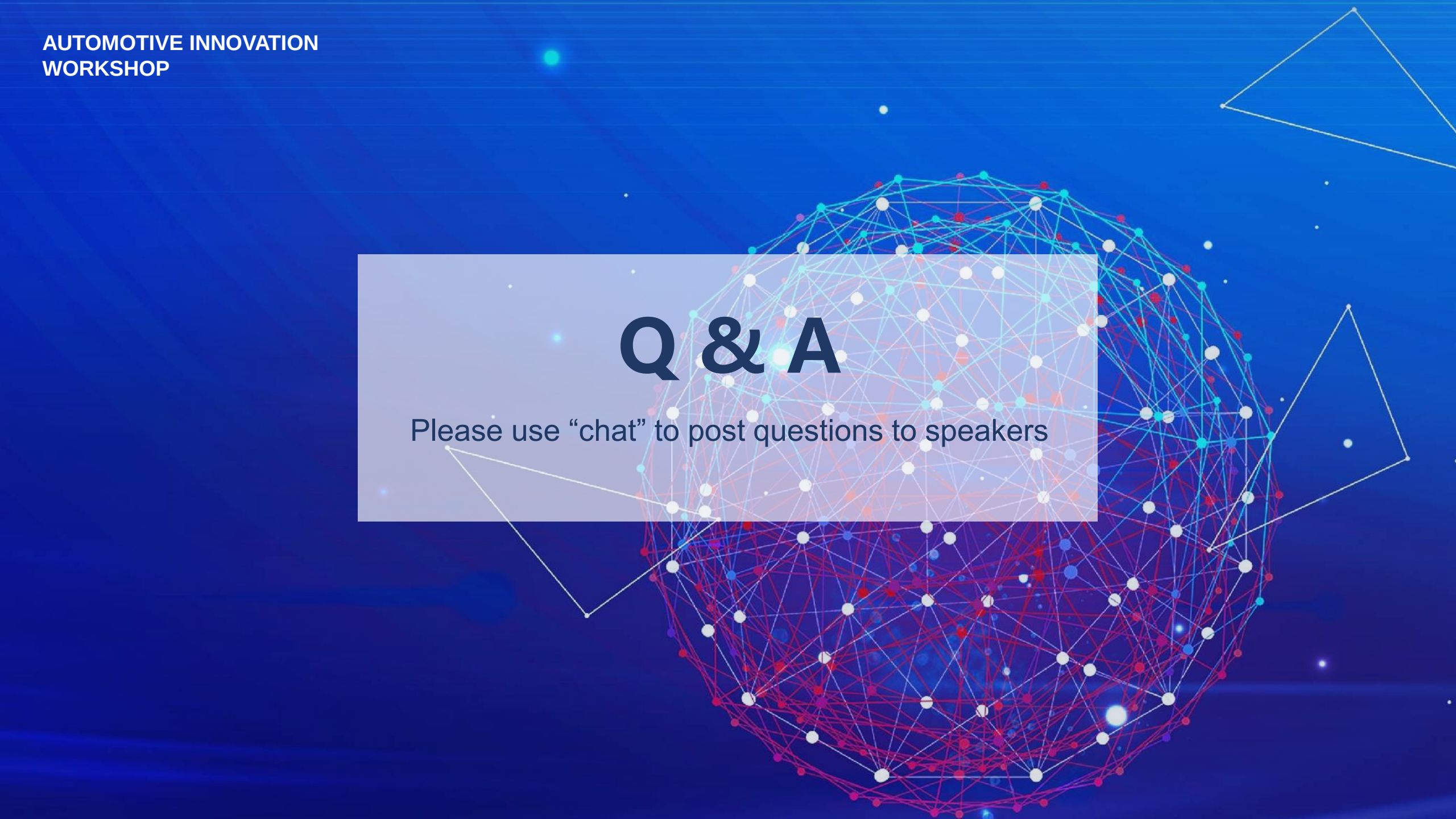
Jürgen Wille

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

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Evaluation of active senor 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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Contact
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