

# LiDAR – The enabling Sensor for Autonomous Driving



## Key Topics:

- **Challenges in building LiDAR Sensors**
- **How LiDAR Sensors generate their Point Cloud**
- **Basics of different LiDAR Sensor Designs and their Setups**
- **The automotive LiDAR Market: Trends & Players**
- **Fundamentals of Signal Processing**

**++ Live Sensor Demonstrations and Hands-On Sessions**

## Dates and Venues

January 28 and 29, 2020  
Dusseldorf

May 19 and 20, 2020  
Munich

September 30 and October 1, 2020  
Hamburg

## Workshop Chair

M. Sc. Hanno Holzhüter, Project Manager, Ibeo AS and PhD Student, University Hanover, Germany



## General Information

### Aims and Objectives

Goal of this interactive workshop is to gain a deep understanding of how automotive LiDAR (**L**ight **D**etection **A**nd **R**anging) sensors generate their point cloud, starting from the very beginning. The workshop is designed for those who want to learn about the assets, drawbacks and technical requirements of LiDAR sensors while also getting an overview of the automotive LiDAR market. During discussion rounds and interactive workshop formats participants will understand why LiDARs are a necessity for self-driving cars. Live sensor demonstrations, practical exercises and hands-on examples will highlight the challenges such sensors are facing. The concepts of different LiDAR designs – based on available information – will be explained by investigating various sensor setups, including their optics, light sources, receivers and processing units.

### Target Group

This beginners and intermediate level workshop addresses specialists, technologists, engineers and managers from manufacturers, suppliers and solution providers of the automotive industry.

Particularly those working in:

- System Engineering
- Software Design/Architecture
- ADAS/Autonomous Driving
- (Optical) Sensors Development/R&D

You are a radar expert and want to get involved with LiDAR? This workshop is also relevant for people from different areas who want to learn more about the LiDAR technology and market.

### Workshop Documentation

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



### Workshop Chair

**M. Sc. Hanno Holzhüter**, Project Manager, Ibeo AS and PhD Student, University Hanover, Germany



Hanno Holzhüter works as a research project manager at Ibeo Automotive Systems and is also PhD student with focus on digital signal processing in LiDAR sensors at Leibniz University Hanover and Ibeo AS. Before joining Ibeo in 2016, Hanno worked as a scientific assistant in the engineering education research group at technical university of

Hamburg after finishing his master in astrophysics at the Georg-August University Göttingen.

### Workshop Methods

In this workshop the workshop chair provides theoretical input and participants apply their new knowledge in interactive and practical exercises. Various discussion rounds will give plenty of room to exchange experiences. In addition, the workshop will be supported by live demonstrations!



[Learn more about our other Workshops:](#)

### Imaging and Optical Sensing Technologies

December 9 and 10, 2019, Berlin

March 31 and April 1, 2020, Frankfurt

### Modern Leadership Competences

December 11 and 12, 2019, Dusseldorf

April 22 and 23, 2020, Frankfurt

### Leadership without Authority

February 24 and 25, 2020, Stuttgart

July 7 and 8, 2020, Frankfurt

## Workshop Content

**1. Day** 09:00-17:00

**2. Day** 09:00-16:00

### Introduction

- Motivation for Autonomous Driving
- Perception sensors
  - Camera
  - RaDAR
  - Ultrasonic sensor
- Benefits of LiDAR sensors
- Fusion aspects on the way to full autonomy

### Light Detection and Ranging

- Methods to measure distances with light
- Light modulation techniques
- Time-of-flight principle
- Power budget calculation

### ++ Live Demonstration of Measurement Principle

### Time-of-Flight LiDAR

- Electronic components of a sensor
- Receiver and emitter optics
- Sensor calibration

### ++ Automotive LiDAR Demo

### Next Generation LiDAR Sensors

- Concepts and ideas for solid state LiDAR
- Requirements and specifications
- Emitter and receiver setups
- Possible scanning mechanisms

### Market Overview

- Important market players
- Updates from the industry
- Trends and market developments
- Available sensors

### Signal Processing

- Basic functionalities
  - Distance
  - Intensity
  - Noise
- Advanced processing
  - Environmental conditions
  - Target properties
  - Interference
  - Confidence
- Point cloud creation

### ++ Hands-On Sessions and practical Exercises



### Five Reasons why you should attend

1. Understand how LiDARs generate their point cloud
2. Benefit from an overview of today's automotive LiDAR market
3. Interactively learn about the different designs of automotive LiDARs including their pros and cons
4. Exchange experiences with your peers
5. Discuss your individual questions with our expert



You need help?  
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**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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