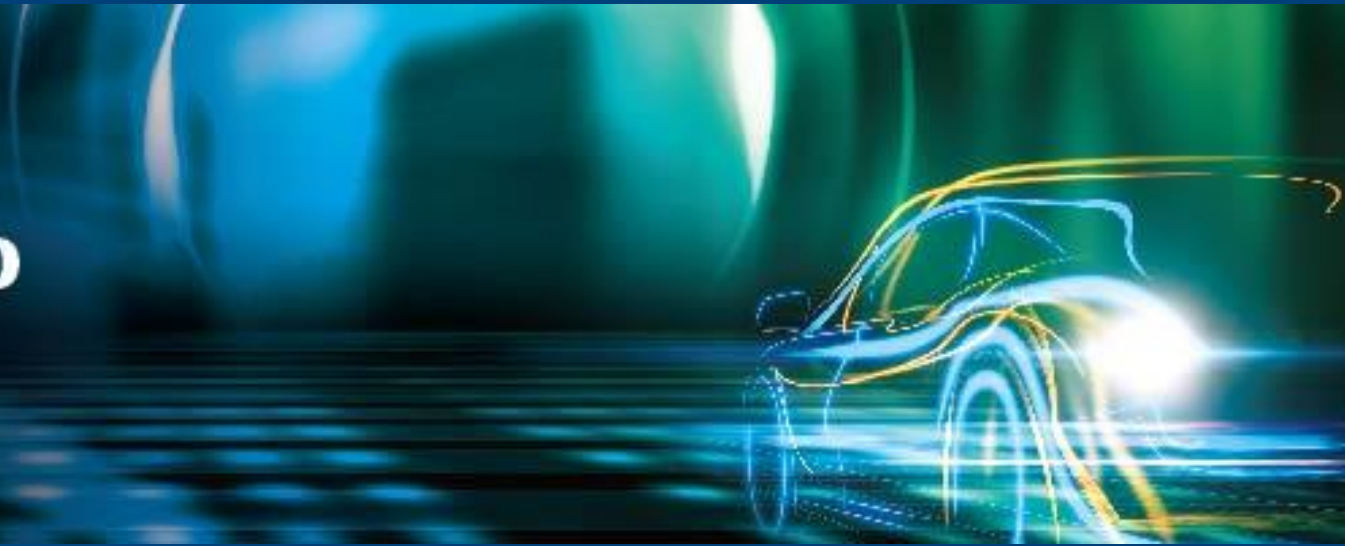


SIP-adus Workshop 2020



Towards Homologation of Sensors, Sensor Fusion and Automated Driving Function: the Role of high fidelity Environment Modeling

SIP-adus Workshop 2020

Prof. Dr. Stefan Schneider

Advanced Driver Assistent Systems

University of Applied Sciences in Kempten, Bavaria, Germany



New ADAS Functions





Vehicle



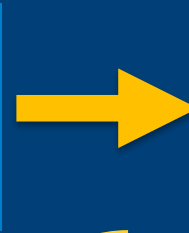
Driver



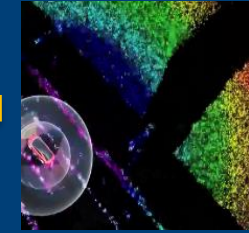
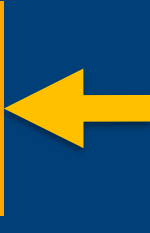
Environment



Abstract Driver



ADAS



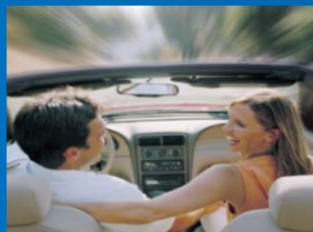
Abstract Environment



Abstract Vehicle



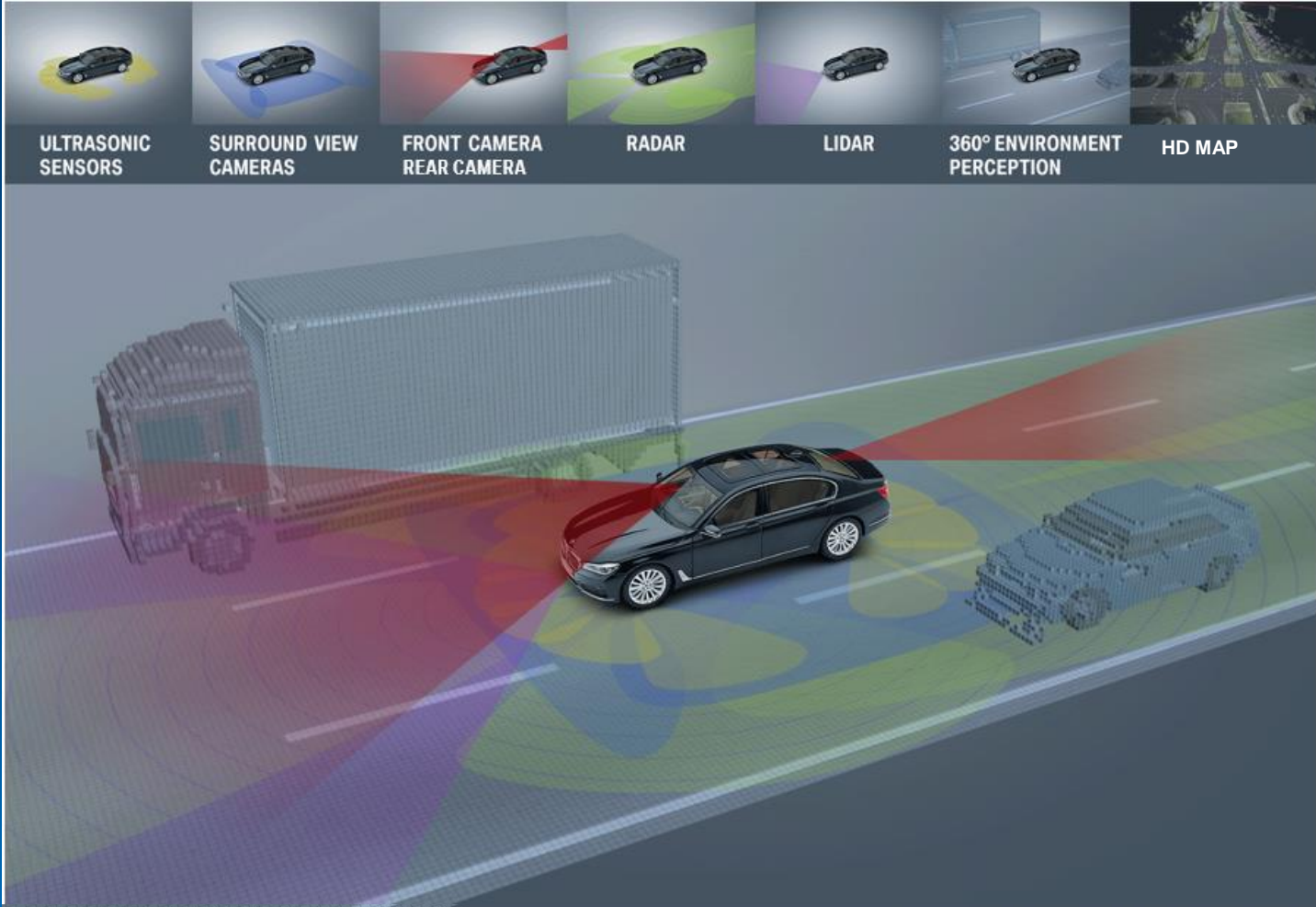
Vehicle

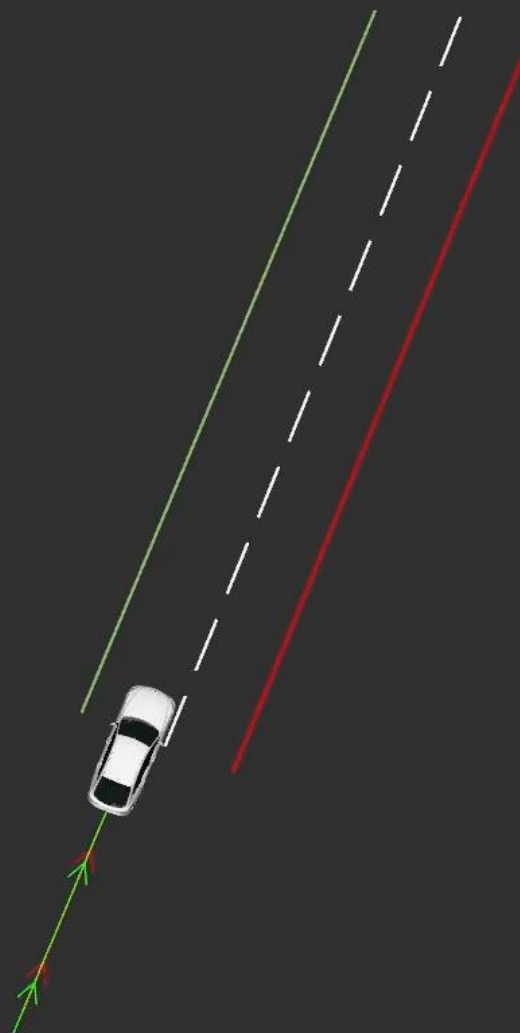


Driver



Environment





Validation	Accidents Involving Personal Injury	Driving Performance	Distance Between Two Injury Accidents
Germany all road vehicles	300.000	$7,1 \cdot 10^{11}$ km	2,0 Mio. km
Germany cars	180.000	$6,0 \cdot 10^{11}$ km	3,3 Mio. km
Motorways all road vehicles	≈ 18.000	$2,2 \cdot 10^{11}$ km	12,0 Mio. km

Driven Miles

Billions of miles of road test will be needed to validate the safety of an autonomous vehicle . . .

≈ 250 round trips to the moon



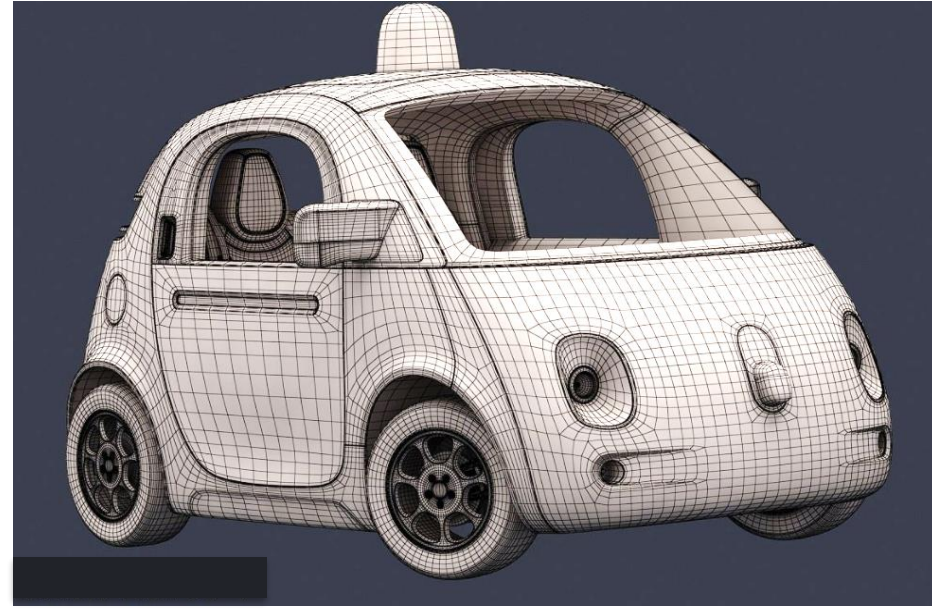
Driving to Safety

How Many Miles of Driving Would It Take to Demonstrate Autonomous Vehicle Reliability?

Case Study: Waymo

Validation

Simulation is the only practical way to validate autonomous vehicles over millions of driving scenarios



**4 Million
Road Miles**

Driven in **NINE** Years



V

**2.5 Billion
Simulated Miles**

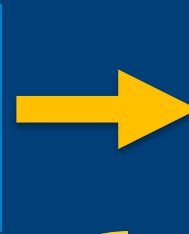
Driven in **ONE** Year



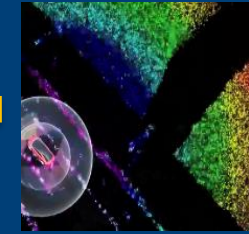
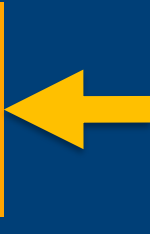




Abstract Driver



ADAS



Abstract Environment



Abstract Vehicle



Vehicle

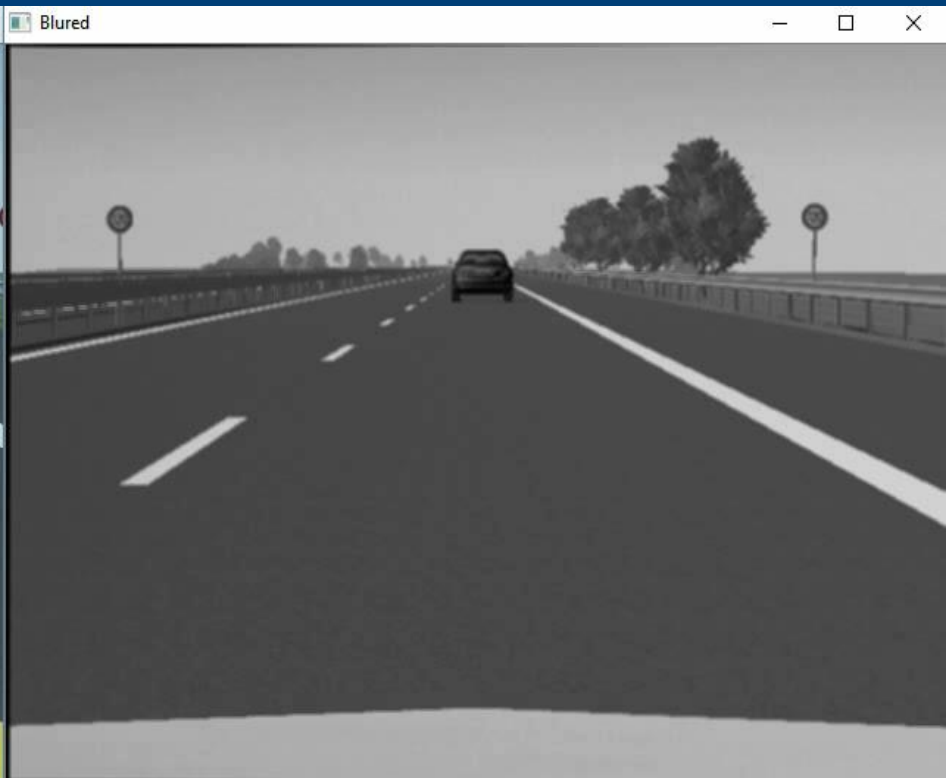
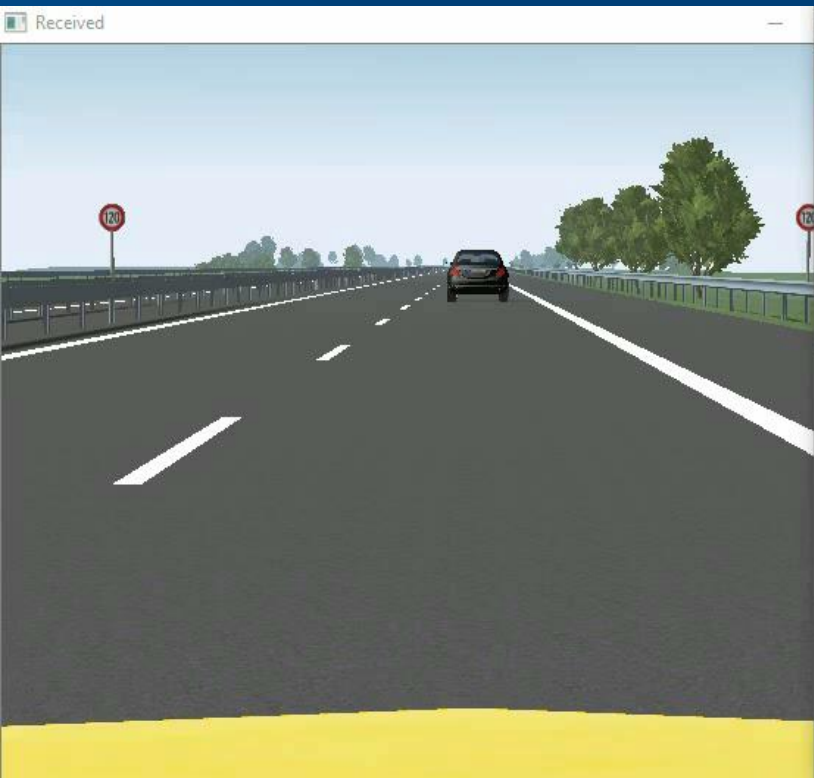


Driver

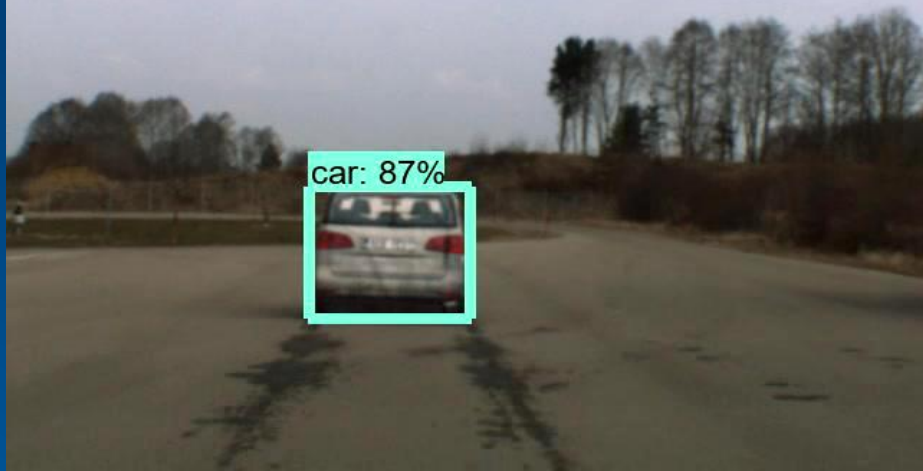


Environment





recorded data



trivial



vignetting



distortion





Moving Objects in Sensor Output: 0
Moving Objects in Ground Truth: 1

Press H for Help

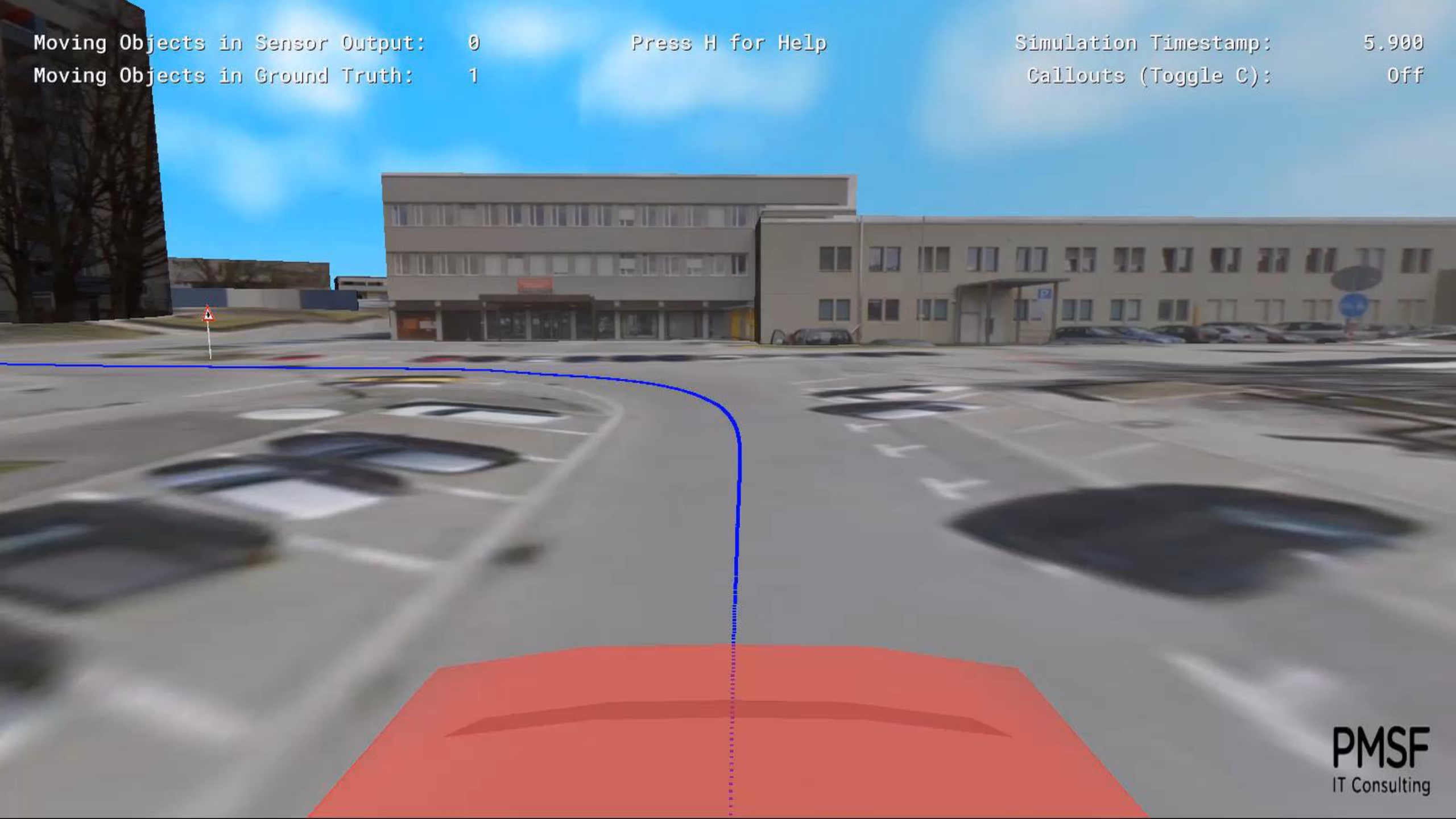
Simulation Timestamp: 19.6
Callouts (Toggle C): 0



Moving Objects in Sensor Output: 0
Moving Objects in Ground Truth: 1

Press H for Help

Simulation Timestamp: 5.900
Callouts (Toggle C): Off







Hochschule Kempten
University of Applied Sciences

ありがとうございました

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