



FORSCHUNGSINITIATIVE
K O - F A S

Simulation based Test Environment for a Cooperative Sensor Technology

Simulationsbasierte Testumgebung für eine
kooperative Sensorik

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Supported by:



on the basis of a decision
by the German Bundestag

- Motivation and Approach
- Required Components
- Sensor Model and Sensor Data Simulation
- Algorithm
- Vehicle Interface
- Code Modules Overview
- Results and Summary

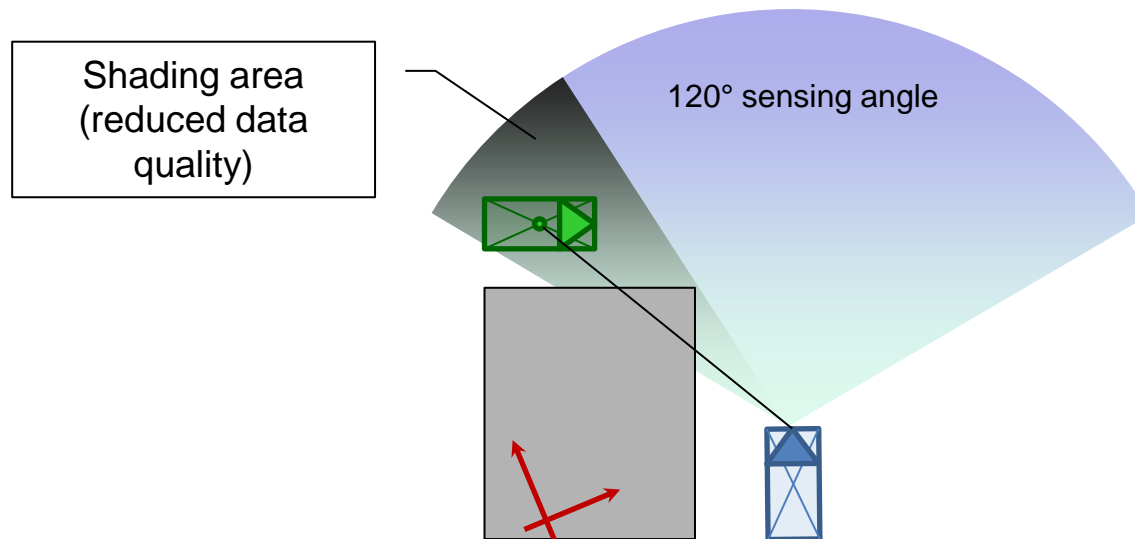
Motivation:

- How effectively can a cooperative sensor technology reduce the accident rate in Germany?

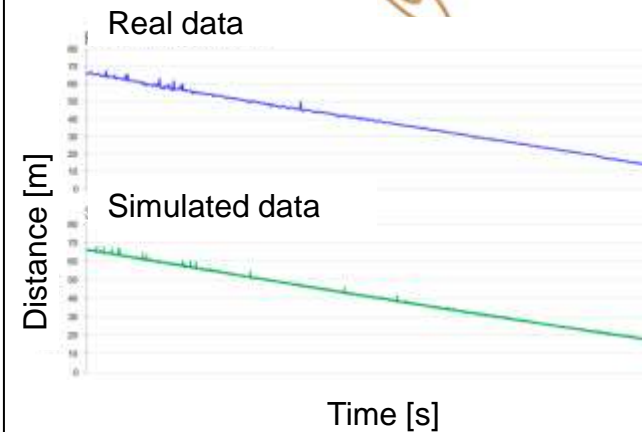
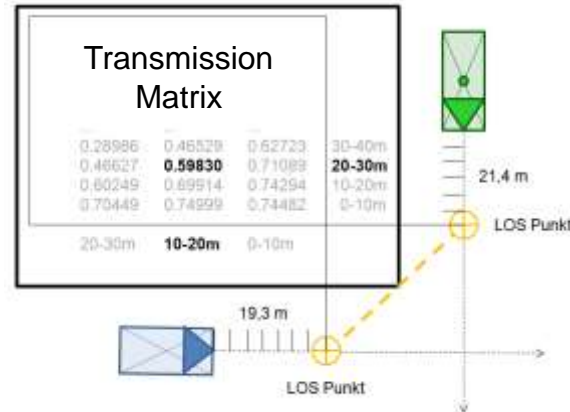
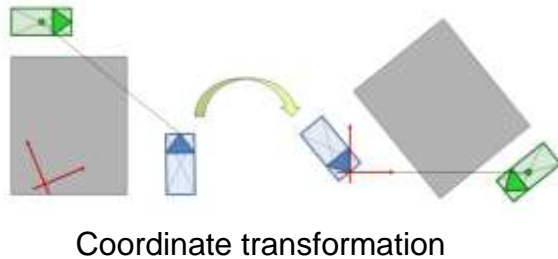
Approach:

- Due to stochastic influence parameters (e. g. accident geometry, communicational probabilities) significant real accidents are recreated in simulation environment and the involved accident partners are equipped with a cooperative sensor technology

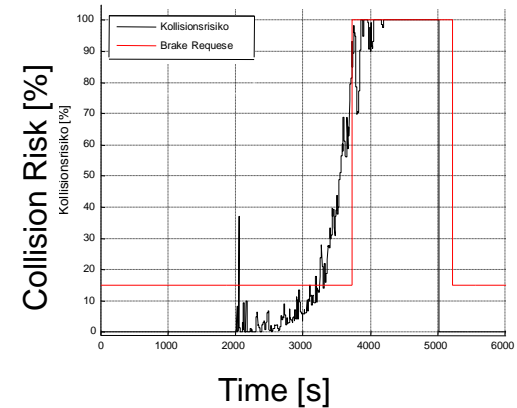
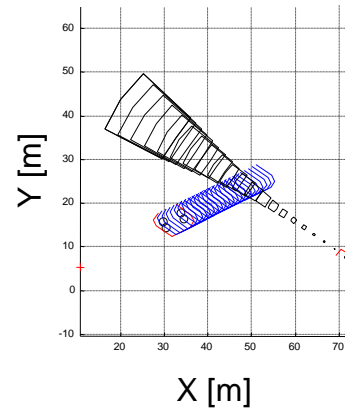
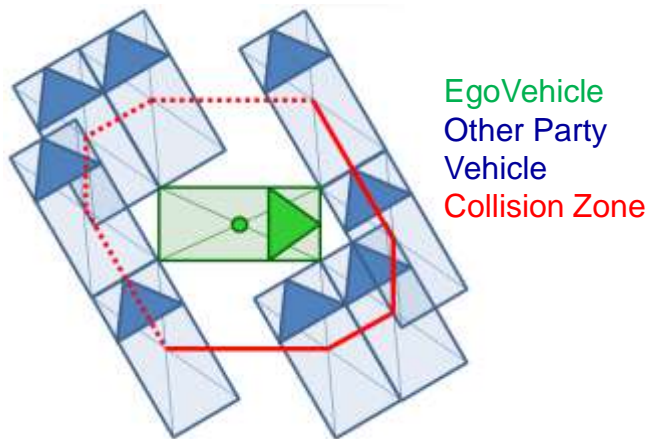
- Statistically relevant accident scenarios (delivered from VUFO - traffic accident research at Technical University of Dresden)
- Simulation environment for driving dynamics
 - Replication of real vehicles and components
 - Intervention interface for a driver assistance function
 - Visualization and data output
- Sensor model and transmission probabilities (delivered from Fraunhofer Heinrich-Hertz-Institute)
- Algorithm (calculates collision probability)
- SW-Infrastructure (Algorithm analysis)



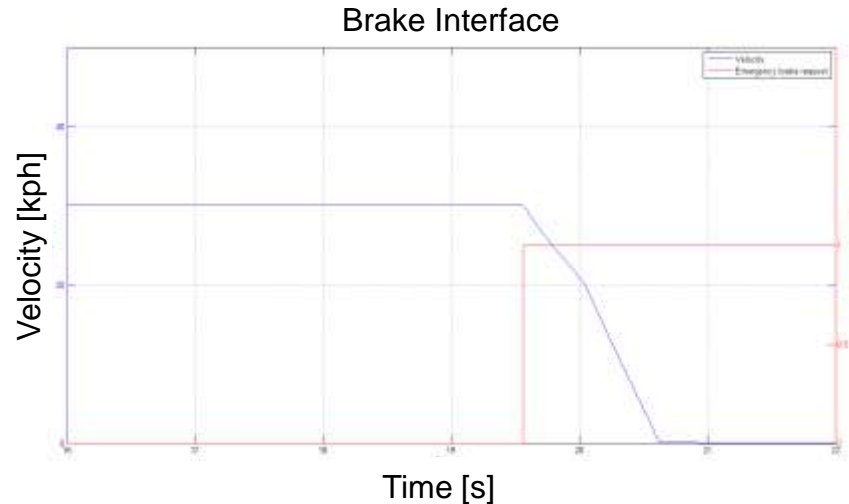
- Sensor integration into simulation environment (sensor characteristics, data channel, mounting position, ...)
- Sensor interface at code level towards data processing and export
- Shaded objects show reduced data quality



- Calculation of masking by coordinate transformation
- Transmission probability between accident partners is calculated by the Transmission Matrix according to the position within each calculation cycle
- Data comparison of real measured data and simulated data shows a high accordance

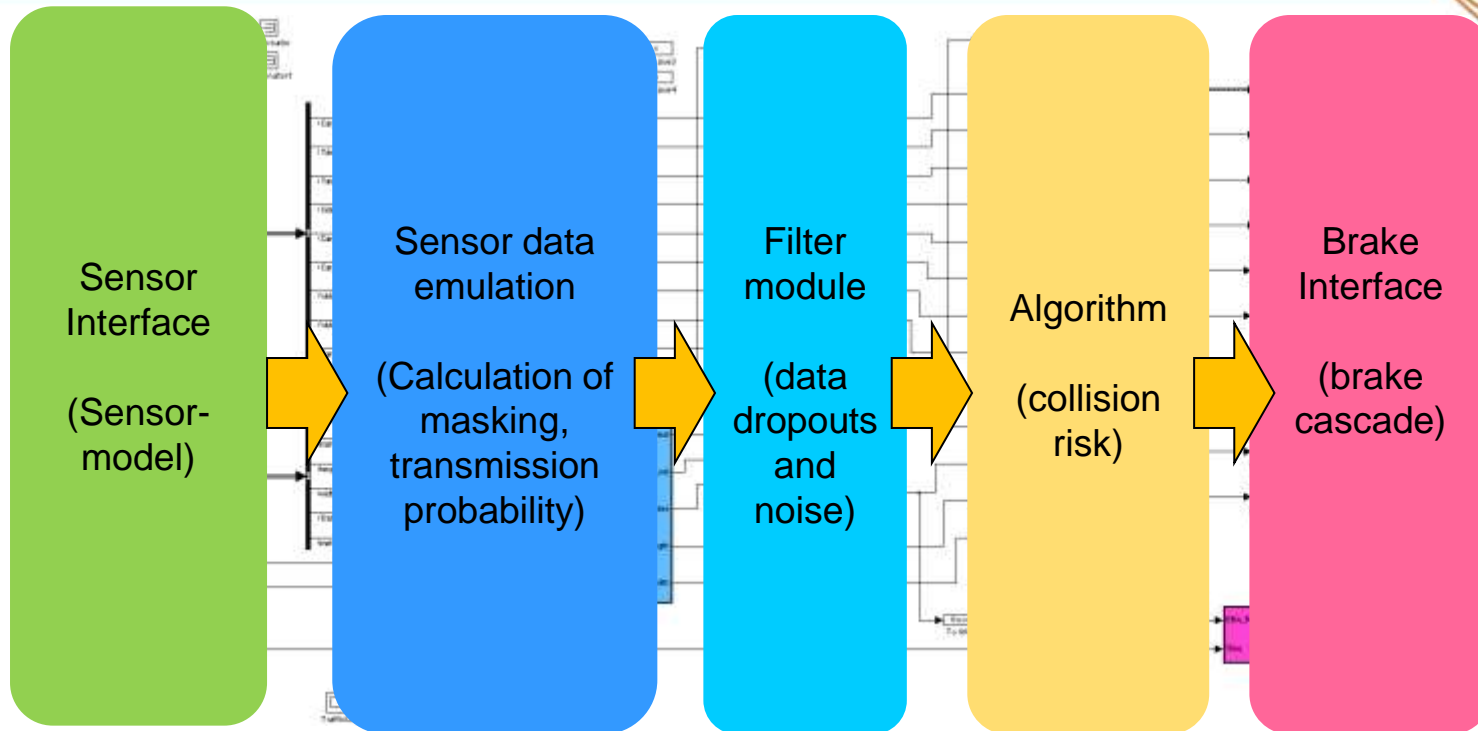


- The collision zone is calculated from the data of both parties involved in the accident and the accident geometry
- Calculation of the presence probability with different motion models (car, pedestrian, bicycle, ...) possible
- Collision zone and presence probability make the calculation of the collision risk possible



- Event based intervention in the simulation (inLoop) by a brake interface
- A typical braking cascade was realized

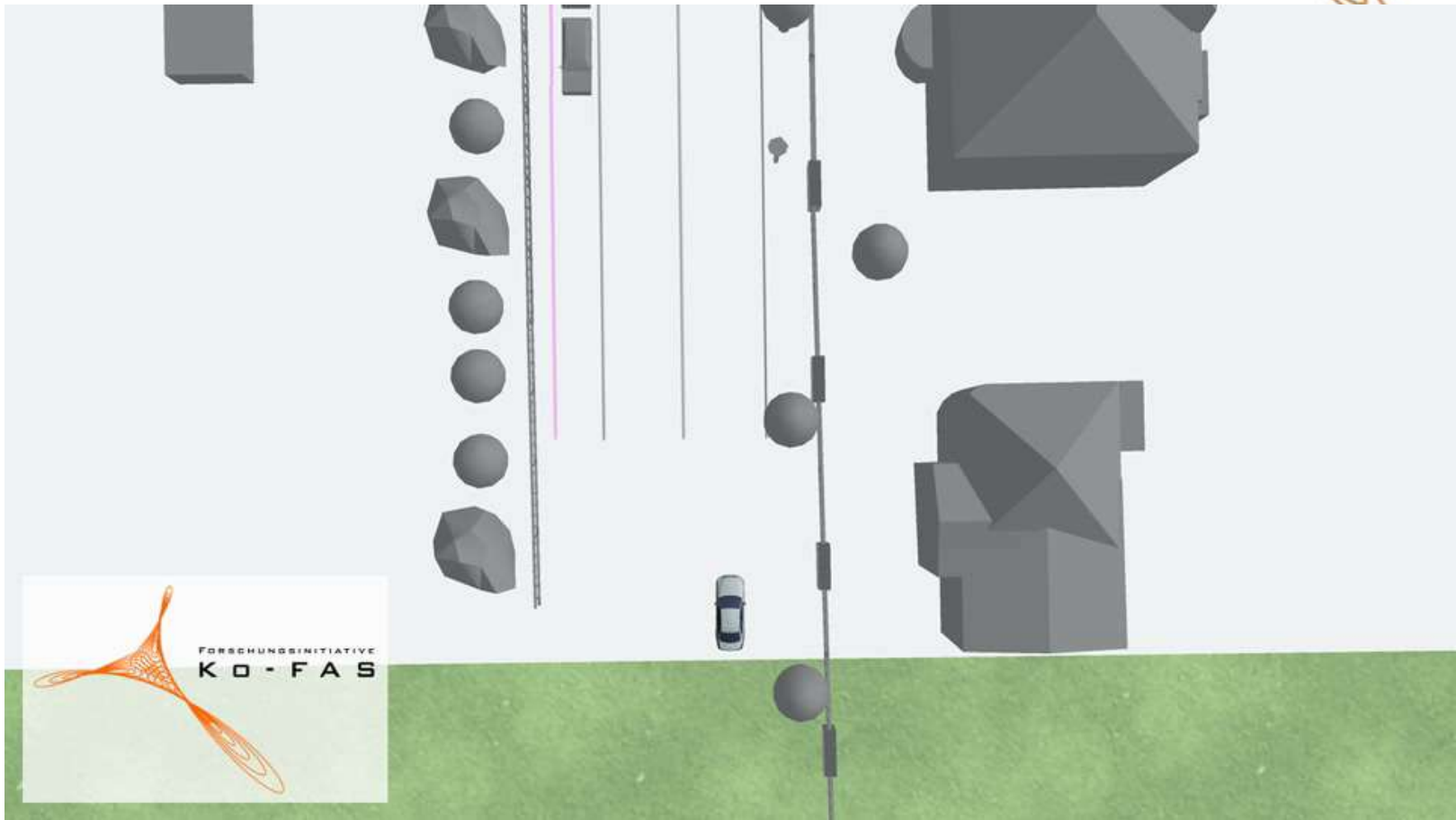
Code Modules Overview



Code modules for inLoop simulation in Carmaker



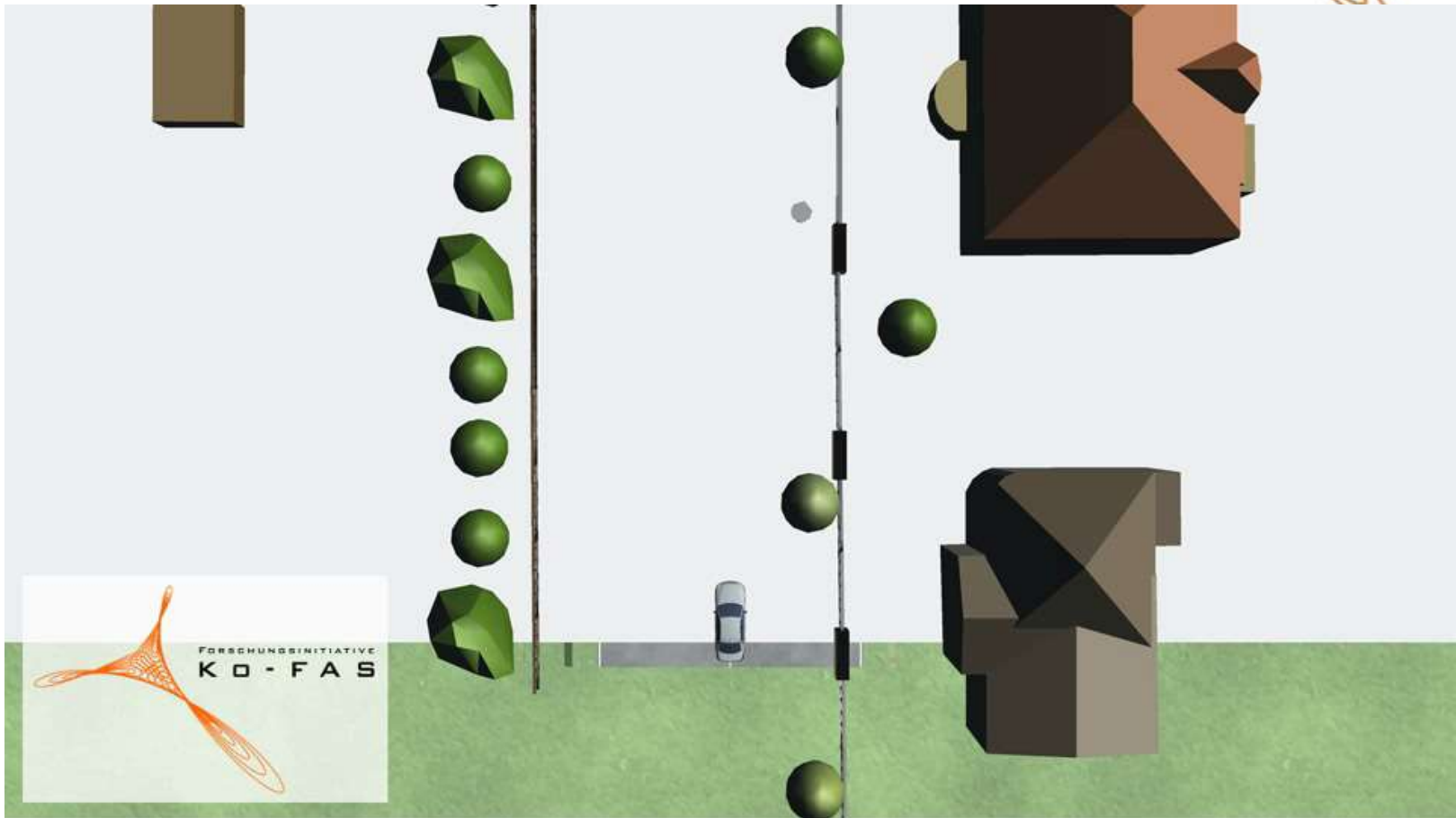
- Accident Avoidance, Scenario 1050714_Main_1



- Accident Avoidance, Scenario 1050714_Main_1



- Reduction of accident consequences, Scenario 1010080_Main_1



- Reduction of accident consequences, Scenario 1010080_Main_1



- The KoTAG sensor technology shows a high working potential
- inLoop – simulation of a driver assistance system has been realized successfully
- Assessment of the simulation result by transfer of the crash vectors to the VUFO (traffic accident research at Technical University of Dresden) for the benefit analysis

Thank you for your attention!



Udo Geißler und Oliver Faust