The Stuttgart Driving Simulator for Driver-in-the-Loop Simulation Tests

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KI DATA TOOLING — The Data Kit for Automotive AI

Facts

- Simulation dome with 5.5 meters diameter
- Lateral and longitudinal acceleration up to 0.8 g
- Yaw, pitch, roll and heave motion, vibration
- Surround view with 12 LED projectors
- Force feedback for steering wheel and pedals
- Simulation of ADAS based on optical, radar, ultrasonic sensors, and GPS simulation

Usage

- Chassis development and vehicle handling
  - Interactively distinguish and evaluate different chassis setups
  - Easy and quick variation of parameters of suspension, tires, steering, and drivetrain
  - Integrate active chassis-control algorithms
- Human-subject research
  - Laymen drivers
  - Reproducible scenarios
  - Driver surveillance and online interview
- Automated driving
  - Interaction of drivers with new driver-assistance systems
  - Driver behavior and control in partially automated systems
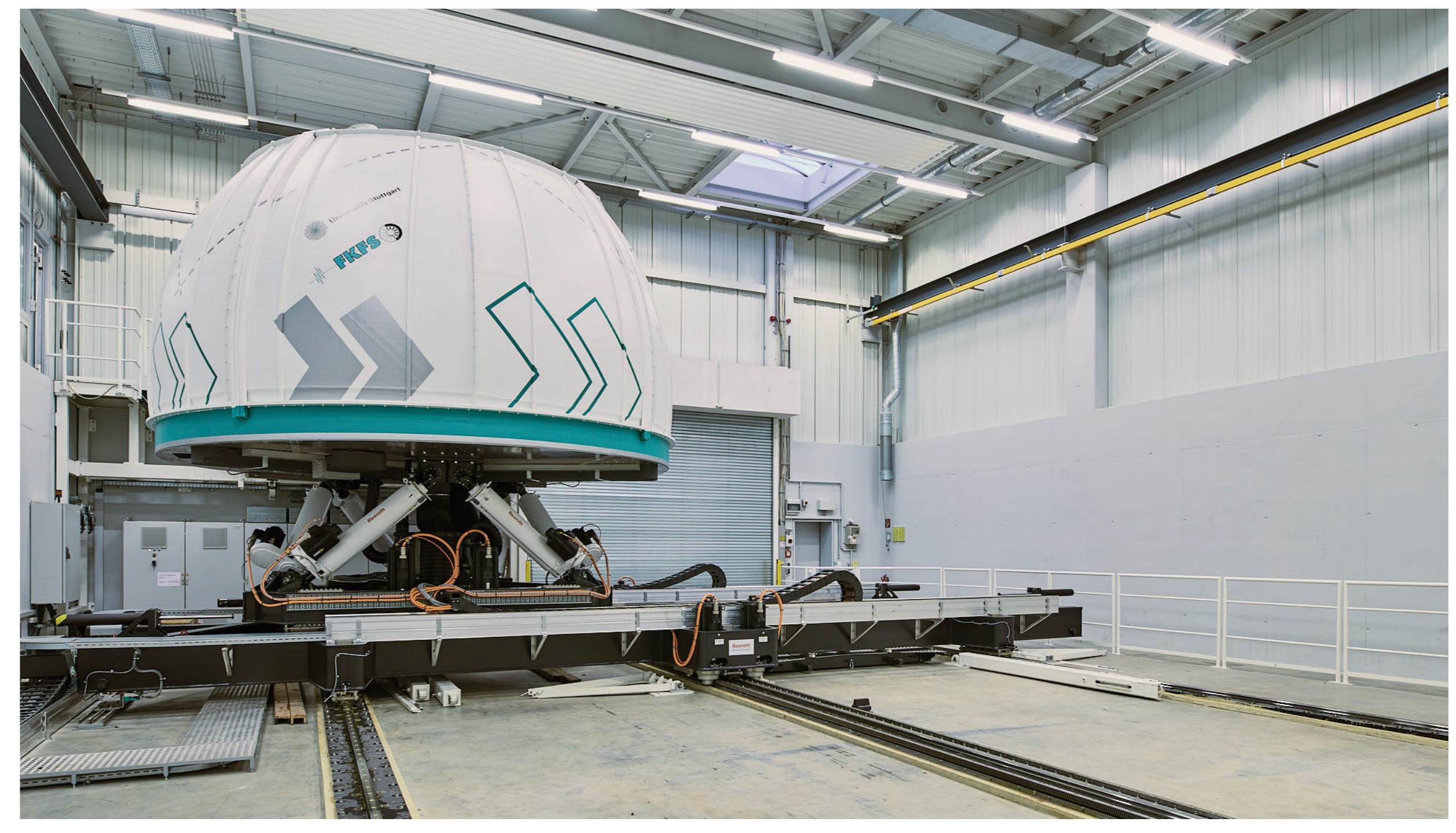 - Comfort studies in fully automated driving

Figure 4: Outside view of the simulator (© FKFS)

Example Radar Sensor-Simulation from ANSYS

Integration of sensor simulation is crucial for real-time applications, taking into account radar physical effects and phenomena. AVxcelerate offers high-fidelity physics-based simulation capabilities to provide realistic sensor outputs.
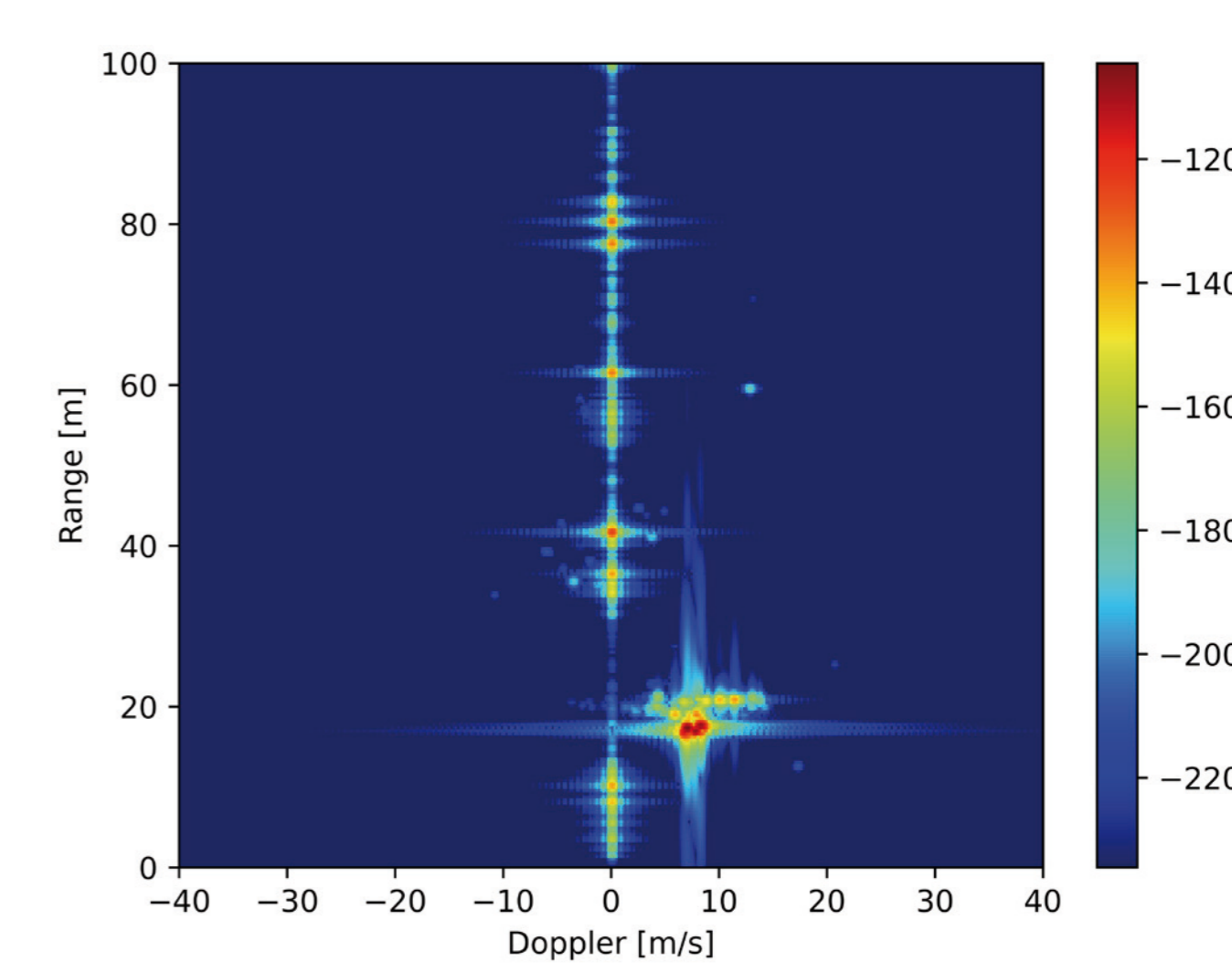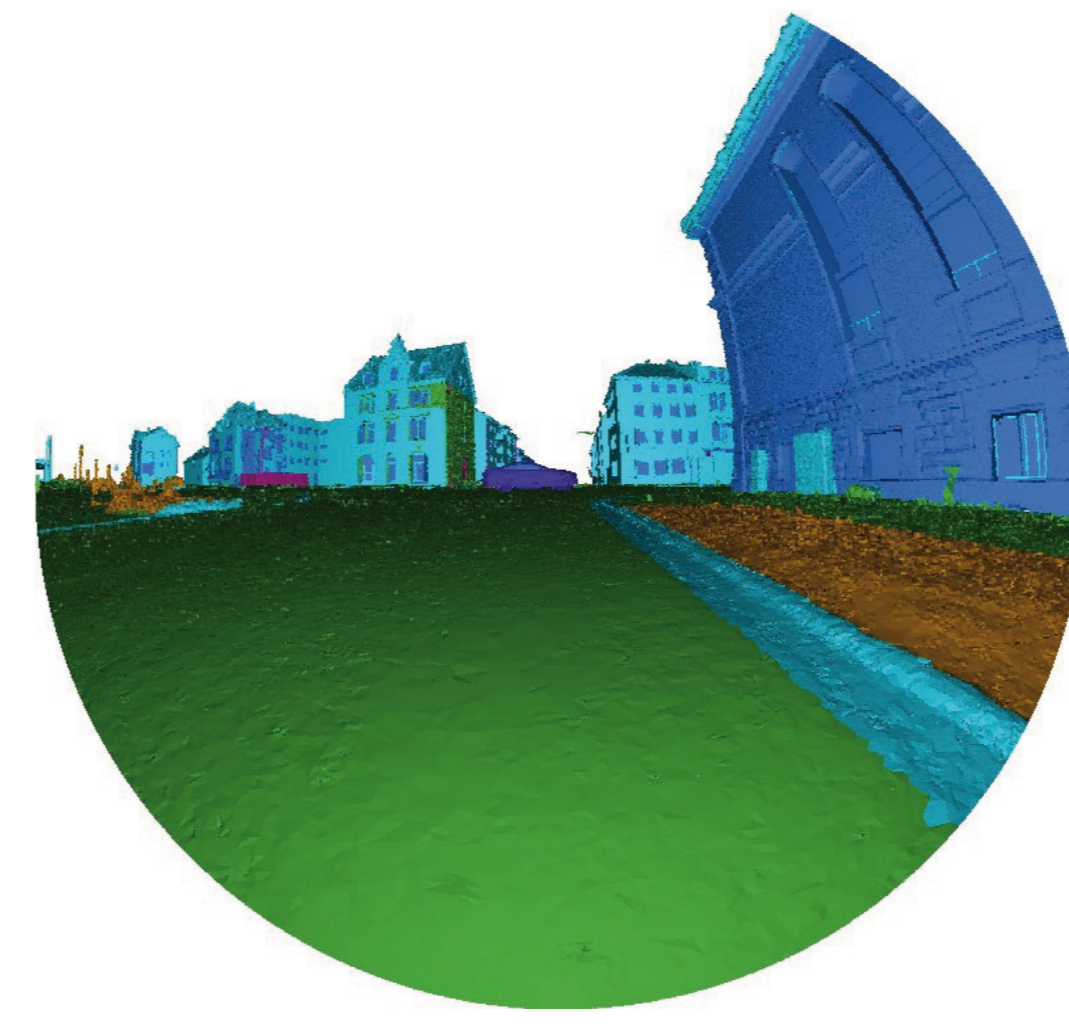

Figure 4: 3. Radar simulation output of Aschaffenburg crossing. Left: Radar Debug Viewer, Right: range-Doppler plot (© FKFS | ANSYS)

Simulation Framework

Integration of:

1) Driver interaction
2) Traffic simulation
3) Real-time graphics output
4) Environment simulation with standards like OpenDRIVE and OpenSCENARIO
5) Sensor simulation; AVxcelerate Radar
6) Vehicle movements
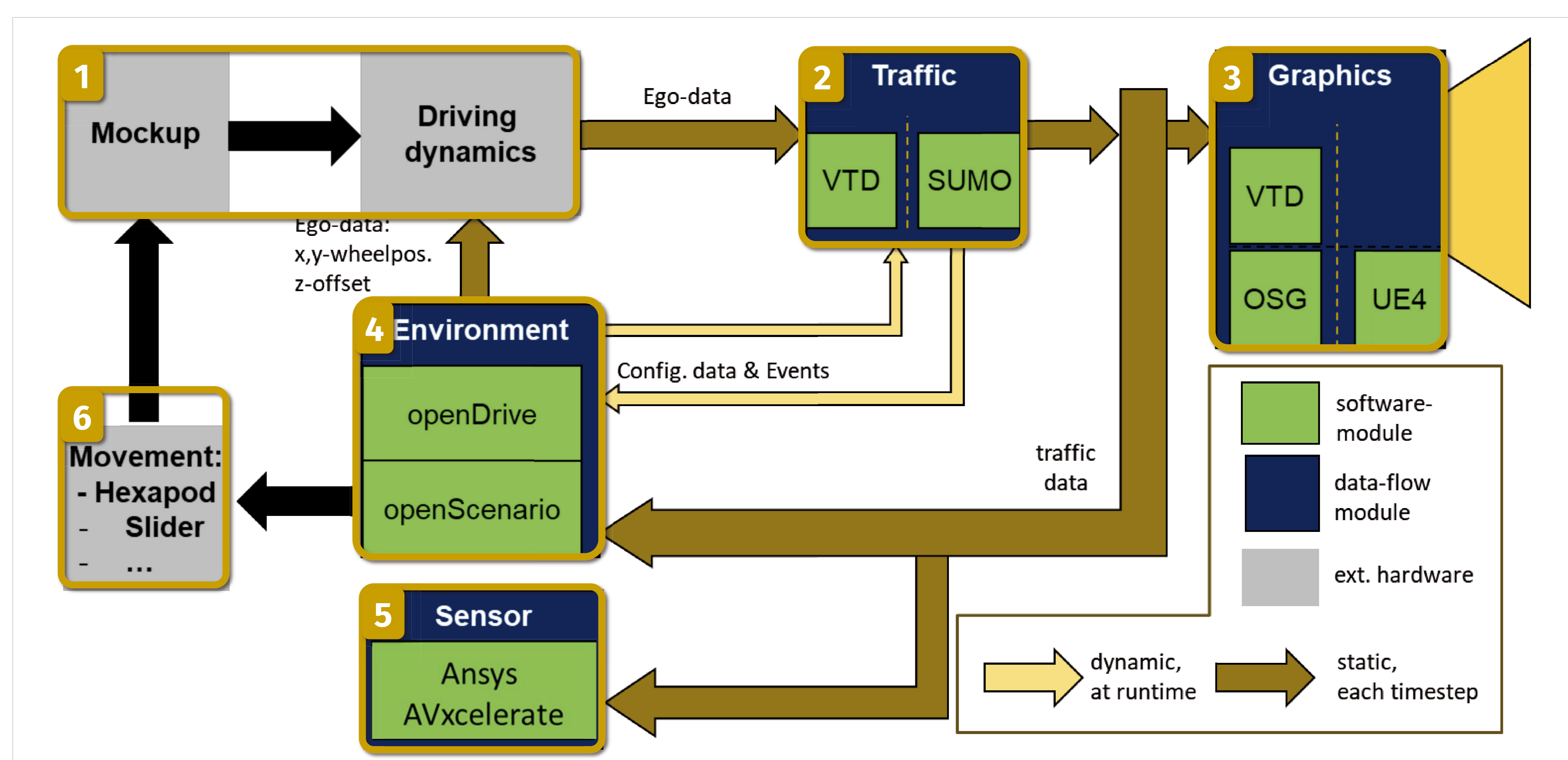

Figure 4: Inside view and simulation view (© FKFS)

Scenarios & Synthetic Data

Figure 4: FKFS driving-simulation framework with sensor simulation (© FKFS)

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