Embedded Success dSPACE
1. ASM for ADAS/AD – Overview
2. ASM Road
   - Build up from scratch
   - Import real data
3. ASM Traffic
   - Build up from scratch
   - ASM smart traffic
   - Coupling to SUMO / Vissim
4. Sensor Simulation
   - Configure MotionDesk Sensors
ASM for ADAS / AD
ASM for ADAS and Autonomous Driving (AD)

Vehicle Simulation
- Vehicle dynamics model
- Drivetrain
- Soft-ECU network
- Driver model
- Maneuver

Traffic Objects
- Vehicles, pedestrians
- Traffic signs
- Buildings
- Parking vehicles

Road Networks
- Roads and intersections
- Lane support
- Artificial/ real world roads
- Road import
- Roadside obstacles

Traffic Sensors
- Object list simulation
- Target list simulation
- Raw data generation

MotionDesk

ModelDesk
ASM Road – Key Features

- Road networks consisting of **roads** and **junctions**
- Independent height and surface definitions
- Lanes with smooth transitions and specific line definitions
- Easy-to-use **interactive road editor** in ModelDesk
- Data conversion from **real world** road data
Live Demo – Building up Road from Scratch
ASM Road – Conversion from Real Data

- OpenDRIVE import and export, OpenCRG import
- GPS or X,Y,Z measurement data
- OpenStreetMaps, ADAS RP, Here, SHAPE, Google Earth, HAD maps (*)

(*) in the context of projects
OSM Road Conversion Example

- Find road network in Open Street Map
- Set filters for roads, (buildings, ...)
- Store the data in Layers (.osm)
- Convert data to ASM data with dSPACE OSM Converter¹)
- Import in ModelDesk
- Add crossings, heights, buildings, traffic lights

¹) Available for ASM Environment/Traffic customers
Live Demo – Import Road from OSM
ASM Traffic – Scenario Definition

- Easy and intuitive scenario definition (UML-like)
- Improved **flexibility** and **usability**
  - Reuse of configured scenarios in different projects by copy/paste
- Independent definition of fellow scenarios
  - Flexible start point
  - Individual activity length
  - Individual activity transition
- **Unlimited number** of fellows
- Pre-defined scenarios for Euro NCAP
- OpenScenario (OSC) core team
ASM Smart Traffic

- ASM ego vehicle and fellows
- Recognition of
  - Priority signs
- Traffic lights
- Speed limits
- Stop signs
- Collision avoidance with other fellows
- Use-cases
  - Random traffic for robustness tests of ADAS/AD
  - RDE with realistic traffic simulation
Live Demo – Building up Smart Traffic
Traffic Flow Simulation

Features
- Simulation of realistic traffic flow (microscopic simulation i.e. movement of single vehicles)
- Evaluation of infrastructure changes
- Remote control via API possible

SUMO - Simulation of Urban Mobility
- Free of charge and Open-Source
- Developed by DLR (German Aerospace Center)
- Support of V2X Communication (e.g. Veins)
- OpenStreetMaps as import format

PTV – Vissim
- Commercial tool
- Developed by German PTV Group

Source: http://www.citi-lab.fr/

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ASM Traffic – Co-Simulation with SUMO & Vissim

ASM

ASM Ego

ASM Sensors

ASM Fellows

Δt = 0.001s

Traffic flow simulation

Position Ego

Ego

Position Fellows

Extrapolation

Δt = 0.1s

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Under Development
ASM Traffic – Co-Simulation with Vissim
MotionDesk Sensors – GPU Based
MotionDesk – Camera Sensor
(RLS 2016-B)

- Simulation of **lens distortion** effects:
  - Radial distortion
  - Chromatic aberration
  - Vignetting
- **Calibration** from real lens-camera combinations
  - Adobe camera lens profile
  - Adobe lens distortion model
- Configuration at MotionDesk
Live Demo – MotionDesk Sensors
Thank you for listening!
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