Cosimulation with CarMaker

Samples Pack 2021

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Across the innovation lifecycle

Prototyping

Machine Learning

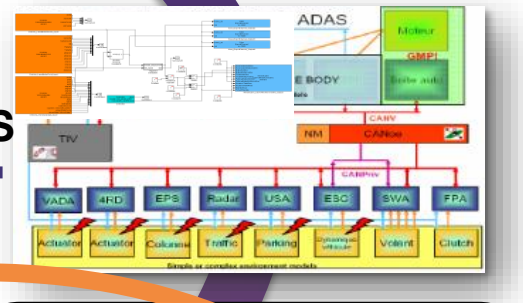
AI

Headlight

Validation & massive simulation

Virtual Reality - HPC

Specification



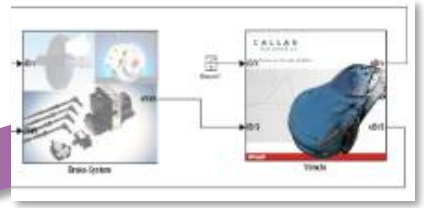
AD / ADAS

GUI & Infotainment

Virtual Testing - Driving Simulation

Development

Vehicle dynamics



Integration

Driver

CAD

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Automotive Domain > SCANeR™studio

CHALLENGES

- **Test and Validate Systems** from MiL to HiL with or without driver in the loop and using my **vehicle dynamics model**.
- **Communicate with various RT target** while maintaining a **critical loop frequency and delay**.
- **Simulate representative situations** (e.g. emergency braking, pedestrian crossing, cut-in, cut-off) or generate these from **industry standards** (e.g. NCAP).
- Etc.

SCANeR solutions

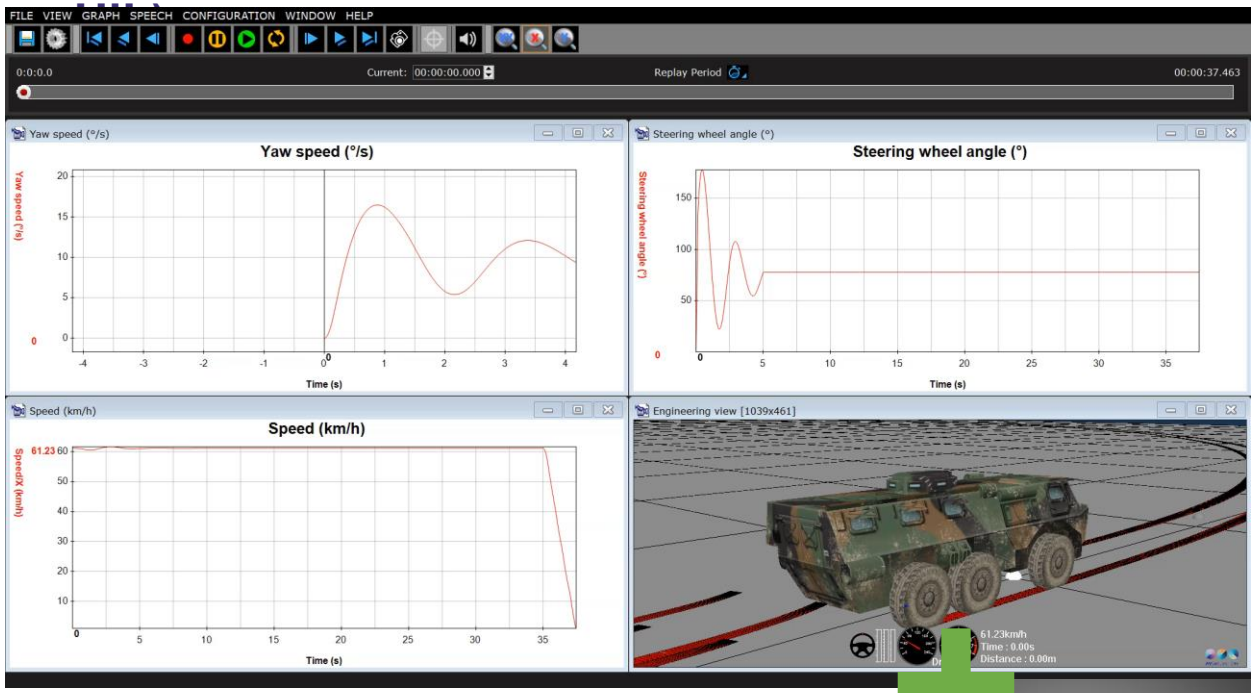
- **Vehicle Dynamics Interface**, use any vehicle dynamics model.
- **Real-Time Gateway**, ensure bidirectional real-time communication with any Real-Time target.
- **Terrain**, easily produce rich and representative environments (thanks to GIS import) with detailed rolling surface (e.g. VS Terrain).
- **Scenario**, intuitive and powerful tools to control in real-time all actors and trigger advanced events.
- **Analysing Tools,** intuitive and powerful tools to replay, analysis and export synchronized data (various format: 3D views, video, sound, Excel, etc.).
- **Real-Time Gateway**, ensure real-time communication with any Real-Time target.
- **Open & Modular Platform**, ease access to simulation inputs and outputs, thanks SCANeR SDK (C/C++, Python, Matlab/Simulink, LabView, C#, RTMaps, etc.)
- Etc.

SCANeR with CarMaker applications

Realistic driving experience (e.g. human factors | DiL)

Evaluate, validate:

- **Vehicles (e.g. full, components | ViL)**
- **Systems (e.g. ADAS, Headlights, Sensors | MiL >**



Third party software

Simulation Pattern → Custom → Results

Third party software

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CarMaker sample

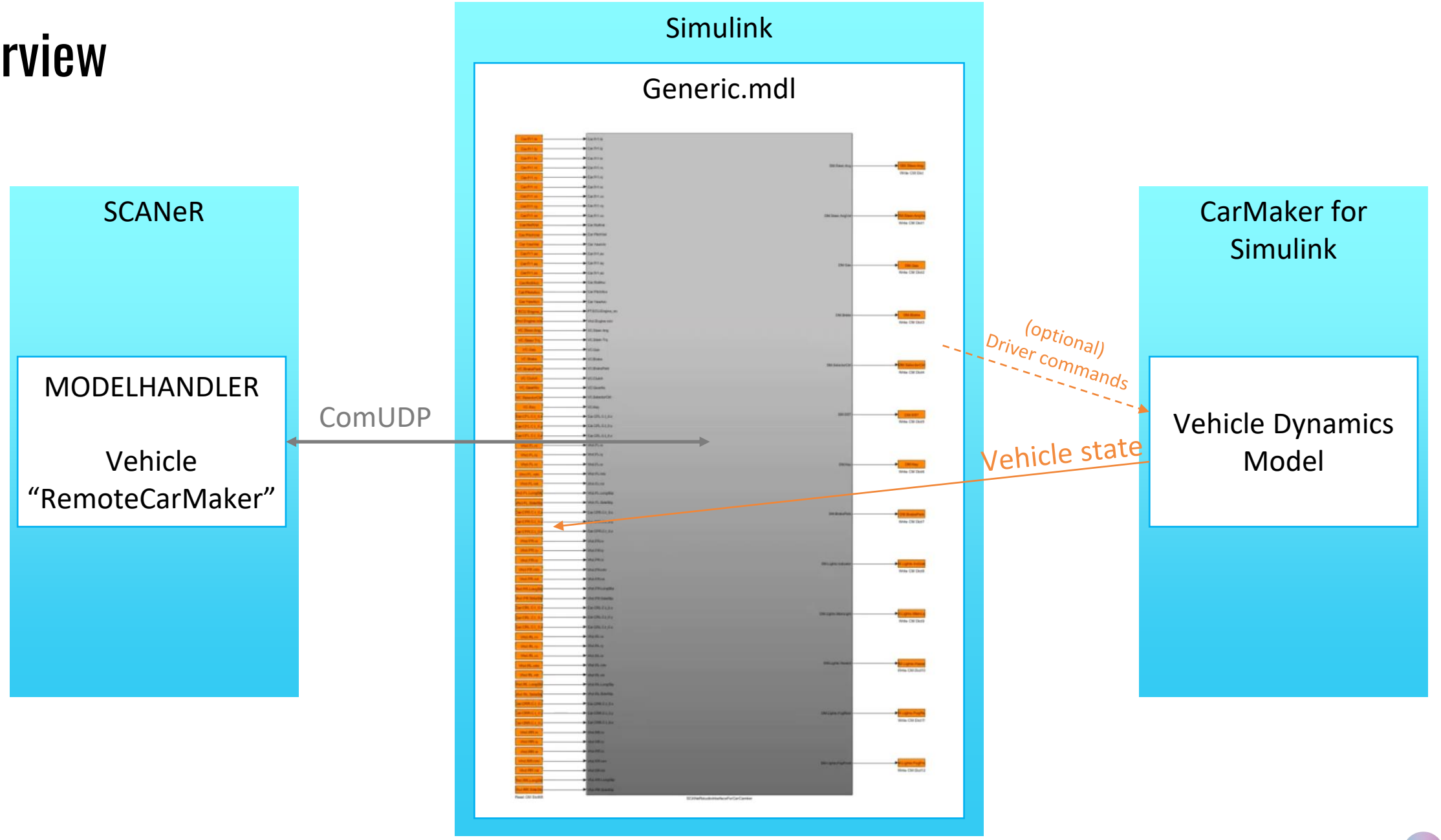
CarMaker Sample Introduction

This sample is an interface between CarMaker and SCANeR™Studio by using Matlab Simulink. In other words, it shows how to use the CarMaker vehicle dynamics model in a SCANeR™Studio Simulation.

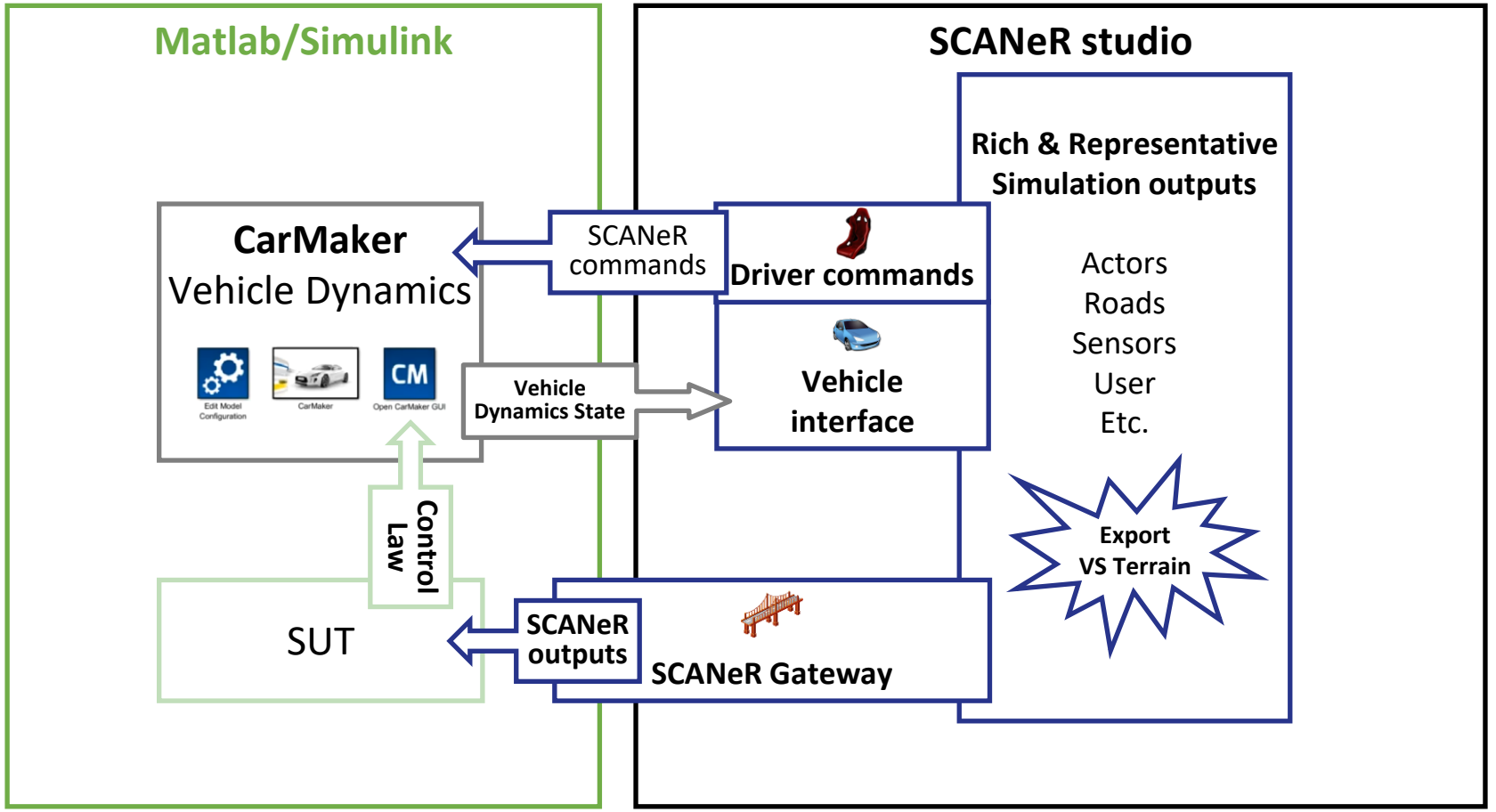
Requirements :

- Matlab 2016b
- CarMaker 8.0.0 or later
- SCANeR™studio

Overview


Simulink
Generic.mdl
SCANeR
MODELHANDLER
Vehicle
“RemoteCarMaker”
ComUDP
(optional)
Driver commands
Vehicle state
CarMaker for
Simulink
Vehicle Dynamics
Model

Interface Architecture



*SUT: System Under Test (MiL to HiL; e.g. AEB, AFS, LKA, AVM, etc.)

Hands on

Quick start

Install

- Download the CarMaker project Test_Software
- Extract under your <CarMaker>/ folder

Prepare

- Open <CarMaker>/Test_Software/src_cm4sl/generic.mdl
- In SCANeR, open the configuration EVAL_CARMAKER
  (the modules start automatically)
- Open CarMaker_Model.sce

Simulate

- Start the Simulink model
- Start the SCANeR™ simulation

Manual installation (make the)

- In CarMaker, create your project with a large road (as a plan area), Driver Manoeuvers should do nothing
- In SCANeR™Studio, create a scenario that uses the BlackLake terrain and the RemoteCarMaker vehicle (avalaible in the DEFAULT folder)
- In Matlab, past the CarMaker_Model.slx block in the main model of your CarMaker project <CarMaker_PAH>/<PROJECT>/src_cm4sl/generic.mdl, then link every input with a “Read CM Dict” CarMaker Block and every output with a “Write CM Dict” CarMaker Block. The keywords to set in the CarMaker block are given by the in/output name, then add “MaxBrake” in the model workspace (recommanded value: 400).
- Copy the folder: <STUDIO_PATH>/<VERSION>/APIs/samples/VehicleDynamics/RemoteVehicleModel/source in the folder: <CarMaker_PATH>/<PROJECT>/src_cm4sl/
- Copy the folder: <STUDIO_PATH>/<VERSION>/APIs/include/VehicleDynamics in the folder: <CarMaker_PATH>/<PROJECT>/src_cm4sl/
- Start the simulation by starting Matlab first then SCANeR™studio

Limitations

- The initial position cannot be set
- The wheel orientation is not optimized

Innovate > Simulate > Accelerate

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