DYMOLA – Vehicle Dynamics Library Active Safety

Overview

• Active Safety function modeling, simulation, and analysis

Key Features

• Active functions sensors and active components

• Test scenarios

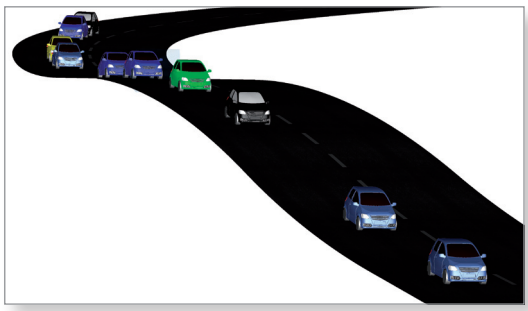
• Extended support for signal routing

• Model reduction

• Seamless Simulink integration

Benefits

• Complete driver-vehicle-safety system simulation in a single environment



Vehicle interaction in dense traffic.

The VDL Active Safety Library is targeted for the development of active safety functions. It provides a platform for complete systems integration which allows for efficient simulation of the driver / environment / vehicle / safety system behavior. Vehicles can be represented with different level of detail, allowing engineers to select the right representation, both for conceptual tests and detailed studies, and ultimately maximize the outcome of their company's active safety commitment.

> Powerful infrastructure

The VDL Active Safety Library makes great use of the inherent flexibility of Dymola® and VDL. Signal routing is managed through a global name-space that can be both predefined and/or expandable when needed. Controllers can be added anywhere in the hierarchy, and integration with Simulink is seamless. As a result, users are free to define any architecture to fit their specific needs.

> Library extension

To facilitate the design process, the library includes implementations of most active safety function behavior, the required actuators and sensors, as well as sample architectures. A first example is an embedded brake system controller with anti-lock braking, yaw stabilization, and traction control. Another example is a centralized vehicle controller that combines the above functionality with brake assist. The models can easily be copied and modified by users to fit their specific needs.

> Traffic and road information

With the extended functionality of the VDL Active Safety Library, users can set-up sensors to detect both surrounding objects and road information.

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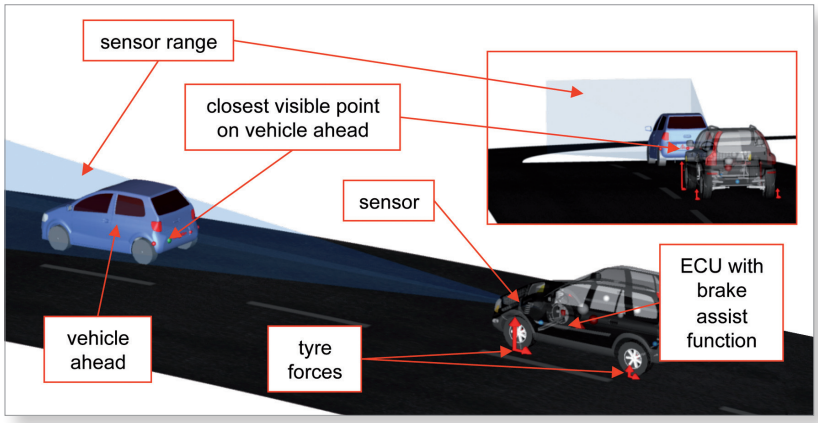


Screen shot from a brake assistance function test.

This includes sensors for distance to closest object, relative speed of object in front, road curvature, distance to lane border, and more.

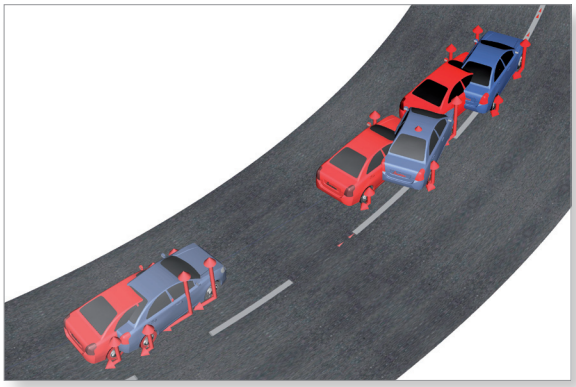
> Model-based control design

The VDL Active Safety Library has extended support model-based control design. As an example, there are single-track models that can both be used as reference models and in feed-forward design. For model reduction and control system calibration, there are predefined experiments and sensors to estimate parameters such as mass, inertia, and cornering stiffness. As all models are based on the equation-based Modelica® technology, Dymola / VDL has a built-in support for state-of-the-art controller design, including automatic model inversion.

> Use Case: Brake assist

The brake assist example illustrates a typical use case for the VDL Active Safety Library. Here, a standard brake system with anti-lock and traction control was extended with an ECU containing a brake assist function. The ECU uses information from a sensor that measures the closest distance to an object within its range. Provided that the distance is to short in relation to the relative speed difference, the ECU intervenes by sending a command to the brake system via the built-in signal bus. The configuration is evaluated using a standard driver-vehicle experiment setup, extended with an additional vehicle ahead.

The VDL Active Safety Library is developed, supported, and maintained by Modelon AB, a Dassault Systèmes technology partner.



Closed-loop driver braking while negotiating a turn. Comparison of two vehicles, with and without active brake force distribution.

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