The DLR Visualization Library

Recent development and applications

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The visualization of simulation data is an important element of advanced simulations. With the increasing complexity of modern multi-body simulations, concerning for example flexible bodies, thermal dissipation, or contacts, the demands for a realistic, real-time capable visualization of the simulation also rise. Using Modelica as modeling language allows the user to pack model functionality in reusable sub-models, e.g. as a replaceable block for a suspension, an engine, etc. This also enables the integration of visualization definitions into the single sub-models, eliminating the need for an additional visualization definition in a separate program.

In 2009, the "DLR Visualization Library" for Modelica has been introduced under the now deprecated name "DLR External Devices Library". The library features a variety of visualization blocks to be used directly as visualizers within Modelica. Visualization elements like configurable rigid bodies (e.g. sphere, box, gearwheel) or rigid and flexible bodies generated from CAD files can be displayed by connecting their respective Visualizer block to the corresponding frame in the multi-body model. Using the C-interface of Modelica, the visualization information is transmitted to the external visualization software which is started automatically with the simulation and allows the user to replay and observe the simulation run in real-time and export it as video.

New additions include among others: dynamic textures, rendering camera images or videos on flexible surfaces, Head-Up-Displays for presenting information and registering user inputs, a collision detection system, returning information about the 3D environment back to the simulation, a particle system, displaying non-rigid elements such as fire and integration of the Oculus Rift virtual reality device along side derived systems such as a wheel ground contact model and a flexible, interactive trajectory planner.
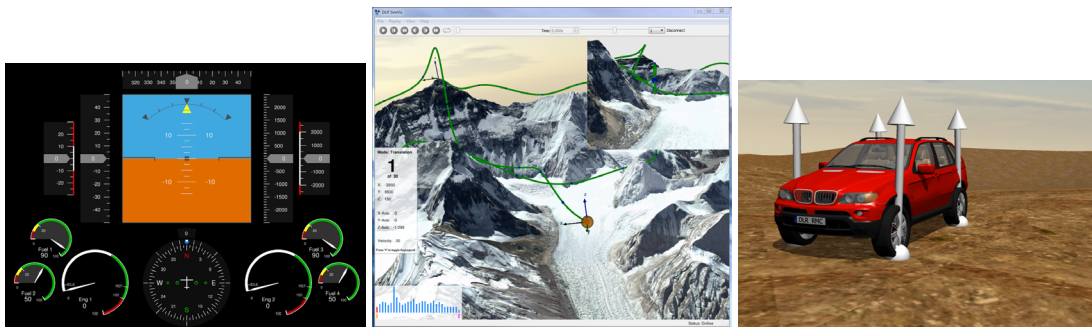

Figure 1: Examples of advanced visualizations; left to right: a complex pilots HUD with attitude indicator in the center, an flexible, interactive trajectory planner showing a path above Mt. Everest and a car driving on a 3D shape using collision detection and a contact model