OpenDS – An Open-Source Driving Simulator for Automated Driving

This talk introduces OpenDS, a free driving simulator, which has first been released under open-source license in 2013. As full-fledged driving simulation software for the evaluation of automotive applications is high in price and low cost simulators often lack of extensibility, OpenDS was initiated to provide a basic simulation toolkit to the researcher community and counts today more than 1500 users from both academia and industry.

OpenDS is implemented in Java and based on the jMonkeyEngine, a high performance scene graph based graphics API which uses Bullet for physics simulation. Due to a high number of extensions and a variety of pre-defined driving tasks, many different scenarios can be simulated out-of-the-box or be created with little effort. Moreover, OpenDS is ready to connect to various hardware (eye tracker, CAN bus, motion seat, steering wheel, Oculus Rift) as well as software (traffic light simulation, multi-driver simulation, data and multimedia provider) and supports multi-screen output for surround projection.

The latest development is driven by the H2020 Dreams4Cars research project, where the simulation software will be used to train an artificial driver in a safe environment. By the means of simulation, almost any critical situation which might never appear under real conditions – even after millions of kilometers of driving – can be created, modified, and simulated multiple times.

The talk also gives insight in the recent simulation developments of the project, especially into the “dreaming mechanism” where critical scenarios will be generated automatically for subsequent simulation, the integration of an interface to operate the virtual vehicle by the artificial driver, and the integration of Chrono, a more realistic multibody physics engine.