Integration of DYNA4 Car Professional with SUMO to perform virtual testing of automated vehicles in complex surrounding traffic

Abstract:
Increasing automation in the automotive sector will lead to a stronger interaction of individual vehicles with surrounding motorized and non-motorized traffic and with traffic infrastructure. This creates new requirements for virtual development and testing that can be met by integrating automotive and traffic engineering simulation tools. To this aim, an approach is presented to integrate the vehicle dynamics simulation software DYNA4 Car Professional and the microscopic traffic flow simulation SUMO seamlessly. This is achieved by establishing a co-simulation setup between the two tools while using common map information based on the OpenDRIVE road description format. Thus, the simulation domains mutually profit from each other by combining their core strengths. As such, the whole vehicle and environment simulation capabilities of DYNA4 are facilitated by SUMO’s simulation capabilities for complex and realistic traffic scenarios including traffic control measures. This setup allows to improve the development and virtual validation of vehicle control systems for autonomous driving. At the same time, the possibilities to evaluate the effects of automated vehicles on traffic
flow with SUMO are improved by permitting the usage of DYNA4’s highly detailed whole vehicle models including driving dynamics, controllers and in-vehicle sensors like camera, radar, lidar and ultrasonic.