I. Hardware-Setup

A. Base vehicle

The hardware base is a dolly manufactured by Parator Industries. The steering system is based around the Electronically-controlled hydraulic Trailer Steering (ETS) developed and built by V.S.E. Vehicle Systems Engineering B.V. (VSE) with two hydraulically steerable axles. It was originally meant to be used in trailer steering as an aftermarket system and thus does not tie in with any of the truck's communication networks or sensor data. This makes it OEM-independent and very robust. The ETS solely relies on the articulation angle between the leading and following unit and the speed of the combination. The articulation angle is gathered via a dedicated sensor mounted on the king-pin of the respective unit, the speed-signal is gathered from the ISO-11992 Controler Area Network (CAN).

The axles permit a maximum steering-angle of 24°

B. Rapid-prototyping system (dSpace MicroAutoBoxII (MABII))

To execute the readily developed algorithms[**?**], that govern the steering of the High Capacity Transport (HCT)-combination, they needed to be ported to a platform, capable of interacting with the dolly and the tractor, while ensuring robust behavior during run-time. It was decided to incorporate the MABII by dSpace, a real-time platform for its advantages in automotive environments with a vast selection of in- and outputs for interfacing with vehicular communications systems (CAN, ethernet, FlexLink). It conveniently ties in with Simulink, which was used for algorithm development, for code-generation. Furthermore it physically is very robust and has good logging possibilities.

C. Arduino

To convert from CAN-messages to serial data directly usable in the real-time simulation, an Arduino Due together with a MCP2551 CAN-transceiver was used. This provided the feedback-loop from the hardware-system to the simulation environment during the Hardware-in-the-Loop (HiL)-testing.