CAN Newsletter Online

COLLABORATION

Hardware-in-the-loop validation of automotive radar sensors

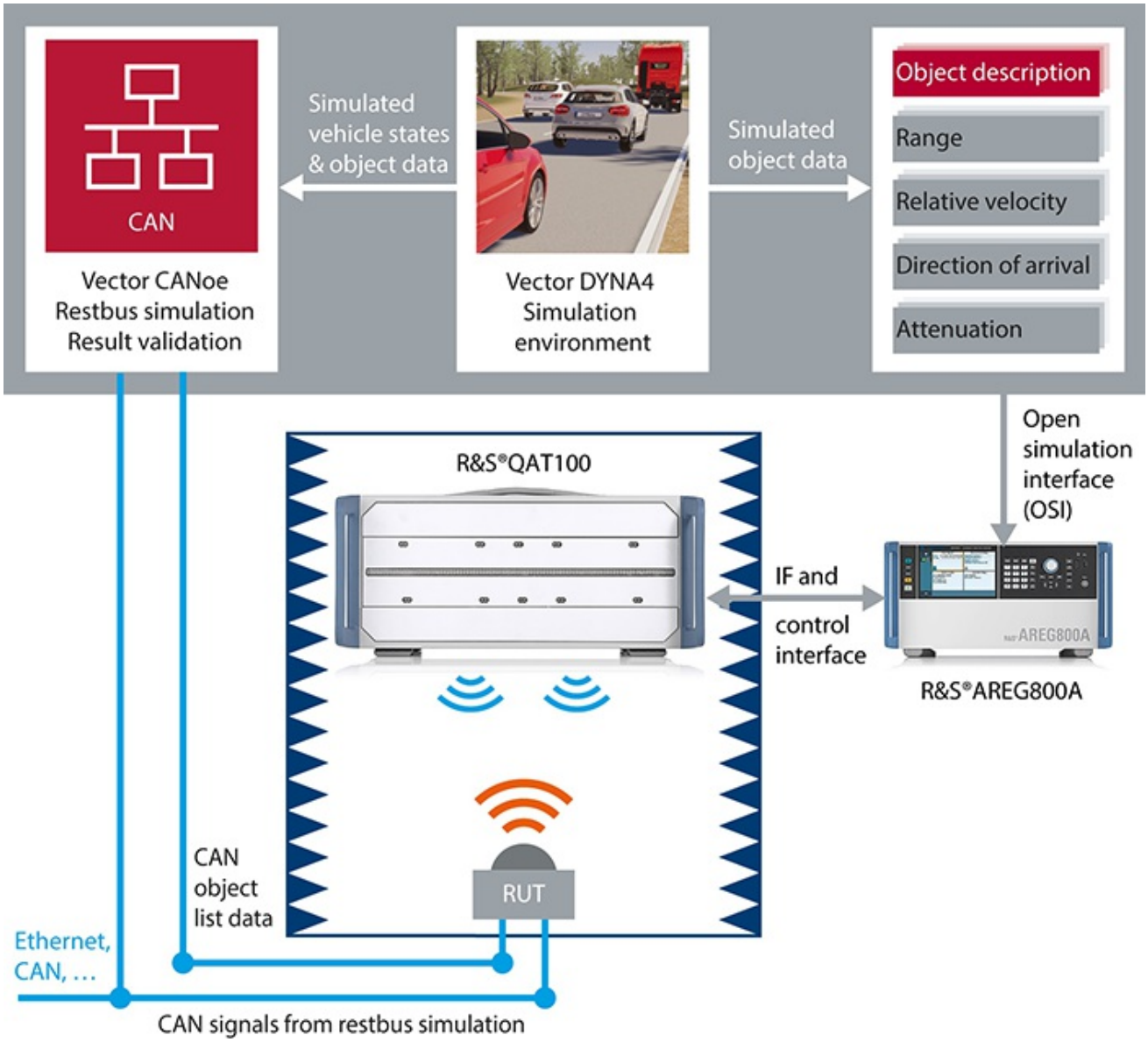
Rohde & Schwarz and Vector Informatik are collaborating on closed-loop scenario testing of automotive radar sensors for advanced driver assistance systems (ADAS) and autonomous driving (AD).

The AREG800A enables possibilities for testing radar-enabled ADAS features (Source: Rohde & Schwarz)

Coupling the DYNA4 virtual test drive simulation platform from Vector with the latest Rohde & Schwarz (R&S) radar moving object stimulation system enables verification of safety-critical ADAS functions. These include emergency braking in an integrated hardware-in-the-loop (HIL) environment.

HIL testing is a technique used to accelerate the development of complex real-time embedded systems such as ADAS in situations where using a fully assembled vehicle is not possible or too costly, time-consuming, or dangerous, explained R & S. Instead, the operation and behavior of supporting systems are electronically simulated.

The system setup consists of the Vector DYNA4 virtual test drive software, which provides the environment simulation and the user interface for scenario configuration and test execution, and the Rohde & Schwarz radar test system, which generates dynamic artificial objects for the radar sensor under test based on ASAM OSI object lists implemented in the DYNA4 environment simulation software. Vector CANoe receives the radar sensor's bus output signals with the objects detected by the radar, and the software then analyzes and visualizes them. The detected objects are also compared with the simulated ground truth.



Setup with Vector's CANoe and DYNA4 virtual test drive software, connected with the R & S radar test system (Source: Rohde & Schwarz)

The Rohde & Schwarz radar test system comprises the R & S AREG800A automotive radar echo generator as the digital backend and the R & S QAT100 advanced antenna array as the frontend. The solution enables possibilities for testing radar-enabled ADAS features and ensures the safety of 1/3 autonomous driving functions in HIL setups, explained the companies Antenna array technology allows artificial objects to be generated for the radar sensors at variable distances and with variable radial velocity, object size, and angular direction. Antennas and test equipment do not need be moved physically.

CANoe

CANoe is a software tool for development, test, and analysis of individual ECUs (electronic control unit) and entire ECU networks. Versatile variants and functions are provided. Already with the basic CANoe users have a tool for simulating, analyzing, and testing of CAN networks. The CANoe multibus concept allows to operate Classical CAN/CAN FD, LIN, Ethernet, Flexray, and Most. Options for CANopen or J1939 are also provided.

A responsive and dedicated HIL interface that conforms to the ASAM open simulation interface specification allows realistic over-the-air stimulation of radar sensors with driving scenarios. In addition to offering regular radar based ADAS feature tests such as adaptive cruise control (ACC) and autonomous emergency breaking (AEB) scenarios, the system can be upgraded to cover advanced test cases. The combination accelerates the development of ADAS features and enables users to test ADAS/AD features and complex validation processes in a controllable and representative environment.

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