

Simulate V2X Environments

Mx-Drive™ is a multi-vehicle and infrastructure mobility simulator that provides an environment to generate and run real-world conditions to test smart/connected vehicle applications. Working in the Mx-Suite ecosystem, with its extensive support of I/O devices, testing of Advanced Driver Assistance Systems (ADAS), Sensor Fusion, Radar, V2X, etc., is significantly simplified.

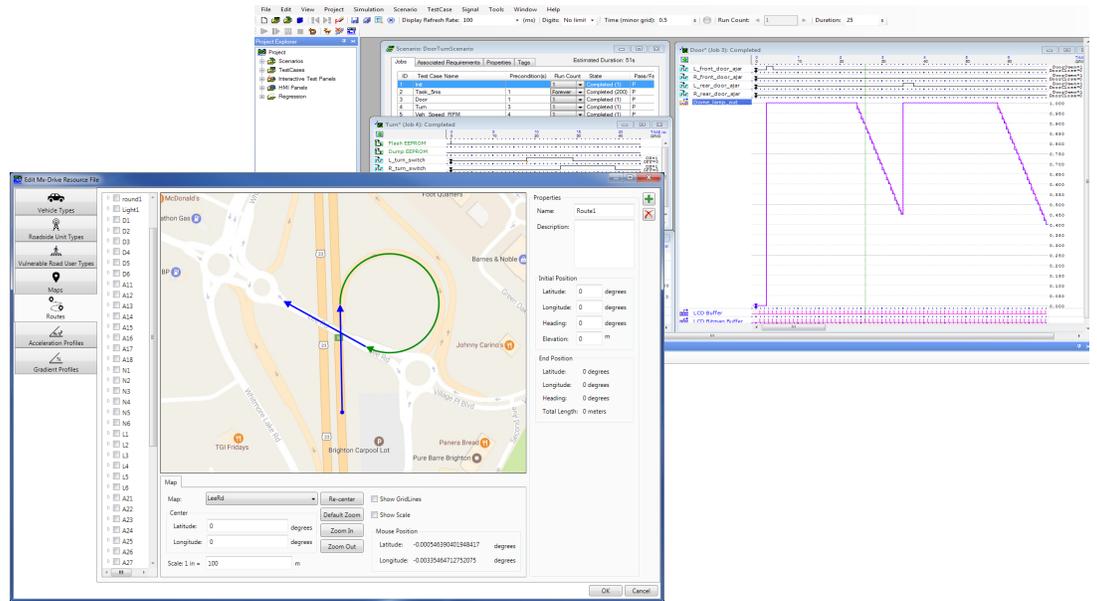
Benefits

Provides more thorough testing of the algorithms than is possible in road only testing

Using a programmatic approach to creating tests, alternate use cases can be easily created from basic conditions, thereby allowing extensive sweep and corner case testing

Mx-Suite's integrated Code Coverage capability helps assess the integrity of the test

Uses the same core as the Mx-DSRC test platform allowing full compliance testing to V2X DSRC standards



Features

The simulation environment can be built, checked, and calibrated using actual recorded road test data

After designing a base suite of standard test cases for V2X applications, test variants can be introduced that sweep through test parameters such as speed, lane, direction, and altitude

This highly scalable solution uses threading with multiple PCs and DSRC modems, as needed, to achieve the design target of 1000 simulated entities

Precise time synchronization of bus and DSRC message traffic is achieved using real-time GPS simulation

Testing V2X Applications

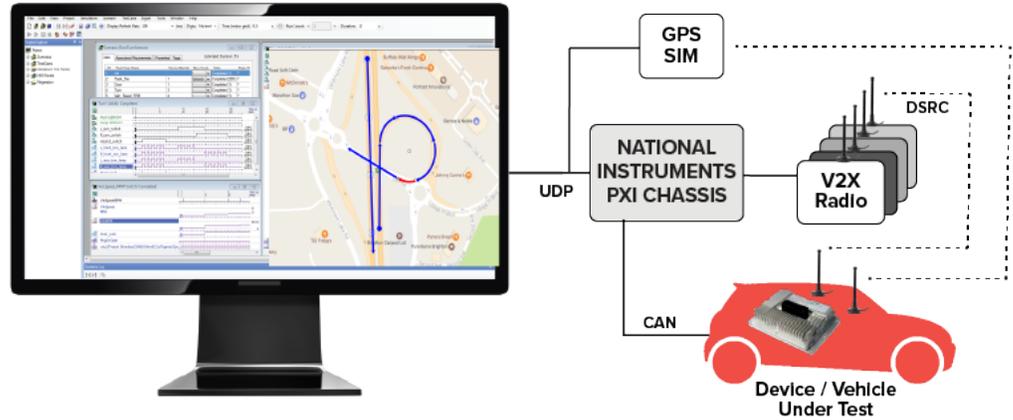
As with other ADAS systems, testing V2X applications on actual roads is very constrained. It is difficult to set up and reproduce test conditions, only a limited number of test conditions can actually be achieved, and safety/damage risks further limit the work that can be done. Given this, the value of testing V2X applications in a simulated environment becomes all the more important.

In the simulation domain the primary challenges of testing V2X applications include:

- Specifying the route of the vehicle under test and the routes of all the other vehicles that will be transmitting V2X messages
- Defining the V2X infrastructure and its behavior
- Producing coordinated GPS, vehicle bus and RF transmissions
- Defining additional actors, such as people and bicycles

The Mx-Drive extension to Mx-Suite delivers the necessary functionality to allow for testing in a fully modeled test harness (MIL) and in a bench test fixture (HIL). Routes can easily be specified, both manually and programmatically. Infrastructure transmissions (e.g. BSMs, TIMs and PSMs) can be configured. Test equipment is precisely time synchronized using generated GPS transmissions. All existing benefits of Mx-Suite, such as test data presentations, pass/fail determination, reporting, etc., remain fully available.

Mx-Drive Transform



Example: DSRC System Test

Mx-Drive Elements

The Mx-Drive environment provides several key capabilities for testing V2X (V2V, V2I, V2P) applications. These include:

- ✓ Simulating the movement of objects such as vehicles and people, as well as the data messages for roadside units (RSUs) and on-board units (OBUs)
- ✓ Generating a GPS signal with simulated time and position data for the unit under test
- ✓ Delivering synchronized CAN, or other vehicle bus alternatives
- ✓ Providing 'alternate' data source choices (if necessary) to deliver simulated accelerometer/gyro information to the SUT
- ✓ Using the Danlaw DSRC modem to transmit SAE J2945/1 messages such as BSM, EVA, TIM, and PSM; its comprehensive suite of processing transforms perform the message data packing, encoding, and security in conformance with industry specifications
- ✓ Support for verification of application algorithms in MIL, SIL and HIL test environments
- ✓ Offering a graphical and a programmatic approach to creating tests
- ✓ Examining or controlling message element details during tests, such as pass/fail or reactive code generation

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Mx-Drive is part of the Mx-Suite Embedded Software Test platform. Please refer to the Mx-Suite datasheet for a comprehensive description of its rich features.

Related Products

- **Mx-Suite Embedded Software Test Automation** is the most comprehensive automated platform for embedded software verification and validation
- **Mx-DSRC Test System** provides ISO, IEEE, and SAE V2X certification tests