Vehicle-in-the-loop testing

Vehicle-in-the-loop methodology covers the current gap between simulation and physical test methodologies by **integrating a synchronized virtual environment into a real vehicle**, doing testing in a simplified track environment, and guaranteeing the correlation between physical and virtual vehicle positioning.

In response to an ever-increasing complexity in the Automated Driving functions implemented in vehicles, IDIADA's Vehicle-in-the-loop services provide solutions that allow the **broadening of the testing coverage matrix** as well as **more complex and dangerous test scenarios** achieved through simulation.

Thanks to our expertise with advanced simulation tools, we have designed a **new virtual testing platform** to support the development of [ADAS and Automated Driving](.).

By applying IDIADA's methodology, virtual sensor information is injected into the ADAS and Automated Driving vehicle's ECU to test the vehicle's behavior when triggering the physical actuators. **The geo-localization of the vehicle and the use of digital maps allows us to merge virtual and physical worlds**, providing immersive scenarios to the driver.

In essence, **we create virtual hazards for the vehicle**, visible also to the driver through augmented video display, which it must then avoid through real physical action on the proving ground. The virtual hazards can include multiple vehicles and vulnerable road users and explore scenarios that are too complex or dangerous to enact with physical target equipment.

The main applications of Vehicle-in-the-loop are the pre-calibration and evaluation of the ADAS and Automated Driving systems and it is also being assessed by [Euro NCAP](#) to be included into the process of determining a vehicle's safety rating, allowing a wider test matrix coverage.

Through specialized simulation software, our engineers can generate a **wider range of complex traffic scenarios** according to existing and future standards, guaranteeing the safety of the driver.

Our Vehicle-in-the-loop testing is a cost-effective solution that allows ADAS and Automated Driving systems development and validation in multiple complex or dangerous scenarios, with **less requirements for [proving ground](#) resources** (as it requires only simple tracks, with virtual targets), **reduced logistical effort** and guaranteeing **high tests accuracy and repeatability**.

IDIADA has all the necessary know-how and tools to perform **Vehicle-in-the-loop turnkey programs**. Our versatile and modular virtual platform is a tailored solution that adapts to our clients' requirements.