

Virtual driving boundaries pushed with new simulation software

Although driving simulators have been around for many years, there has never been better interactive 3D simulation software available than there is today. And there have never been so many applications for this simulation technology – technology that enables the ‘virtual’ driver to have a ‘real’ driving experience, on- or off-road.

While this technology has traditionally been used in human factors research, advances in software development have led to driver training and transport planning also becoming important, including research into advanced vehicle safety and autonomous driving systems.

The choice of hardware depends primarily upon the available budget and project objectives. While all users would like a multimillion-dollar hexapod-based system, not everyone has the wherewithal. However, most professional applications demand more than a simple steering rack and LCD screen.

Cost-effective solutions

To solve this problem, Forum8 provides a wide choice of modern hardware systems, based on both cost and technical specification. The ‘trick’, if that’s the right word, is to be able to offer an interactive 3D VR simulation software solution that can move seamlessly from a basic desktop simulator to the most complex hexapod-based system. Forum8’s VR-Design Studio simulation software (VR-DS) can be used to mimic the real world in all its glory, thereby providing the driver with a truly realistic driving experience.

The primary objective of VR-DS is to enable simulation



Left: An in-car view of the simulation system

Need to know

Forum8 aims to provide the most realistic driving experience technically possible

- Forum8’s VR-DS allows road traffic and the driving environment to be set and altered
- VR-DS is used in V2V and V2I research
- The addition of driving sounds increases the ‘reality’ of the experience
- FORUM8 cluster software enables multiple drivers to simultaneously drive in the same 3D VR networked environment

of the real world as accurately as technically possible. This includes being able to reproduce and control every conceivable environmental effect, including the time of day, location, shadows, lighting, headlights, puddles, rain and snow.

The next step is to enable traffic to be set and controlled – including its speed, volume and direction. As well as this, the inclusion of a scenario editor enables an infinite number of ‘what if’ events to take place.



Above: Forum8’s new 6DOF driving simulator

The option to build 3D traffic systems from 2D micro-simulation data is also available.

Reality check

Sound is added to complete the virtual driving experience. This includes the sound of the engine, horn, tires on different road surfaces, wind, rain, thunder, as well as other sounds associated with driving, such as crashes. VR-DS is also able to monitor and record the driver’s carbon footprint through its Eco Drive system. In addition, the dynamics of the driven vehicle can be altered manually, or data can be imported from one of the industry standard third-party dynamics packages.

The VR-DS also enables remote control of the driven 3D environment, as well as scenarios by a trainer or operator using a wireless tablet

or via a PC in a control room. Audio communication is also available from trainer to trainee(s).

The VR-DS software development kit (SDK) enables the production of a range of interfaces that allow features such as eye-tracking devices and head-mounted displays to be integrated within the overall driving simulator, along with hardware-in-the-loop (HILS) simulation systems.

Testing roads of the future

The latest application of DS systems, and in particular the VR-DS software, is in research into vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) communications. This work is possible due to the ability to incorporate various warning systems and cameras, and the use of the Forum8 cluster software, which enables multiple drivers to drive within the same 3D VR networked environment.

The Forum8 software developers have also created Driver Diagnosis, Data Log-Export and Replay plug-ins to make it possible for the actions of the driver and vehicle to be monitored, recorded and replayed for research and training purposes. ○

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