Virtualizing a traffic world

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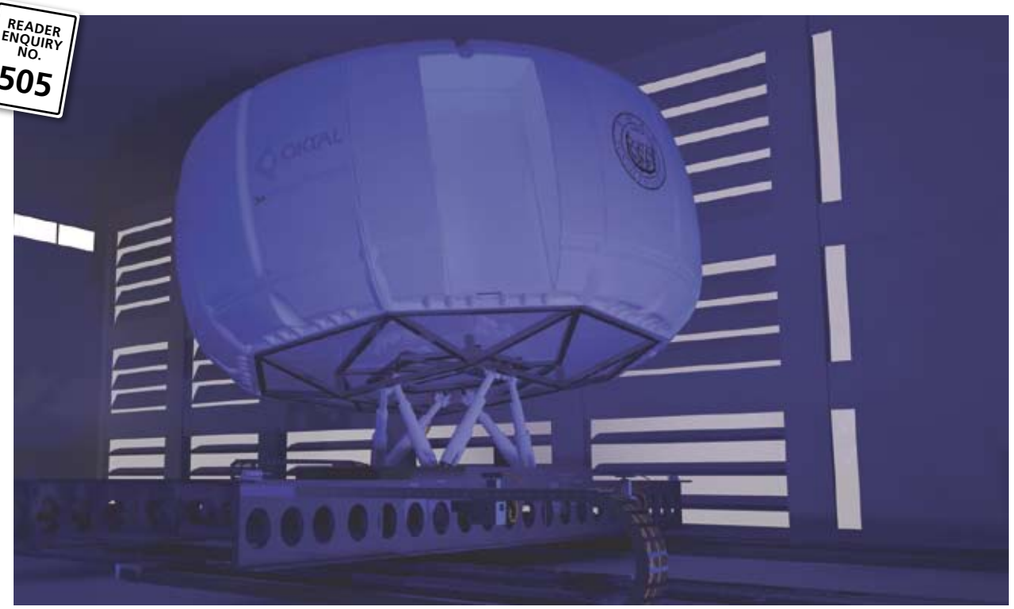


(Above) **The SCANeR driving simulator**
(Below) **Screenshots showing the realistic traffic situation that is created by blending Aimsun with SCANeR**

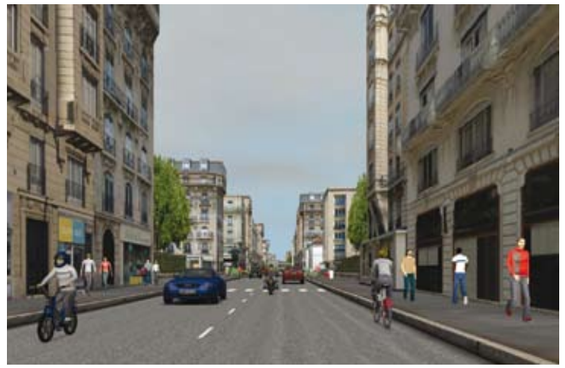
Driving simulation has long been used in research, industry and training, but integrating Aimsun software into the SCANeR driving simulation engine now makes it possible for users to drive in SCANeR immersed in a detailed virtual world and in a completely realistic traffic situation.

To improve driver immersion in the virtual world, the traffic situation needs to be realistic from the driver's point of view. The blending of these two complementary simulation worlds of Aimsun and SCANeR opens up a whole host of applications. For example, it makes it possible to study driver behavior in dangerous situations, or even help car manufacturers to develop and test innovative driver assistance technologies. Users can implement and test V2V (vehicle-to-vehicle) systems, V2I (vehicle-to-infrastructure) systems, as well as evaluate various ADAS in various real traffic conditions. It even allows for the testing of prototype navigation systems against real-time alerts for congestion, incidents or workzones, as well as analyze emergency vehicle training in rush-hour conditions.

Need to know?

Integrating SCANeR simulators with Aimsun simulation software to enhance the virtual experience

- Collaboration between Aimsun and Oktal brings traffic reality to world of driver simulation
- Assists in the analysis of applications such as driver behavior, development and testing of V2V/V2I and ADAS
- Realism reaches new levels with information about traffic density, accidents, workzones, rerouting, etc



Innovative electronics

Oktal's SCANeR traffic simulation model includes realistic surrounding vehicle movements, advanced driver behavior models, tools providing high-quality 3D visual restitution, complete vehicle control, and scripts to provoke situations or customize behavior. To embed these innovative electronics systems into a virtual world, they need more complete information on a larger scale; realism reaches a whole new level with information about traffic density on major roads, accidents, workzones, rerouting etc. This means dealing with thousands of cars and kilometers of lanes and the ability to simulate traffic on the scale of a whole city or even an entire region. This is where Aimsun steps in.

So how does it actually work? Although Aimsun handles the traffic signals and traffic in the whole network, there are some defined zones where the traffic vehicles will be controlled by the SCANeR traffic model. The main zone surrounds the driver's vehicle and moves along with it. Other zones can be freely created and positioned by the user. When Aimsun vehicles enter the zone, they are dynamically created in SCANeR and Aimsun releases control. Conversely, when they leave the zone, they are destroyed in SCANeR and control is restored to Aimsun. The SCANeR API and Aimsun SDK were used to create a SCANeR module embedding Aimsun and exchanging simulation information in real-time. Both models need to share a common description of the road environment, such as road geometry, intersections, signs, limitations, etc. The standard and open RoadXML format was the perfect solution. SCANeR uses it as a native file format and import and export functions have been developed in Aimsun. Moreover, using RoadXML as an exchange file format allows users to import, create and edit complex road networks through SCANeR studio terrain and Aimsun tools. For example, users can import the SCANeR database in Aimsun and prepare a complex traffic situation, or export a network from Aimsun, import in SCANeR studio and generate the databases needed to drive in the virtual environment – a 3D database for the visual module, road description for dynamic vehicle road-query, and road network description for the SCANeR traffic module.

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There is a glaring difference between collecting fuel taxes and collecting road use taxes. To collect fuel tax, governments tapped into existing fuel distribution infrastructure for a near-free collection platform. Relative to any of the current proposed approaches to collecting road use fees per vehicle (RFID/DSRC, GPS, cellular, camera, OBD, odometer, vignette), collecting at a small number of fuel distribution nodes is smart, easy and cheap.

Shifting tax from fuel consumption to road consumption is all uphill. The tax collector's business model is to build an elaborate, dedicated, complex, confusing, and expensive infrastructure that is subject to greater user resistance and mischief, to collect a few dollars a week from each vehicle. This is a terribly complex operation for a small amount of money.

This is why the economically inefficient fuel tax is preferred, why even less efficient sales taxes and property taxes are preferred, and why the USA is currently back-filling sagging fuel tax revenues from the General Fund. Pretty much anything other than metering each vehicle is more expedient to administer.

If vehicles already had a reliable telematics device running a number of desired and indispensable applications – comparable in importance to having fuel in your tank – it could carry an embedded road use meter and become the collection platform for the replacement of the fuel tax.

We already know how to make such devices. But we don't make them coveted and indispensable. We are missing a pre-existing, easily exploited, free collection platform to rival the fuel distribution platform governments used over the past century. This is why building a dedicated telematics tax collection infrastructure that reaches into every vehicle is wrong headed. And this is why promoting telematics systems for safety, convenience, traveler services, parking payment, PAYD insurance and infotainment – systems that can carry road-use metering functionality at little or no extra cost – should be the first order.

Such systems can be made desirable, useful, reliable and nearly self-enforceable. They can make our roads safer and less congested, drives more pleasant, trips more efficient, and save almost all of us money. Much more importantly for funding, demand management, emissions management and oil independence, such systems can provide the basis for private enterprise to offer profitable and competitive services, just as fuel distributors offered profitable and competitive services a century ago.

If markets for telematics-based parking and insurance metering, safety systems, traveler services and infotainment were standardized, encouraged, and regulated or legislated in smarter ways, private enterprise would build the telematics platforms governments could then exploit to collect road use fees while avoiding system operational costs of dedicated road tolling – the same thinking used to exploit the fuel distribution system a century ago.

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>
> **Bern Grush, chief scientist, Skymeter Corporation, Canada**