

Research Report Summary



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Driving Simulator Use in the Roadway Design and Planning Process

National Advanced Driving Simulator: Texture Algorithm
and Tile Model Integrator Tool

Driving simulators are powerful tools to support transportation designers and highway safety evaluations through the creation of driving simulator scenarios that can be used to evaluate how existing and proposed highway facilities impact driving performance. However, scenario creation remains a lengthy and system-specific process, requiring expertise in visualization and driving simulation. Time invested in creating scenarios for a specific driving simulator provides no benefit to researchers or transportation designers who wish to run an experiment using the same scenario on a different platform.

This collaborative project between the University of Wisconsin-Madison and the University of Iowa focused on establishing a workflow to create visual models and road attributes that were compatible with two simulator platforms: the NADS MiniSim™ and RTI. A focus on core aspects of the scenario was necessary because the 3D modelling and roadway definition tasks are among the most time-consuming steps in scenario creation. Therefore, establishing a common workflow between the two simulator platforms could result in time savings and a



Texture test model

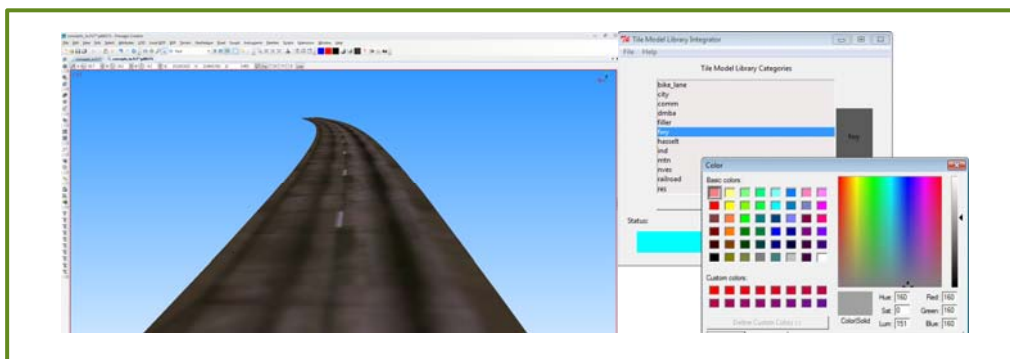


Simulation model

reduction in the workload of scenario creation.

Scenarios that can be shared across multiple platforms can foster collaboration between institutions and provide opportunities to study broader subject demographics and regional characteristics. This project demonstrated cross-platform compatibility through the virtual reconstruction of an existing road segment compatible with both simulator platforms.

Two key elements of the scenario creation process are the use of 3D models as simulator resources by importing transportation designs into the simulator, and application of contextual texture mapping on these imported models. These two tasks are typically highly dependent on visualization and simulation expertise.



This project addressed these two issues through development of a tool to manage the simulator configuration changes necessary when importing a new model into the virtual content library, and through the implementation of a texture-mapping algorithm that applies texture to arbitrary 3D ribbon geometry, such as a road surface. The algorithm results in textured geometry that is consistent with manually applied texture.

The Tile Library Integrator Tool is written in Python and relies on the OpenSceneGraph utility OSGConv.exe as a converter engine, and the Presagis OpenFlight™ API python bindings. All simulator integration tasks are automated once the model is selected and model attributes are defined. All data entry tasks occur through a graphical user interface to guide and inform the user through each step of the process.

This tool supports Wavefront OBJ files, a common 3D file format that also supports texture. Imported files are fully operational within the NADS MiniSim™ virtual asset pipeline and may be re-used as any other natively created model. Additional file formats are possible by enhancing the OSGConv.exe application.