SPRINGFIELD: A CASE STUDY FOR IMMERSIVE DRIVING SIMULATION ENVIRONMENTS

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Driving environments for transportation research driving simulators are typically built to support scenarios that expose drivers to a series of events corresponding to a research plan. These environments are purpose-built for a specific set of scenarios and thus serve limited reuse outside those scenarios. Project resources constrain the effort that is put into building these purpose-specific environments and result in driving environments that look devoid of interesting scenery, signage, and architecture that one finds in real life and are a far cry from rich lifelike driving environments that can be found in immersive, graphically rich video games. Every once in a great while, we encounter an opportunity to build grander environments that are envisioned to support multiple types of uses and have appropriate funding available to build a more lifelike driving environment.

This paper describes Springfield, a virtual city consisting of 175 miles of roadway in urban, residential, interstate, and rural highway settings. In addition to roadways built to civil engineering standards, the environment contains rich scenery, signage, and architecture.

The creation of an entirely new, interactive, 3D environment represents a significant expense in project budgets. However, this cost can be mitigated to a degree through the use of modular building blocks that can be reused as the final product is assembled. This paper will examine such a methodology by detailing the design and construction of a large environment intended for ground vehicle applications.

Created for use as a multi-purpose environment, Springfield contains several interconnected areas representing the spectrum of driving settings (in particular, rural, freeway, residential, and urban), each with roadways and features appropriate to the area. In addition to freely drivable roads, Springfield contains two distinct regions designed for specialized use: a maneuver area, and a test track. These areas are designed to acclimate drivers to a simulated environment through the exercise of various maneuvers including parking, steering through a challenging road network, and controlling speed. These special purpose areas also include collision detection on all features to provide appropriate feedback when struck by the driver. Consideration will be given to the performance implications associated with various layouts and methods to manage them.

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BIO

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Shawn Allen is the Transportation Visualization Program Manager at the National Advanced Driving Simulator (NADS). His responsibilities include virtual asset design and development, proposal generation, and project management.

Mr. Allen has worked in driving simulation since 1993, and has an extensive work history that includes look development, modeling and texture for real-time simulation. In addition to project support by developing 3d models and environments, Mr. Allen participated in development of standard operating procedures at NADS, provides training and mentoring for scenario development and miniSim, and was requested to participate in the NADS Project Review for virtual environments in 1998. More recently Mr. Allen oversaw the development of a tool suite to convert transportation design models to miniSim compatible models.

Mr. Allen earned his B.F.A. at the University of Iowa with an emphasis on graphic and 3D design.

RELATED PUBLICATIONS

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