Wegzeit - the Geometry of Relative Distance

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Abstract

This web3d project explores how the concept of non-linear space - that is space structured by relative units - can be used in VR and architecture. It offers a dynamic view on Los Angeles' structure, radically different from usual architectural representations.

1 Introduction

The project presented here explores how non-linear space-space that is structured by relative units-can be used in VR and architecture. It offers a dynamic view of Los Angeles' structure that is radically different from conventional architectural representations. The background of the project is described in more detail in the sketches&application presentation of this project.

2 Implementation

The project consists of six dynamic virtual environments that propose models of how to visualize three-dimensional relative spaces. They deal with certain properties and effects caused by the nature of relative space such as the asymmetry of temporal distances.

The environments were designed in such a way that they can be used both in immersive VR and web3d contexts. All deformation models are managed by scripted behaviors that are evaluated in real-time. Most of the underlying parameters can be changed interactively.

The creation of the environments involved little modeling; space is constructed by the actual visual perception of the driver. The frontages of the streets examined are represented by long strips of texture that were created from videos taken from the moving car. Three of these models can be briefly described here:

Linear distance model Space is described here as a path-network with variable distances between its nodes. A number of constraints give more control over the resulting shape. In the example, a half-mile area is displayed in time-space based on speed limits, phases of traffic lights and actual driving time.
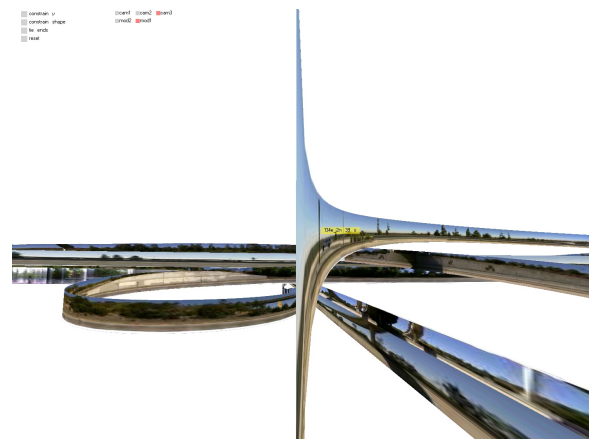
Area model While the network model works fine for the representation of relative distances, other relative parameters are based

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on surface units. For these parameters, a different model is necessary. The example presented investigates the space of attention. The diagram of all installed written signs on the Las Vegas Strip from the essay "Learning from Las Vegas" by Robert Venturi et al. is transformed into relative space based on local information densities. Areas with high information density seem inflated.

Slope model Temporal distances are usually asymmetric; the distance from point A to point B might be considerably different than the distance from B to A. This asymmetry can be expressed as steepness of the terrain. If travelling in the opposite direction is much faster, the movement is somehow against the stream-like going up a steep mountain. If we are on the faster track and it's more difficult to go in the other direction, it's like going downhill. This metaphor is the basis for the following environments. The model is influenced by M. Fujihata's Mt. Fuji Project, which uses a similar approach to reconstructing the shape of Mt. Fuji from the walking-velocity of a group of people.

One of the biggest challenges in working with non-linear space in VR is maintaining its legibility for the user. Working carefully with internal and external views of the environment, constraining the user's motion to a set of paths, and simplifying interaction are possibilities to prevent confusion in an environment without any kind of static form.

The project can be viewed at http://futurelab.aec.at/wegzeit