

Method for Incorporation Displacement Mapping into Existing Image Generators
Chladny,Brett - Renaissance Sciences Corporation

ABSTRACT

Creating a high fidelity virtual environment for flight simulators can be both expensive and labor intensive. Aircraft simulators rely heavily on geo-specific imagery to provide the trainee with a high fidelity virtual environment which is rich in 2D visual cues. It is well known that the addition of three dimensional (3D) models to this synthetic environment enhances visual cues that enable the perception of depth and motion. Alignment of 3D features with the underlying imagery is crucial to avoid visual distractions, especially at low altitudes. Constraints in hardware performance and budget limit the amount and quality of 3D features that can be included in the virtual environment. This paper presents an innovative software library that can be integrated into pre-existing Image Generators (IGs) to significantly enhance visual cues. By using an adaptation of the displacement mapping rendering technique, this rendering library achieves near constant rendering performance, regardless of how many features are added to the scene. This library has been designed to be a drop-in module that uses the power of modern commercial off-the-shelf Graphics Processing Units (GPUs) and OpenGL 4.0. This library can be used to enhance feature densities in both new and pre-existing terrain databases. By avoiding current IG system bandwidth limitations, this novel rendering solution has the potential to raise the bar for high complexity and high fidelity virtual environments for real-time training simulators.