



The Chinese University of Hong Kong

Non-confidential Abstract of Technology Disclosure

Title:

Real-time Volume Rendering Technology on Standard PC

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Inventor(s):

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Patent Status:

- ◆ US Patent no. 7,154,500
- ◆ US CIP Patent no. 7,184,041
- ◆ Chinese Patent Pending
- ◆ Hong Kong Patent Pending
- ◆ PCT Application Filed

Non-confidential abstract:

A computer-based method and system for interactive volume rendering of a large volume data on a conventional personal computer using hardware-accelerated block filtration optimizing uses 3D-textured axis-aligned slices and block filtration. Fragment processing in a rendering pipeline is lessened by passing fragments to various processors selectively in blocks of voxels based on a filtering process operative on slices. The process involves generating a corresponding image texture and performing two-pass rendering, namely a virtual rendering pass and a main rendering pass. Block filtration is divided into static block filtration and dynamic block filtration. The static block filtration locates any view-independent unused signal being passed to a rasterization pipeline. The dynamic block filtration determines any view-dependent unused block generated due to occlusion. Block filtration processes utilize the vertex shader and pixel shader of a GPU in conventional personal computer graphics hardware. The method is for multi-thread, multi-GPU operation.

Key Features of the technology:

The subject technology can be applied in a wide area of volume rendering applications. At this time, application to computer-aided medicine and medical education has been demonstrated. Interactive volume rendering is extremely tedious, time-consuming, and data-intensive. Fragment processing is made much easier by the technology by a filtering process that involves passing fragments of data through various processors selectively in blocks of volume picture elements (“voxels”). In addition, it is found that the technology:

- is faster than existing technologies in the market;
- can accommodate a large dataset volume;
- is suitable for an ordinary PC;
- provides for a real-time, interactive system and method for visualizing images in three dimensions.

The approach is a two-pass rendering process making use of the graphics processor unit (GPU) in the graphics hardware of a conventional personal computer.

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