# Integration of the volume rendering system with virtual studio

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## Abstract

The paper briefly introduced the volume rendering as a technique for visualizing voxel data. The system implementing this technique is integrated into VS2000 virtual studio. VS2000 is described. The advantages of the proposed solution for online education courses are outlined.

***Keywords:*** *Volume rendering, volume texture, virtual reality systems, virtual studio, e-learning..*

## 1. VS2000 VIRTUAL STUDIO

VS2000 virtual studio is high-integrated PC-based multimedia set used to create video feeds combined with full 3D to produce live studio broadcasts. VS2000 uses multi-channel hardware and software for color keying of live actors or video. VS2000 is trackless so it does not require any expensive camera motion trackers. Even more, being a truly 3D virtual set, the VS2000 is not limited to simple background and foreground 2D images around the live video of an actor. Instead, its script language easily operates with 3D mesh objects, materials, virtual lights, cameras and animation tracks created with 3D graphics design software such as 3D Studio Max.

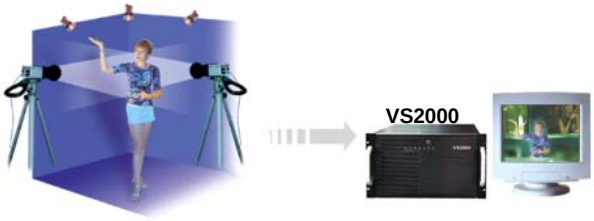


**Figure 1:** Virtual studio concept

## 2. VOLUME RENDERING

Volume rendering is a technique for visualizing three dimensional arrays of sampled data. It provides a way to see through the inner structures of volumetric objects, revealing complex 3D object or phenomenon. We introduce the system that is based on common graphic accelerator beginning from GeForce3. There is no need for special hardware to get access to real-time volume rendering functionality. Volume rendering system is now integrated to VS2000. The advantages of the proposed solution in addition to rapid adoption for any particular need enable a multitude of interesting applications.

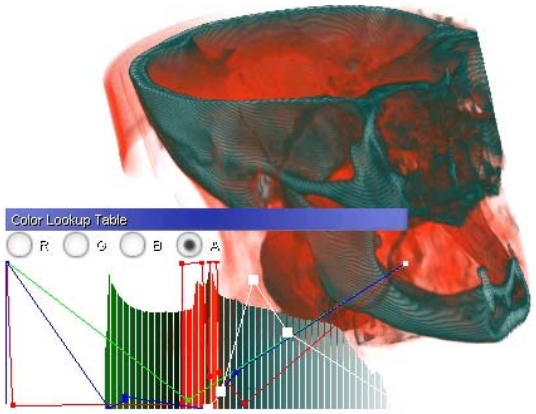


**Figure 2:** Volume Rendering of CT-Data

## 3. INTEGRATING BOTH TECHNIQUES FOR ONLINE EDUCATION COURCES

Today we also introduce VS2000 as turnkey PC-based solution for rapidly creating online education courses with 3D virtual sets. The usage virtual reality technology aims the imitation of the lecturers (or even students) interaction with modeled objects and phenomenon. The illusion of submersion in virtual environment results in the profound understanding of subjects especially spatial ones while interactivity allows learners to apply knowledge and skills rather than simply remembering facts. New possibilities added with volume rendering allow to perform lectures showing the 3D data. This visualization provides the students a way to make known complex 3D phenomenon. The data shown is generated by computer simulations or different 3D scanning techniques such as magnetic resonance imaging (MRI), computed tomography (CT), 3D ultrasound etc.. Thus the focus is on reproducing its 3D aspects. The proposed solution aims increase the efficiency of educational processes by allowing students to relate concepts spatially.

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