CATEGORY: **BIOINFORMATICS & GENOMICS**

POSTER **BG02**

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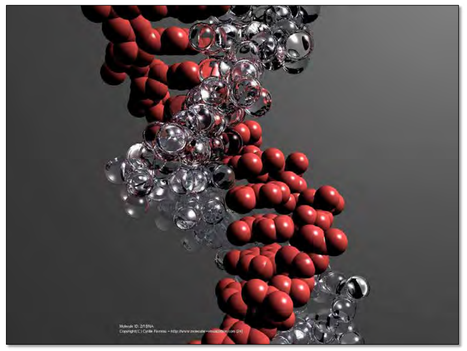
GPU TECHNOLOGY CONFERENCE

Interactive & Photorealistic Molecule Visualizer



IMV is an interactive molecule visualizer based on a ray-tracing engine. Targeting high quality images and ease of interaction, IPV uses the latest GPU computing acceleration techniques, combined with natural user interfaces such as Kinect and Wiimotes.

One of the limitations of high performance software is that it restricts itself to high-end machines. In a time of tablets and laptops, other solutions are needed. Thanks to its Client/Server architecture, IMV is cloud-ready. The client sends information such as mouse and keyboard events to the server. The server takes care of the rendering and sends a stream of images back to client. Transport is optimized using compression technologies, making it possible for every client to enjoy a different and fully customizable view of the protein.

Microsoft and Nintendo introduced a new way to interact with computers, called natural user interfaces. IMV uses these new devices to ease interaction with proteins, making it a unique experience in the bio-chemical software industry.

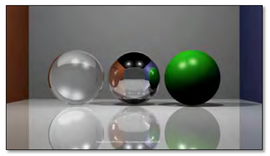
We truly believe that ray tracing is the future of digital imaging and augmented reality, and that's why we made IMV ready for this revolution. Being able to go much further than rasterization in terms of image quality, ray-tracing also makes it easy to compute, for example, the amount of light received by an object.

The nature of ray-tracing, and the techniques used for its implementation can be reused to run scenarios such as calculating interactions between atoms or determining what the surface of contact would be between two molecules. In such cases, NUI device force-feedback features can be used to increase the quality of the user experience; IPV is also ready for this.

IMV provides a cheap way to visualize proteins in 3D, thanks to anaglyph technology. Get a pair of glasses for less than $2 and enjoy an immersive and unmatched experience. But IMV is also able to simultaneously produce images side-by-side, making it ready for nVidia 3DVision. Simply capture the window, play it back in a 3DVision compatible player and enjoy an immersive trip into the heart of your proteins.

We believe that IMV can be a great tool for teachers and researchers. It is currently at a very early stage of development and should be considered as such.

Interactive ray-tracing engine

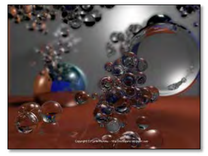


In computer graphics, ray-tracing is a technique for generating an image by tracing the path of light through pixels in an image plane and simulating the effects of its encounters with virtual objects.

The technique is capable of producing a very high degree of visual realism, usually higher than that of typical scanline rendering methods, but at a greater computational cost.

Ray tracing is capable of simulating a wide variety of optical effects, such as reflection and refraction, scattering, and dispersion phenomena (such as chromatic aberration).

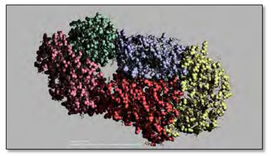
Post-processing effects



In optics, particularly as it relates to film and photography, depth of field is the distance between the nearest and farthest objects in a scene that appear acceptably sharp in an image. Although a lens can precisely focus at only one distance at a time, the decrease in sharpness is gradual on each side of the focused distance, so that within the DOF, the unsharpness is imperceptible under normal viewing conditions.

Ambient occlusion attempts to approximate the way light radiates in real life, especially off what are normally considered non-reflective surfaces.

Support for large models

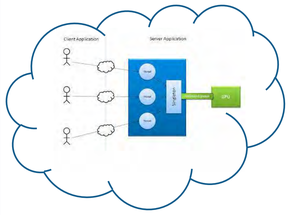


In order to produce optimal results in terms of rendering speed, IMV uses a bounding volume hierarchy. This technique allows the ray-tracing engine to work with thousands of atoms. The GPU implementation offers the necessary computing power for real-time rendering.

Natural user interface

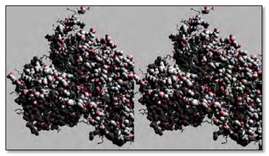
Microsoft and Nintendo introduced a new way to interact with computers, called natural user interface. IMV uses these new devices to ease interaction with proteins. Making IMV a unique experience in the bio-chemical software industry.

Cloud solution



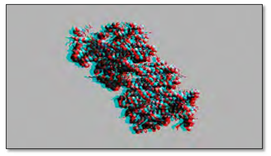
Thanks to its Client/Server architecture, IMV is cloud ready. Client sends information such as mouse and keyboard inputs to the server. The server takes care of the rendering and sends a stream of images back. Transport is optimized using compression technologies. Each client can enjoy a different and fully customizable view of the molecule.

3D Vision



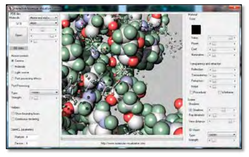
IMV is able to simultaneously produce a different view for each eye, making it ready for nVidia 3D Vision. Simply capture the window, play it back in a 3DVision compatible player and enjoy an immersive trip into the heart of your molecules.

Anaglyph 3D

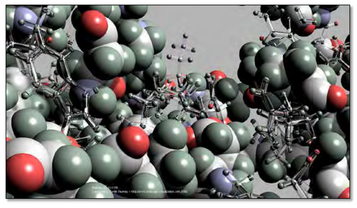


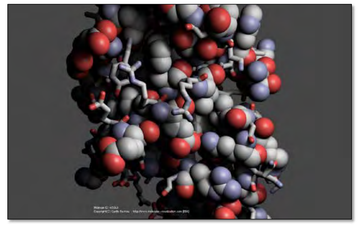
IMV also provides a cheap way to visualize molecules in 3D, thanks to anaglyph technology. Get a pair of glasses for less than $2 and enjoy en immersive and unmatched experience.

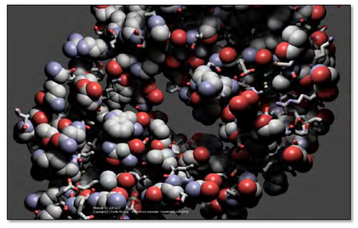
Molecule Editor

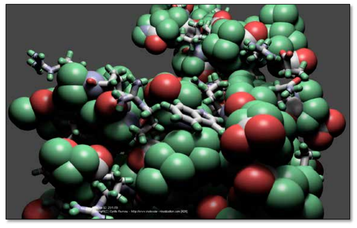


In order to produce optimal visualization, a fully configurable editor is available on Windows platforms. The editor automatically downloads PDB files from RCSB (Protein Data Bank) via HTTP, and allows customization of materials used to render atoms and sticks. Post processing effects and ray-tracing parameters are also accessible from the editor and have immediate effect on the interactive and ray-traced view of the molecule.









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