

USING THE PHYSICS OF REALITY TO DETERMINE THE DYNAMICS OF IMAGE MAKING

Sajid Haniff, an employee of the Rogers Communications Centre, is currently developing a system of parallel rendering. Parallel rendering involves harnessing the resources of several computers on line to render information far more efficiently. This system, which combines the use of programming language such as XML and C++, takes the information, divides it into segments and sends it out to various computers (according to each computer's ability). Consequently, each computer is utilized to render just a part of the information rather than the whole, thus cutting down the rendering time significantly. The end product is sent back to its source. As a result, certain projects that typically would take days or even weeks to render are completed in a matter of hours, making this a very efficient way of rendering large amounts of data.

Driving Mr. Haniff's work is a project that involves radiosity. Radiosity is the science of calculating the amount of incident light energy on a surface, a mathematical theory that calculates the amount of light energy reflected off a surface. For instance, a photograph is able to accurately capture the amount of light energy reflected off a surface giving the image an uncanny sense of realism. A computer-generated graphic is unable to do so. By employing the principle of radiosity, Sajid is exploring how to make computer graphics duplicate reality by accurately determining the amount of light energy a surface scatters back into the environment.

The theory governing this research is the concept that a surface does not give off light energy on its own. Light energy is incident on the surface and is reflected back into the environment. In other words, a light source emits photons that hit a surface and the surface then scatters energy back into the environment. According to Haniff, in order to duplicate this phenomenon with CGIs (Computer Generated Images), we must understand how reality distributes light energy. Each surface is different and some surfaces scatter more light energy back into the environment than others. When one has figured out how much light is reflected off a specific surface, one is able to model that surface, recreate it and make it almost indistinguishable from reality. According to Sajid, it is a way of using the physics of reality to model the physics of images.

Radiosity is a general rendering equation that describes the propagation of light energy off simple surfaces. It calculates how much light energy a surface reflects and deals with simple surfaces by indicating the amount of light energy that will be scattered back into the environment. However, since most surfaces do not scatter light uniformly, a global illumination factor must be applied. Global illumination takes radiosity much further by determining how the reflected light energy is distributed in an environment. It is the physics of tracing the energy distribution in a room from point to point. This is quite a complex formula and even more complex

to code. When successful, the resulting images are far more realistic than regular CGIs. In fact, if the calculations are correct, one can create images almost indistinguishable from reality. Effectively, global illumination and radiosity can trick the mind into thinking that what it sees is real, giving a whole new meaning to the term 'virtual reality.'



SAJID HANIFF