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Rendering on Demand

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The computer graphics industry, and in particular those involved with films, games and virtual reality, continue to demand more realistic computer generated images. In addition, high fidelity imagery is playing an increasingly key role in many applications, for example archaeology, architecture and simulations, in order to accurately represent real environments on a computer. In such applications, failure to produce images which accurately match reality may in fact lead to, for example, the archaeologists misinterpreting the past, or the incorrect display of a military vehicle attempting to camouflage in a certain simulated terrain may result in detection of the vehicle in the real battlefield scenario.

Despite the ready availability of modern high performance graphics cards, the complexity of the scenes being modelled and the high fidelity required of the images means that rendering such images is still simply not possible in a reasonable, let alone real-time on a single computer. Two approaches may be considered in order to achieve such realism in real-time: *Parallel Processing* and *Visual Perception*. Parallel Processing has a number of computers working together to render a single image, which appears to offer almost unlimited performance, however, enabling many processors to work efficiently together is a significant challenge. Visual Perception, on the other hand, takes into account that it is the human who will ultimately be looking at the resultant images, and while the human eye is good, it is not perfect. Exploiting knowledge of the human visual system can save significant rendering time by simply not computing those parts of a scene that the human will fail to notice.

This paper will describe the novel Rendering on Demand system which combines visual perception and parallel processing to selectively guide rendering computations in order to achieve perceptually high fidelity computer graphics in real time.