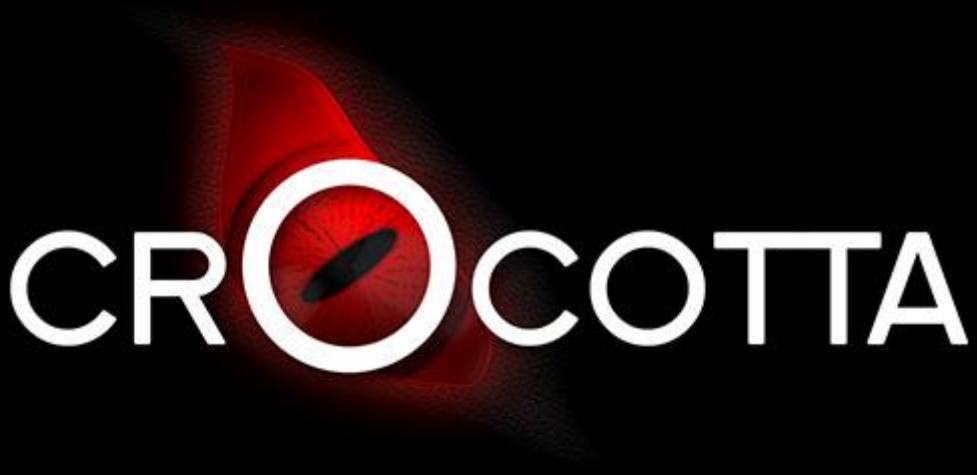

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“Be ambitious of climbing up to the difficult, in a manner inaccessible...”

We are a small team of international researchers with the aim of conducting leaps in technologies like visualization, virtual reality, artificial intelligence, and robotics.

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RAPIDLY INCREASING POSSIBILITIES IN 3D VISUALIZATION

By Crocotta R&D

Robert Sugar[1]

FOREWORD

3D visualization today has ever-expanding applications in science, education, engineering, medicine, interactive multimedia like games, etc. Producers of graphics processing units (GPU) - are specialized electronic circuits designed to rapidly manipulate and alter computer memory in such a way so as to massively accelerate the visualization of 3D environments - bring ever faster products to the market every six months which is rapidly increasing the possibilities of near future visualization/simulation methods.

LITTLE TEASER OF OUR WORK

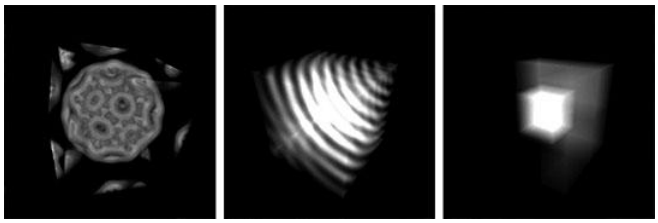

Figure 1 (click the image to enlarge):
3D volume raycasting performance test - naive method vs. our method.
(left)
NVidia's volume raycasting demo (naive implementation in CUDA) on a GTX 460 GPU with 336 parallel CUDA cores.
155 fps
(middle + right)
Our volume raycaster on a single core CPU (in plain C89 language).
123 fps (middle)
19 fps (right)

All 3 volumes are of identical size of 32^3 voxels and have been tested on the same system (AMD Athlon II X3 445, 3.1 GHz). Unlike the NVidia implementation our demos, and their relevant performance results, include the non-stop animation of the material texture and the computation of a distance map at every frame, besides the conventional raycasting.

REAL-TIME RAY-TRACING

In computer graphics, raytracing 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 (see games), but at a greater computational cost.

Thanks to the ever faster graphics hardware real-time raytracing is going to be the replacement of contemporary raster graphics (direct3d, opengl) and part of everyday life very soon.

REAL-TIME PHOTON-TRACING

Photon tracing is a rendering method similar to raytracing for creating ultra high realism images. The method aims to simulate realistic photon behaviour by using an adapted Raytracing method, by sending rays from the light source. Each ray keeps bouncing around until it is absorbed by any material. Even though the image quality is superior this method has one major drawback, namely the render times.

Thanks to the ever faster graphics hardware and to the latest breakthroughs in photon tracing algorithms this method is going to be real-time and part of everyday life (not restricted to movie theatres only) soon as well.

AUGMENTED REALITY

Augmented reality is a variation of virtual reality as it is more commonly called. Virtual reality technologies completely immerse a user inside a synthetic environment. While immersed, the user cannot see the real world around him. In contrast, augmented reality allows the user to see the real world, with virtual objects superimposed upon or composited with the real world. Therefore, Augmented Reality supplements reality, rather than completely replacing it. Ideally, it would appear to the user that the virtual and real objects coexisted in the same space.

Crocotta predicts that augmented reality applications are going to penetrate and massively transform society (bring it to the next level of accessible information) within the decade.

CROCOTTA'S ENGAGEMENT

1. Particle based visualization & simulation

Large – interactive – volumetrics with real physics.

2. Synthesis

Procedural generation of virtual (in-) organic structures.

3. Virtual entertainment

Next generation, fully volumetric gaming and virtual reality without the use of polygonized surfaces.

REFERENCES

Robert Sugar[1] is a scientist, researcher and IT entrepreneur the same time. He has been starting companies since 1996, ranging from software companies, media companies, computer game developer companies and internet companies.

He was born in 1978, and grew up in Hungary. He graduated in physics at the Lorand Eotvos University (Budapest). First software engineering was just his hobby and later it has become his full time profession. His first development project was about artificial intelligence and graphical visualization for computer games back in 1996. He founded his own game developing studio in 2001 - called Mithis Entertainment - in the heart of Budapest for the purposes of "AAA" game development. From a small group of enthusiastic people, Mithis Entertainment has become the biggest developer studio in Hungary by 2005 and completed four big game titles which were distributed world-wide by well-known multi-national publishers.

Since his departure from the gaming industry in 2006 he has been focusing on the researching of cutting edge technologies.

By Crocotta R&D, July 2012