COMPUTER GRAPHICS

Volume 33 Number 1 February 1999

A publication of ACM SIGGRAPH

FOCUS: Non-Photorealistic Rendering

ABOUT THE COVER

Non-Photorealistic Rendering

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Computer Graphics Cover Editor

Front Cover
The top image is a wireframe rendering of the 3D geometry used to create the second cartoon image below. It shows the type of data used to create a non-photorealistic image.

The bottom image is a 3D "toon," rendered using mental ray™ and custom software extensions developed by Michael Arias to enable simulation of cel animated imagery. With the exception of color corrections, no image processing or compositing techniques were used to render the final image - "ink" lines, shadows, highlights and reflection are all ray traced, and the "nebulae" in the background as well as the robot's headlight beam are volume rendered using a ray-marching algorithm. Scene geometry was modeled by Tim Stevenson (ILM) using SOFTIMAGE 3D, and composed and rendered by Arias using mental ray running in parallel on a two-processor DEC Alpha workstation.

The toon rendering software was initially developed by Arias to support two feature film projects, *The Princess Mononoke* and *Prince of Egypt*. The ultimate goal of the toon software development was to allow insertion of 3D-rendered elements into imagery otherwise created using "traditional" cel-animation media. Toon rendering algorithms were the subject of a technical sketch presented at SIGGRAPH 96 by Arias.

Stevenson and SOFTIMAGE have graciously given permission for the "Orbit" models to be used for this publication.

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Front cover text provided by Michael Arias

Back Cover
The back cover is a series 16 frames of an animation showing non-photorealistic ecto-plasm, lava lamp, generic ooze and smoke — modeled as isodensity surfaces, animated using particle simulation and rendered using proprietary ray tracing software.

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From the Guest Editor

Michael Arias
SOFTIMAGE Special Projects

As guest editor of this issue's focus on non-photorealistic rendering, I have been fortunate enough to find a group of contributors whose technical and artistic brilliance is matched only by their awareness of, and skill in articulating, the basic issues facing those of us involved in the creation of non-photorealistic digital imagery. They have, in fact, left little for me to add on the subject — so I'll keep my introductory comments brief and personal!

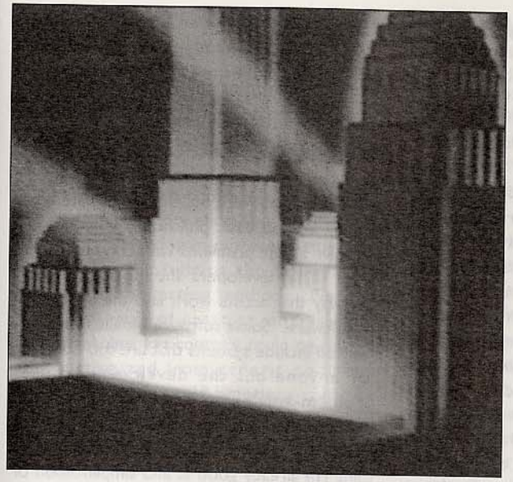
My own involvement with non-photorealistic rendering began several years ago when, while living and working in New York, I was introduced to the work of Hugh Ferris (1889 - 1962), an architect best known for his visionary charcoal delineations (renderings) of the "new metropolis." Even now, looking at pages from *The Metropolis of Tomorrow*, I am filled with a sense of inspiration both at the grandeur of his skylines, and at the humanistic touches placed low and deep in the frame of my favorite Ferris works. His primary role at this phase of his career as architectural delineator necessitated a certain logic and practicality to the art. Ferris' style is certainly more restrained than that of many similarly inclined artists of the Bauhaus or Futurist schools — and yet his best work always manages to convey a sense of poetry and warmth. The contours of the buildings and bridges are not hard or mathematical, but rather soft and hazy, glowing from within, as if seen from a great distance, or as recollections from a distant past.

At this time I was between jobs, but had access to a couple of graphics workstations together with all the equipment needed to compile a reel of the computer graphics I'd worked on up until that point. I'd been experimenting with various 3D rendering and image processing techniques. One of the first tests of this software used a 3D model left over from an earlier project, and resulted in a very simple view of the highest portion of the Empire State Building. It was only when viewing the piece with an architect friend that I fully realized how much of an impression Ferris' work had made on me. What I had found lacking in most computer graphics images up until that point was right in front of me — in those 15 seconds — and, of course, in the Hugh Ferris sketches pinned around my desk.

Computer graphics imagery has always been cursed by precision, and perhaps this is a legacy of the very early days of computer graphics — filled with images of chrome balls, teapots, Mandelbrot sets — precise, mathematical expressions or approximations of physical laws — technical demonstrations created by scientists and technologists — not artists. Quaint as they may be now, these early computer graphics images were fantastic for their time, and one could imagine a future where the mechanisms for film-making would exist only in silicon wafers, rather than taking up huge movie stages.

As filmmakers are now aware, things have not changed as much as one might have thought they would 10 years ago. The "CG revolution" has made many things easier for artists, but at the same time, the higher level processes of filmmaking have changed remarkably little. A team of artists, actors, producers and directors is still (more often than not) needed to produce a film, and the viewer is still more likely to be affected by a movie with an evocative story or engaging characters than by hyper-realistic alien creatures and the destruction of cities and planets (forgive me if I make my sensibilities too obvious).

At any rate, I went on to create about a minute of my *Homage to Hugh Ferris*, all rendered using my 'smeared charcoal' CG technique. Years later, it remains the work I've taken greatest enjoyment and satisfaction in making. (This is not to say that others would appreciate. I've never shown it publicly; it is technically flawed and, at worst, a trite imitation of Ferris' work.) For me, however, it was a turning point — working on the piece made me realize that imitation of reality was not the Holy Grail that I had previously perceived it to be. Instead, it struck me that any visual artist, CG animators and artists included, must strive for deeper meaning. Style (impressionistic, expressionistic, photo-realistic, etc.) and media (watercolor, charcoal, photochemical, etc.) are secondary to this goal, and, in fact, meaningless without such motivation. What affects viewers are not solely the images — fresh or exciting as they may be — but rather the *ideas*, emotional content, mood, tone and timbre of their contents. As obvious as these words may be to others, they were not so to me at the time — even now I must continue to remind myself of their meaning, so as not to lose



myself in the bits and bytes, BSP trees and supersamples of technical computer graphics.

Great thanks are due to all involved in producing the issue, particularly the contributors. I hope the articles contained herein manage to spark some interesting discussions, inspire fresh work or perhaps even cause conflict!

Michael Arias began his career in visual effects 11 years ago, on the motion control stages at Dream Quest Images, where he worked as motion control camera operator on such films as *The Abyss* and *Total Recall*. Since then he has worked with directors Douglas Trumbull, David Cronenberg, Spike Lee and most recently, Koji Morimoto and Hayao Miyazaki (for whom he created SOFTIMAGE's "toon" rendering features). For the past three years, Michael has been employed by SOFTIMAGE Inc. as consultant and software developer. Arias lives in Tokyo, where he is currently supervising the computer graphics for a fully digital animated feature film.

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