The Magazine for Digital Content Professionals

ComputerGraphics World®

Dream Machine

Live-action animation portrays a child's imagination in The Polar Express

Interactive Horror

Game makers go for the gory

Generation 2.X

Today's consoles get an upgrade

Creative Compositing

New tools push the art of video production

December 2004 www.cgw.com

PennWell

ComputerGraphics World

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On the cover:
The magical train in *The Polar Express* was crafted to appear just as it did in Chris Van Allsburg's illustrated book of the same name. For more, see pg. 16.

editor's note

Phil LoPiccolo
Editor-in-Chief

A Few Good Mentors

Last spring, the editors received a rather cryptic e-mail from an animator at a major studio about a "side project" that he and a few of his friends were working on. When we checked it out, we learned that the group was planning to launch an animation school with a couple of novel twists. Rather than following the typical instructor-in-the-classroom model, the school would be online and available to anyone, anytime, anywhere. And instead of providing boilerplate responses, as is often the case with any sort of online services and support, a staff of professional animators would offer personal, video-based, one-on-one mentoring.

Intrigued with the concept of personal online mentors in an age of impersonal electronic communication, we invited the three founding members of the group to put on a Q&A demonstration over the summer at our booth on the SIGGRAPH convention floor. We were curious about what issues were on the minds of those in the animation community and how much interest they would have in posing questions to these animators.

What transpired during the demonstration surpassed expectations. Hundreds of attendees stood for hours at the booth querying the trio of self-proclaimed "animation mentors"—Shawn Kelly of ILM, Bobby Beck of Pixar, and independent artist Carlos Baena—with questions ranging from the simplistic to the sublime.

The session, in fact, was similar to an experience two of the artists shared years earlier when teaching an animation course in a traditional university program. Kelly, who had been the instructor for a couple of semesters, invited Beck to deliver a guest lecture to his class. During what many of the students would later say was one of the most inspirational nights of their education, the instructors let the class run over a couple of hours while they were bombarded with questions about the finer points of animation. Kelly says, "We couldn't help notice the hunger for the type of knowledge we were trying to pass on, and the apparent scarcity of it in the school system." As Beck drove home that evening, the basic idea for the online animation school was born.

Professionals who are passionate about their work are eager to pass on their expertise to the next generation.

Immediately following the demonstration at our SIGGRAPH booth, we asked the artists to continue their conversation with the animation community and participate in a Q&A dialogue with the visitors to the *Computer Graphics World* Web site. To view the results of their efforts, or to pose questions of your own, go to www.cgw.com and click on the Ask the Animation-Mentors icon in the left margin.

Why has this concept of asking questions of personal mentors been so appealing? In retrospect, the positive response should have come as no surprise. Students who are passionate about their field of endeavor naturally generate questions that fall outside any linear path to knowledge. And professionals who are passionate about their work are eager to give back to the community. As Kelly puts it, "We hope that by bringing the knowledge of all these ninja animators to students, we can help them grow into the next generation of animators who will blow us all away and push our art form to a whole new level."

By featuring the animation mentors on our Web site, we hope to play a key role in building a stronger graphics community. And to that end, we invite people with all levels of expertise to participate in the Q&A sessions as well as in our online forums. Bringing together people with passion is a powerful way to advance the state of any art.

ComputerGraphics World
The Magazine for Digital Content Professionals

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products | video

NewTek Unveils VT4 Live

NewTek has released VT4 Live, an integrated production suite of hardware and software, for professionals in SD video production.

Among the many features new to VT4 Live are support for Microsoft PowerPoint presentations, DVD Authoring with instant project import and playback, and VT-Stream one-button streaming. The upgrade adds more than 200 new digital video effects and transitions, bringing the total number of DVEs in VT4 above 500. Image Super-Scaling for sharp picture-in-picture, real-time DV out, integrated genlock, MPEG-2 encoding, and CG for titles, scrolls, and crawls round out the new version. The bundle also includes LightWave 3D Version 8 for high-end animation, as well as DVD Workshop 2 SE for DVD authoring.

Complete with an SX-84 Switcher Expansion, an RS-8 Remote Switcher, and software, VT4 Live is priced at $5995. VT4 software bundled with the VT-Pro I/O card costs $3995. Registered users of previous versions can purchase an upgrade to VT4 software for $995.

NewTek; www.newtek.com

products | 3D animation

Eovia Introduces Cararra 4

Eovia has started shipping Carrara 4, the latest version of its 3D animation, modeling, and rendering software, in Standard and Professional versions.

New to Version 4 are an updated Scene Wizard, faster OpenGL functionality, and the ability to apply shaders to a group. The upgrade also features new terrain and sky modules, shader transforms, new texture and lighting controls, raytraced depth of field, and improvements to rendering, motion paths, IK, and timeline support.

Carrara 4 Pro exceeds the Standard version in its capabilities and power, adding vector and 3D motion blur, network rendering, and Amapi Designer 7 and Eovia's TransPoser and CADstyle plug-ins. The Pro version also extends the user's file import options to include BVH, COB, FBX, and LWO files.

Carrara 4 Pro is priced at $579 for the full version and $189 as an upgrade from Versions 2 and 3, whereas Carrara 4 Standard costs $279 for the full version and $119 as an upgrade.

Eovia; www.eovia.com

products | previz

@Last Software Upgrades SketchUp

Maker of conceptual design software, @Last Software has unveiled Version 4.0 of its SketchUp 3D design tool for previsualization in the entertainment, film, and gaming industries. Designed for quick and easy sketching, modification, and presentation of 3D models, SketchUp has been upgraded with a Ruby scripting interface; Face Me, which makes 2D components look 3D; Texture Tweaker,

products | 3D modeling/animation

Maxon Launches Cinema 4D Release 9

Maxon Computer has introduced the ninth generation of its modeling and animation tool, Cinema 4D.

As well as housing more than 100 new functions and features, Cinema 4D Release 9 offers a re-engineered modeling core, designed to ease and speed the process. The modeling core gains support for N-Gons, with which users can create models based on polygons having virtually any number of points. At the same time, Cinema 4D's modeling tool set adds improved polygon knitting and a new brush tool for painting point deformations on a model.

Cinema 4D's user interface is made more intuitive by HeadsUpDisplay (HUD). By bringing the necessary tools within the editor, HUD provides access to configurable information and functions, and enables users to take advantage of a full-screen editor. For character animators, the upgrade offers new Clothilde functions that ease the process of adding clothing to characters and simulating cloth. Hard-IK sports more kinematics for character motion, whereas Motion Blending enables motions to be blended into each other. And the cloth dynamics engine, made specifically for simulating cloth, ensures fast collision detection.

Release 9 boasts Sub-Polygon Displacement, which generates more details during rendering and lessens both memory consumption and render times. Cinema 4D also now supports the direct export of multipass rendering data to Discreet's Combustion and Apple's Final Cut Pro, as well as Adobe's After Effects.

■ **Maxon Computer;** www.maxon.net

enabling textures and photos to be stretched and manipulated across a continuous surface; Follow Me, for pushing and pulling a surface along a path; and The Intersector, aiding users in intersecting complex shapes with a single mouse click. SketchUp 4.0 is available now for $495 for a new license and $95 for an upgrade.

The company also has debuted a previsualization extension for SketchUp 4.0. SketchUp 4 Film & Stage, now available for Windows and Mac OS X platforms, assists SketchUp users in storyboarding, scene design, layout, and logistic planning. SketchUp 4 Film & Stage includes a library of pre-drawn film-specific components, as well as a Camera Tool with which to control aspect ratios and camera position. Users also have the option of exporting AVI and QuickTime files for use with such professional video applications as Apple's Final Cut Pro.

■ **@Last Software;** www.sketchup.com

products | film recording

Celco Advances Film Recording Software

Celco has announced the availability of Version 2.0 of its FilmOut Pro advanced film recording software.

The newly upgraded film recorder and image control software is designed for use with the latest generation of the company's Fury and FireStorm digital motion picture film recorders.

Sporting a new user interface, FilmOut Pro 2.0 provides users with various image processing and viewing tools with which to define aspect ratios and formats, crop and resize images, and more.

Version 2.0 further offers an automated color-management utility, an interactive A/B image-comparison slider, image-sharpening algorithms, degrain functions, and the ability to display image histograms by color channel. FilmOut Pro is bundled with FinalView, an image-viewing software solution that provides users with a final look at the image, in its exact size and position on film, before it is sent to the recorder.

■ **Celco;** www.celco.com

spotlight

user focus | music video

Hi Def Jam

Most music videos, which are created on a "fast track," are not finished in HD. The format is expensive, the postproduction work is time-consuming, and, above all, music video channels do not push for it. But when the Beastie Boys tapped Northern Lights Post to create a video for their song *Ch-Check It Out*, they required that it be done in high def.

"It was important to the band to have a 24p HD master because the musicians are not only interested in the technology, but they also want to preserve their work for years to come," says editor/effects artist Ross Shain of Northern Lights Post. A universal mastering format, 24p is not interlaced so it results in a 1:1 relationship with the original film frames. This makes it ideal as a master file format, since it can be ported to other formats for future needs without image degradation.

Ch-Check It Out itself is a blast from the past, with an eclectic collection of nostalgic-style beats and rhythms. The video is a similar bizarre mix of hip-hop humor and visual non sequiturs that range from a parody of the *Star Trek* TV series to a chase through the Florida Everglades.

While some of the styles look dated, all the imagery was shot in the present. Nevertheless, the music video was shot in a number of formats, including 16mm, 24p, HD, and NTSC, all of which had to be converted to HD resolution.

In addition to finishing the video in HD, Northern Lights Post also handled the visual effects and the compositing of numerous greenscreen shots.

For the video's *Star Trek* sequence, the artists used Avid's DS Nitris to mimic the low-tech look of the original TV series.

For the Everglades scene, for example, the artists used an Avid DS Nitris system to composite the 16mm footage of the band and the boat, which were filmed against greenscreen and composited with the background plates of the swamps, which were shot in the less-expensive 24p HD. The scene was augmented with animated water splashes, mist, and particles created in Wondertouch's ParticleIllusion. —*Karen Moltenbrey*

What Ryan has won and lost are equally astounding.

Awards
TO DATE

Annecy International Animation Festival
Special Jury Prize

Cannes Film Festival Critics' Week
Kodak Discovery Award for Best Short Film
Canal+ Award for Best Short Film

2004 Worldwide Short Film Festival
Sun Life Financial Award for Best Canadian Short

SIGGRAPH 2004
Jury Award

PRIX ARS Electronica 2004
Linz, Austria
Golden Nica
Computer Animation Visual Effects category

It's nice to be recognized. We know because the Academy of Motion Picture Arts and Sciences® was nice enough to recognize our Maya® software with an Oscar® for Scientific and Technical Achievement. So we would like to recognize Chris Landreth and his new animated documentary, *Ryan*, an incredible journey down the path of every artist's worst fear – losing it. We are proud that *Ryan* was Made in Maya™ and that we were involved in bringing Landreth's unique world of "psychological realism" to life. Visit **www.alias.com/awards** to view and learn more about *Ryan* and other examples of award winning creativity Made in Maya.

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Ryan is a Copper Heart Entertainment Production in Co-Production with the National Film Board of Canada in Association with Seneca College - Animation Arts Center.

broadcast

user focus

Slam-Dunk Effects

Audiences can expect plenty of action when two of the NBA's best point guards go head-to-head on the court. But when their digital doubles play an intense game of one-on-one in a grungy industrial back-lot setting, the feats escalate from the superhuman to the totally outrageous.

That's what transpired when computer-generated versions of Steve Francis of the Houston Rockets and Baron David of the New Orleans Hornets faced off in an all-CG television commercial for Reebok. As the spot progresses, the two-some's above-the-rim duel becomes more extreme, with the stars trading stunning three-point shots and devastating slam dunks that eventually leave the basketball court in ruins.

Despite the unbelievable stunts, the spot, created entirely by Blur Studio, features photorealistic animation created with motion-captured data. In one scene, for instance, Davis ricochets the ball off an air duct and light stanchion before catching it and dropping it through the rim in a backward slam dunk. He then flips his body over the rim and lands gracefully atop the backboard. "It's pure fantasy," says Blur president Tim Miller, "but it's a fantasy that is inspired by the real talents and personalities of the players."

Digital doubles of two NBA stars show off their athletic superpowers, and their footwear, in an all-CG Reebok TV spot.

To create the CG athletes, Blur artists met Francis and Davis while they were on the road, and acquired high-res digital photos of their facial and body features that the artists used as a reference while modeling the characters in Discreet's 3ds max. The Blur team also used the photos to texture the models, which was done in Adobe's Photoshop.

Next, using a Vicon mocap system, the group acquired motion data from a performance by two players recommended by Davis who mimicked the moves of the two stars.

The artists then used Eyeon Software's Digital Fusion to composite the CG players into the scenes, which are brimming with detail. For instance, a number of close-up shots reveal the granularity in the asphalt surface of the court and the cracked and fading paint of the free-throw line. In addition, panoramas offer sweeping views of the gritty urban environment, complete with spray-painted scrawls created by a graffiti artist commissioned by the studio. —*KM*

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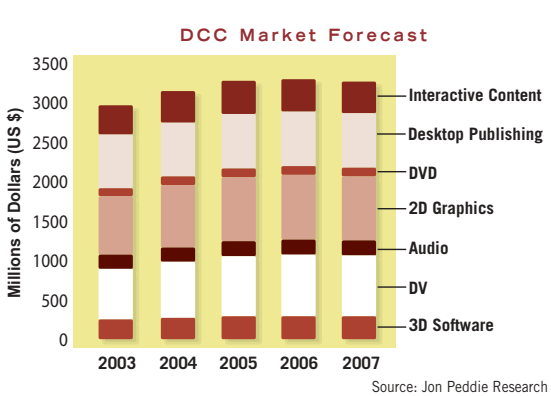
spotlight

market outlook

The DCC market at year's end

In its updated "Digital Content Creation Report," Jon Peddie Research calls attention to several industry trends that emerged over the past 12 months, as well as provides a forecast for 2005.

3D modeling and animation software experienced growth in 2004, a trend expected to continue throughout 2005. The 3D modeling and animation segment saw other profound changes in 2004 as well. Alias emerged from the shelter of parent company SGI to go private and shook up the market with a dramatic price cut for Maya, a move that increased unit shipments and overall revenue. Competitor Softimage, owned by Avid, followed suit with price reductions, including a $495 version of XSI. The trend has driven down prices across the board, which is offset by increased unit sales. Price-cutting has been beneficial overall and has spurred sales as artists show a willingness to experiment with new products.



Source: Jon Peddie Research

In 2004, several companies hoped to build a high-volume consumer market with CD/DVD-burning products, an idea that originally spurred the organization of Roxio. Pinnacle acquired VOB Computersysteme GmbH, adding CD/DVD-burning products to its arsenal. With OEM deals for its MyDVD products, Sonic Solutions is the venerable market leader. Moreover, Roxio sold its CD/DVD products to Sonic Solutions this year. Despite all this activity, the DVD authoring and audio market segments are forecast to realize only small gains throughout 2007.

Evidence indicates that the 2D graphics segment leads the DCC market, and its dominance is expected to continue through 2006. With its Photoshop products, Adobe has maintained a firm hold on the high end of the 2D graphics and imaging markets, which experienced a rise in digital photography in 2004. Although longtime competitor Jasc remained doggedly on Adobe's heels with its PaintShop Pro product, it has been acquired by Corel, a company unwilling to cede the professional imaging market to Adobe.

All in all, the digital content creation market weathered a difficult period. The decline of world economies had a profound effect on the DCC market, as advertising revenues declined and budgets tightened. Although almost every DCC segment suffered, the trend reversed itself in 2004. Casting an eye on the future, Jon Peddie Research suggests that the DCC market as a whole will continue to rise through 2006, after which time it is likely to begin tapering off.

— Kathleen Maher, senior analyst, Jon Peddie Research

news

In Brief

Newly separated from parent company **DreamWorks SKG**, **DreamWorks Animation SKG** (Glendale, CA) premiered on Wall Street, offering 29 million shares of common stock at an opening price of $28 per share, a price that quickly rose by nearly 40 percent. Raising roughly $819 million, DreamWorks Animation is the first major stock debut to hail from Hollywood since the public offerings of **Lion's Gate** and **Fox Entertainment Group** stocks in 1998. DreamWorks Animation shares are trading on the New York Stock Exchange under the ticker symbol DWA. **Hewlett-Packard** (Palo Alto, CA) revealed that it has signed a three-year extension of its multimillion-dollar agreement with **DreamWorks SKG**. The new alliance designates HP as DreamWorks' sole preferred technology provider for its core technology purchases. The companies also will collaborate on technology innovations in such market areas as digital editing, digital cinema, and digital asset management. **BioWare Corp.** (Edmonton, WA), maker of *Star Wars: Knights of the Old Republic* and *Neverwinter Nights*, was awarded Game Developer of the Year at the 2004 Billboard Digital Entertainment Awards. The company also debuted its BioWare Online Store at http://store.bioware.com.

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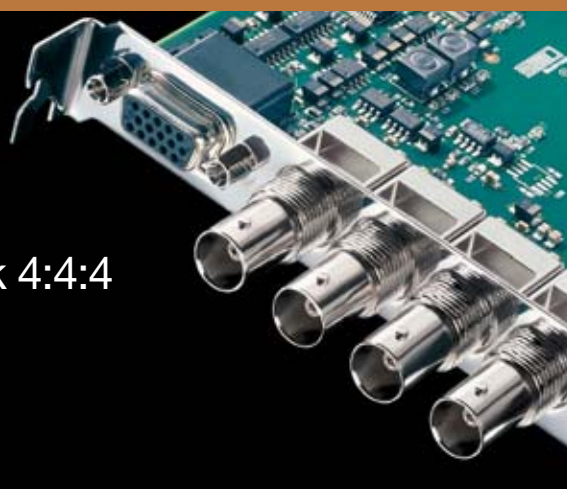

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viewpoint Video

Uncommon Compositing

By Jeff Sauer

Compositing. It's arguably the part of postproduction in which the graphic artist meets the videographer. Compositing is about designing the frame, and building and layering images. Simplistically, whereas video editing assembles clips linearly over time, compositing mixes images in the visual moment, vertically, on a timeline, rather than horizontally.

There was a time in digital video's relatively distant past when compositing was viewed as an exclusive craft. Compositors and editors were almost thought to be from different planets, or at least of differing artistic strengths and sensibilities. That perception was fed by the (very expensive) dedicated Unix workstations that compositing required and by the specific and detailed training it took to capably operate them. Few professional video editors would venture there. In those days, compositing was a big line item on a production budget typically reserved for premium clients and high-profile jobs.

Most of that has changed. Compositing has exploded, driven primarily by the rapid growth of computer processing power, and it has become a regular, indeed expected, part of postproduction. Today, it is just about assumed that all video projects—from wedding videos to corporate promotion to TV advertisements—will include titles and graphics with production values similar to those we've all come to know from watching television. Fancy motion graphics, flying logos, and montages are all standard fare. Much of the time, those "enhancements" are expected for free, and most video editors are automatically enlisted as compositors.

Apple's new Motion software provides a layer palette along with drag-and-drop simplicity for applying filters and motion behaviors. These features make the program feel more like a graphics editor than a video editing application.

Certainly compositing is more accessible now. Video editing system timelines regularly support multiple layers, as well as keyframe control of effects, objects, text, transitions, and layers. That blurring of the lines between video editing and compositing is nothing new, of course, going back to the mid-1990s when video editing software began to include the ability to layer tracks and visual effects. The developers of the first release of Apple's Final Cut Pro started with the stated goal of matching at least 80 percent of the video editing features of Avid's industry-standard Media Composer as well as 80 percent of the features of Adobe's dominant compositing application, After Effects.

Built-in Compositing

Today, just about any serious non-linear editing (NLE) system or software supports multitrack editing and the ability to layer images, effects, filters, transparencies, and graphics in a single timeline. Applications such as Avid's Media Composer Adrenaline, Pinnacle Systems' Liquid Edition, Adobe's Premiere Pro, Leitch's Velocity, Ulead's Media Studio Pro, Canopus's Edius, and others all have significant multitrack, motion control, and effects-creation capabilities that were once the domain of compositing engines. What's more, because software alone can handle just about any basic edit-

Jeff Sauer is a contributing editor of *Computer Graphics World* and director of the Digital Video Group, an independent research and testing organization for digital media. He can be reached at jeff@dtvgroup.com.

Compositing has fueled expectations for creativity at all levels of video production.

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ing function without rendering, real-time compositing visualization—functionality that once required that big Unix iron—is the carrot that now drives many digital video hardware vendors (see "Hardware-Enhanced Editing," November, pg. 14).

Yet in many ways, the transition to compositing within video editing applications has just traded one type of complex process for another. Whereas training was once needed to drive the Unix hardware of old, today one often needs to understand the most intricate levels of often very advanced and complex video editing interfaces in order to create multilayer motion animation.

For example, to create simple motion text in an NLE interface, you might have to start with a title or character-generation utility, an interface that may or may not include any motion capabilities and is even less likely to include filters and effects. Perhaps you'd create a title, save it, then open it in an effects editor, work there, then save that to the timeline to mix it with the other tracks. Dedicated compositing tools offer greater control of the elements in a unified interface.

Apple's new Motion software was designed for just that purpose. Motion is a dedicated motion-graphics tool that may not seem so special when its list of features is compared to those built-in capabilities of non-linear editing applications. But the $299 price is a bargain for the facility it offers for handling common compositing tasks.

Motion builds visual sequences in a timeline that is similar to that of a video editing application. But much of the interface feels more like a graphics tool. Most notably, Motion has a dominant layer palette, much like that of Photoshop, that offers the ability to non-destructively add objects and view groups of objects. And dozens of canned filters (including various blurs, color and brightness correction, distortion, and glow) as well as visual and particle effects (such as fire, smoke, and bouncing balls) can be applied by simply dragging and dropping.

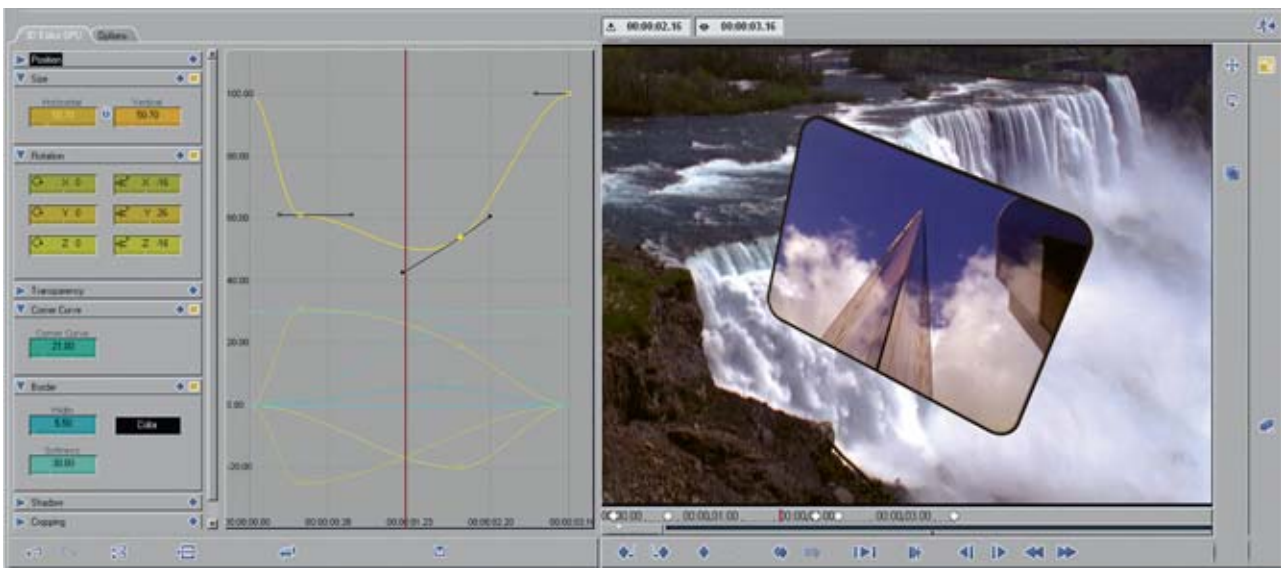
Motion follows the same simplicity in its approach to creating movement. "Behaviors" are something like movement templates that can be added to create motion animation as easily as adding a filter. The roughly 40 supplied behaviors (including throw, gravity, grow, and spin) are stackable and can create complex movement sequences with little effort. Naturally, with both filters and behaviors, you'll always have the ability to fine-tune, edit, and alter the defaults, but they offer invaluable time-savings for both mundane text animation and creative experimentation.

Perhaps most important for professionals, Motion integrates directly with Apple's Final Cut Pro HD. It launches directly from within Final Cut Pro and includes support for real-time visualization with HD sources. Motion can even be used as a DVD motion-title and motion-menu creation tool for Apple's DVD Studio Pro authoring application.

On the surface, products like Motion—as well as the wide availability of compositing capabilities in video editing software—may seem like they will spell the death of compositing as a craft, just as the use of canned effects and stock motion animation may appear to dumb down video creativity. And in some cases, that will certainly be true.

However, the proliferation of compositing at virtually every level of production ultimately drives expectations at the highest levels of production to find creative differentiation. That offers opportunities for imaginative designers working at all levels of video production to produce uncommonly creative composites. Indeed, this is true whether they use straightforward tools, such as Motion, or more transitional compositing tools, such as Adobe's stalwart After Effects (now in Version 6.5), a wide array of tools from Discreet (ranging from Combustion all the way up to Flint, Flame, and Inferno), or Apple's increasingly robust Shake. ⌗

Because detailed motion and effects parameter controls are now standard fare in just about every non-linear editing interface—including Pinnacle's Liquid Edition, shown below—they afford significant compositing possibilities.



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Live-action film techniques transport Tom Hanks and cast into the CG world of The Polar Express

Locomo

When filmmakers think about bringing a storybook to life, they usually imagine re-creating the fantasy world by using animation or by putting actors into the roles of the storybook characters. *Shrek* is a good example of the former; last year's *Peter Pan* is a good example of the latter. This year's *The Polar Express* is an example of neither...or, perhaps, both.

The film, based on Chris Van Allsburg's illustrated book of the same name, *The Polar Express* tells the story of 8-year-old Chris's train ride to the North Pole on Christmas Eve. It looks like an animated feature, and it was created entirely with 3D computer graphics, including the IMAX release. But it was directed by Robert Zemeckis like a live-action film, in which actors performed nearly all the human characters.

"Bob wanted to direct actors, not a bunch of animators," says Sony Pictures Imageworks' Jerome Chen, co-visual effects supervisor. What he wanted, to be precise, was Tom Hanks—whose production company had optioned the book, and with whom he worked on *Cast Away* and *Forrest Gump*—to play the part of the boy...and the train conductor, the hobo, Santa, and the boy's father. "He didn't want Tom to just voice the characters," says Chen. "He wanted him to act them." And he wanted adults to play all the other children, too. Imageworks made it possible.

The actors—Hanks, other adult actors who played the parts of children and adults, child actors, acrobats, small people, and even musicians—performed on three stages. They were all fitted with costumes and some wore makeup. The dialogue was recorded while they were filmed, much as it is for any live-action film. But it wasn't like any other live-action film. The stages were motion-capture stages. The sets and props were built out of blue chicken wire, and when the actors wore costumes on stage, the costumes were made of mesh so they wouldn't occlude the motion-capture cameras. Rather than one cameraman working with the director, 12 cameramen using off-the-shelf video cameras filmed the actors in the round. And motion-capture equipment recorded the actors' every movement.

"The set looked like the holodeck from *Star Trek*," says Chen. "Everything was gray and black with all these high-tech looking lights. And 20 feet away, inside the "widow maker" [a separate room], people were making sure the computers were working and the network cards weren't failing. It was so

otion

By Barbara Robertson

Before *The Polar Express* train finishes its journey to the North Pole, it takes its passengers on a wild ride that becomes even more exciting in the 3D IMAX version thanks to 3D graphics.

weird. I never thought I would see Tom Hanks in a motion-capture suit with Bob Zemeckis directing him."

Animation for the train conductor, one of five characters acted by Tom Hanks, was derived from performances directed on stage by Robert Zemeckis and captured with a 360-degree facial- and body-performance capture system developed at Sony Pictures Imageworks.

Performance Capture

Once the crew members knew they would be capturing Hanks while Zemeckis was directng him, they began looking at existing motion-capture technology. Until then, body and facial performances had been captured separately, and often the facial performance was hand-animated rather than captured—as it was for Gollum in *The Lord of the Rings*, for example. Animators then pasted the two separate performances together.

That was not what *The Polar Express* crew had in mind. "When you have an actor like Tom Hanks, you don't want to split him apart," says Chen. "We needed a place where four actors could look at one another and move in any direction, and we could record their faces and bodies."

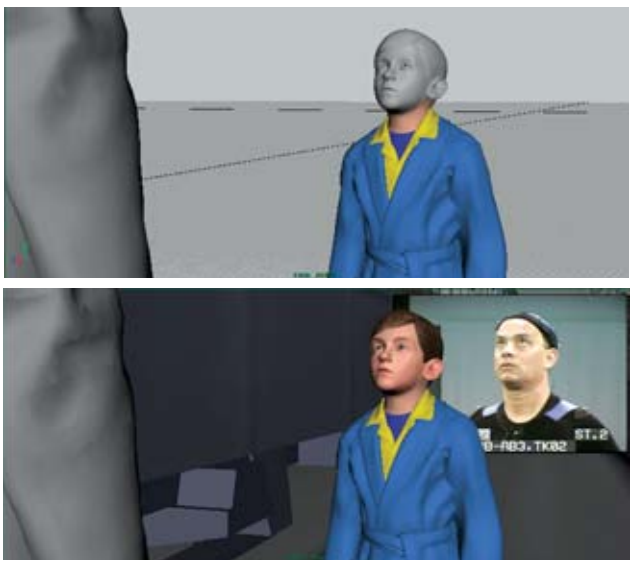
As a result, Imageworks, with the help of Vicon, developed a performance-capture system to do exactly that. With this system, based on Vicon motion-capture equipment, they captured the faces and bodies of up to four actors working on a 10- by 10- by 8-foot stage using 64 motion-capture cameras linked together. Demian Gordon, motion-capture supervisor, designed the camera placement: Each camera had a 3- by 5-foot field of view. Vicon's IQ software was upgraded to handle the multiple cameras and dense facial capture; the upgrades were incorporated in version 1.5 and later into the company's new MX system. The House of Moves' Diva software was also tweaked to handle the heavy load.

The actors each wore 151 markers on their faces and 32 markers on their bodies. The markers were the size of a pencil lead, 2.7mm in diameter. Fifteen makeup artists applied these dots to the actors' faces using a map drawn by Alberto Menache, senior CG supervisor, who developed the facial muscle system for the digital models. "The markers had to be painstakingly glued onto the same places every day," says Gordon. "After every scene, a host of people with flashlights inspected each marker and searched the ground for any that fell off."

The crew also applied markers to the sets and props, which were built in two sizes—an adult size and a larger size so that the adults would look child-sized next to them; the markers helped the crew place matching objects in the CG environment more precisely. The sets and props were moved between three stages—the performance-capture stage and two larger stages for body capture only—which were managed by Giant Studios.

Most of the characters in the film were motion-captured (body only) or performance-captured (face and body simultaneously), including the waiters. Giant Studios handled the body capture of multiple actors on large motion-capture stages.

One sequence supervised by Menache takes place in a small passenger car on the train and has 30 characters, including waiters and chefs serving hot chocolate to the children. "But they're dancing and doing cartwheels and walking on the walls and ceiling, and the conductor is dancing and doing the moon walk," he says. For this, the second-unit actors and acrobats playing the waiters, chefs, and children were captured on the large stage, while Hanks's performance was captured on the performance-capture stage.



Performances from videotaped capture sessions were applied to 3D proxies (top) and put into simple sets (middle) so Zemeckis could design camera moves interactively. Later, facial animation was applied and sets added (bottom) based on the camera moves.

Because Hanks performing as a child and as an adult would often be in a shot with adult actors playing children, a team of "triangulators" kept track of all the different scales for eyelines, props, and sets. They also blocked out how many steps an adult actor should take to walk across the set when the action was destined to be scaled down to child size. Each scene with children was filmed and motion-captured twice—once with the adult actors and once with child actors; however, the data from the child actors was primarily used for reference.

After each take, a team of 18 people from Imageworks and Giant Studios would check the data—massive amounts of data. "We shot 50 gigabytes a day," says Gordon. By way of comparison, Gordon, who was also motion-capture supervisor for the last two *Matrix* films, says that number is five times the total amount of data captured during six months of working on those films.

At the end of each day, Zemeckis picked performances from videos shot during the day. The motion-capture team, using time codes from the video, selected motion-capture data to match. The selected body performances for each character were then assembled into scenes in Alias's MotionBuilder, and video clips of matching facial performances were placed around the perimeter of the screen.

Zemeckis then "shot" the scenes with Robert Presley, a camera operator, who used a camera head as an input device. When he turned the wheels on the camera head, he moved the virtual camera in MotionBuilder—one wheel would tilt the camera; the other would pan it. The system, dubbed Wheels, was developed by Imageworks.

"He was working in real time with the motion capture applied to the low-res characters that were in CG sets," says Chen. "The sets were in the same place as the chicken wire on the stage. It was a new experience for Presley, and yet the device was familiar." Using this system, Zemeckis created master shots, close-ups, over-the-shoulder shots—just as he would have done with a live-action film. "The only difference was that he was filming a digital character that did exactly the same thing on every take," says Chen.

Meanwhile, a separate crew applied the facial-animation data to the digital models. The data, once fastened to 300 digital muscles, drove the facial performance—except for the eyes—although animators fine-tuned the expressions. The eyes and eyelids were entirely hand animated.

To create the digital muscle system anatomy for characters performed by Hanks, Menache started with 80 photographs of the actor doing different facial expressions. "I traced where I thought his muscles would be on waxed paper," he says. "The only thing I guessed about was his jaw pivot." The map he derived was used in two ways—to place the motion-capture markers on Hanks and, similarly, to create the digital muscles. "We put markers on the digital face just like on the actor," Menache says, "and then ran a program that created all the muscles."

Model Makers

Character technical directors used the same system for other characters, all of which had the same number of facial muscles. Thus, even though the markers roughly matched a performer's anatomy, the data could be applied to other characters. "The data is converted to the anatomy of the character," Menache says. "We tried to keep the rigging as straightforward as possible so it could be duplicated." Similarly, the motion data captured from one performer could drive disparate characters. By scaling the data, adult actors could perform child-sized characters.

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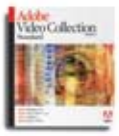

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All the models were created in Maya using subdivision surfaces for the bodies and skin; the characters' costumes were created with NURBS. To create the models, actors playing the main characters were scanned and photographed. "For Santa and the hobo, we scanned Tom [Hanks] wearing make-up, prosthetics, and a fat suit," says Sean Phillips, senior CG supervisor. "We also scanned 24 kids, but ended up using five body types mixed and matched to reduce the load on the modelers."

The hobo and the child were both performed by Hanks. To help actors playing children, the crew made props out of blue chicken wire and wire mesh in two sizes—normal and large enough for an adult to seem child-sized.

The costumes were simulated using the same object cloth system in Maya that was used for *Spider-Man 2* (see "Another Big Leap," July, pg. 22), developed by Imageworks and Alias. For hair, the crew used a variety of methods including dynamics in Maya and a proprietary simulation engine. "If the character was a hero, we'd use one system, but if it was in the background, we used simpler hair that approximated the right motion," says Rob Bredow, senior CG supervisor. "We simulated subsets of the hair in a way that is similar to the way guide hairs are used, but we don't like to go into a lot of detail about our system." The studio's patented work on clumping, however, is documented in SIGGRAPH papers.

"The challenge for this film was not whether we could do the simulations, but how to set them up for 40 characters with often three or four characters per shot for the hour-and-a-half film," says Bredow. The most extreme setup was required for the scene in Santa Square, where 30,000 elves mingle with the children, Santa Claus himself, musicians, and reindeer.

As with the other characters in the film, the performances for the elves were based on motion-capture data, in their case from Cirque du Soleil acrobats and little people. To manage 30,000 elves, the crew used crowd-simulation software. The same program also helped herd thousands of digital caribou in one of the many environments the train passed through on its journey north.

"One of the hardest things about the environments was that we didn't know where the camera would be when we were building them," says Phillips. "We had blueprints, but until we got the camera move, we didn't know how much detail we'd need. So, especially for Santa Square, we rolled the dice."

Much of the film takes place in outdoor environments or inside the train. "The environment changed as the train got closer to the North Pole, from semi-urban to rural to forested, and then into tundra in a great arctic wasteland," says James Williams, layout supervisor. "Because we built the environments in a one-to-one scale with the real world and because the motion data is one-to-one, we were very creative in how we dressed the sets so we could reuse a lot of them."

Magical Worlds

Although many sets were made with 3D objects, some were matte paintings created with Maxon Computer's Cinema 4D. To handle textured 3D objects and sets, the crew used a new envi-

The 30,000 elves in Santa Square were animated using motion-capture cycles applied to crowd-simulation software. Tom Hanks plays Santa, the child Chris with Santa, and the train conductor.

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The camera follows a train ticket that flies out of Chris's hand into a magical CG winter wonderland complete with CG wolves and lit only by moonlight and the train windows.

ronment-assembly system. "We've got thousands and thousands of objects—from a marble that rolls across the floor to the train itself—and everything was painted in our texture paint department," says Mark Lambert, senior CG supervisor. "We had to have a system to keep up with what texture goes on which object and provide it when it was needed."

In one shot, for example, the camera moves through four miles in two and a half minutes. "We follow a train ticket through the moonlight in a forest where we see wolves, an eagle, and waterfalls," says Lambert.

The animals were all hand animated as was the train, which is an enormous model. "It's based on an actual train," says Phillips. "The hydraulics and the steam vents, for example, are accurate almost to a fault. It is so heavy that we had fairly elaborate scripts for stripping out the undercarriage."

The effects department added the smoke and steam. "When Chris first walks out into the street, the train looks just like it does in the book, with smoke and steam pouring off," says Rob Bredow, senior CG supervisor. "It had to hold up for many minutes because it established the scene and the mood of the film."

Because the motion-capture data was most easily applied to CG characters on a one-to-one basis, the train was built on a one-to-one scale as well. Smoke and steam were added using a new custom drawing tool called SPLAT.

For these effects and others, including atmospherics and cracking ice, the crew used Side Effects Software's Houdini with a new custom tool called SPLAT (Sony Pictures Layered Art Technology). "SPLAT uses a painter's algorithm to draw all of our smoke and steam," says Bredow. "It sorts the particles from back to front, draws the back one first and the next one on top of that." Because the algorithm is accelerated in hardware (Nvidia cards using OpenGL), volumetric renders that might have taken 20 hours were output in three to four minutes per frame. "The nice thing is that an artist can move lights around almost in real time and see the effect on the smoke," he says.

The lights helped keep the imagery from becoming too photorealistic. The film takes place entirely at night—inside the train or later, in Santa Square, and outside in the moonlight, which encouraged dramatic lighting. "I wasn't lighting like I would for a live-action movie," says Lambert. "It's Christmas Eve and time is magical. We had beams of light cutting through the dark with fog in the air. We used color in ways that wouldn't happen in the real world. If I wanted something moodier, I could try it. It was a great thing to play with."

The crew members who worked on this film believe they have taken part in filmmaking magic, in helping create a new filmmaking medium.

"This is a medium where we get the best of both worlds," says Williams. "We get the exactness of the animation process in which you can go back again and again and refine each take, but at the same time, we get the spontaneity of live-action performances and live-action tools. It breaks through a glass ceiling we never knew was there. It frees us to redefine the way we make movies."

Barbara Robertson is an award-winning journalist and a contributing editor for Computer Graphics World.

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FEAR FACTOR

Game developers use the latest tools and techniques to create frightening experiences

By Karen Moltenbrey

Using various technical and artistic approaches, three developers have injected fear and horror into their recent game releases, producing unique and terrifying experiences that are not for the fainthearted.

In *Doom 3*, Id Software crafted a hellacious scenario—using state-of-the-art computer graphics and techniques—in which the player assumes the role of the main game character to confront horrific demons and zombies unleashed from hell. Meanwhile, gaming giant Konami employed both a riveting story and compelling graphics to place the player in the middle of a psychological nightmare for the latest release in its frightening franchise, *Silent Hill 4: The Room*. In *Missing: Since January*, game studio Lexis Numerique devised a new approach to instill fear, using reality and unusual mixed media—video, the Internet, and graphics—to immerse the player (acting as himself or herself rather than a game character) in the gripping story line, as the person matches wits against a serial killer.

Through spellbinding stories augmented with CG innovation and invention, these studios are delivering what, in effect, are real-time horror films that, because of their interactivity, deliver far more chills and thrills than a typical scary movie.

Doom and Gloom

Cutting-edge CGI, including unified lighting and shadowing, gives players a hellish experience in Doom 3

In 1993, Id Software set a new standard in first-person shooter games with its flagship sci-fi horror title *Doom*, which, through a revolutionary game engine, upped the ante in gameplay and interactive graphics. Recently, Id and Activision gave the classic release, and the technologies used to create it, a total makeover, the result of which is *Doom 3*.

A retelling of the original tale as opposed to a sequel, *Doom 3* employs state-of-the-art 3D technology, enabling the player to again assume the role of a marine stationed at a Union Aerospace Corporation facility, only this time on Mars instead of on one of the Martian moons. Just as before, a portal opens and demonic creatures from hell spring forth, forcing the main character and a handful of other survivors into a clash between good and evil.

With the game's sophisticated graphics, players are drawn into a frightening first-person gaming experience rife with moody environments and scary monsters. "From the near-cinema-quality visuals to the terrifying atmosphere and hyper-realistic environments, the whole game screams 'interactive horror film,'" says Id co-owner and CEO Todd Hollenshead.

From the beginning, players are immersed in the title and remain so through the last level largely because of the tight integration of the cinematics and the gameplay. As lead designer and Id Software co-owner Tim Willits explains, in most games, players know they aren't in gameplay mode anymore when they watch the cinematics, which are usually a higher quality because they are rendered outside of the game's graphics engine. "But when we pull the camera back and show the players a glimpse of some monsters they'll be encountering, those monsters in the cinematic look the same as those in-game," he says. "The visual quality and fidelity are exactly the same, rendered in real time through the *Doom 3* engine built by [Id founder and technical director] John Carmack."

Engineered for Fright

Doom 3, in fact, more closely reflects the vision Carmack had when he created the original *Doom* more than a decade earlier. After completing *Quake III Arena* in late 2000, Carmack began developing the new *Doom 3* rendering engine, now available as a commercial license, to take advantage of some of the advancements the card vendors were making in hardware acceleration, particularly for calculating geometry and real-time lighting and shadowing. "Lighting and shadowing can be very moody and atmospheric, which is perfect for the level of fright we wanted in this game," states Hollenshead.

In fact, as programmer Robert Duffy points out, the *Doom 3* engine is programmed for cinematic gaming, providing a landscape in which the Id designers and artists could utilize revolutionary graphics features and techniques, among them unified lighting and shadow-volume calculation, in which every light can cast shadows. "We are using the features of the latest graphics cards, but the actual image rendering is done in the engine, not the card, and that's what gives the imagery its unique look," says Duffy.

Id's former engines, such as those employed in *Quake III*, used "pre-baked," or static, lighting. However, with unified lighting, the dark areas of the long, creepy corridors become that much darker. "You can really appreciate all the subtle shadows and the way the light moves around objects in the environments," says lead artist Kenneth Scott. "In *Doom 3*, the lighting is dynamic and realistic. If the player moves a flashlight over a corrugated surface, the tiny shadows pouring over all the surfaces will shift based on the direction of the light. It looks real, and the player becomes more immersed in the story and the action."

Taking advantage of a state-of-the-art graphics engine, Id Software raises the terror level in *Doom 3* with film-like imagery, including detailed demons, moody environments, and eerie shadows.

In addition, *Doom 3* uses normal mapping, a variation of bump mapping that, instead of just applying grayscales, uses all color channels (RGB) for per-pixel lighting. The color channels, obtained from a higher detailed version of an object to produce the same effects, allow an artist to add more shading to create the illusion of high detail on a low-res model. A sophisticated graphics technique, normal mapping had not been used to this extent in previous games because the imagery could not be processed fast enough on current hardware to support interactivity. However, Carmack, known for devising technical solutions that push the gaming industry forward, developed in-house techniques that overcame that hurdle and enabled the *Doom 3* engine to "draw" what appear to be detailed characters and imagery in real time.

The team built high-poly (300,000 to three million), cinematic-quality models for the characters and monsters using mainly NewTek's LightWave, in addition to Pixologic's Zbrush. Next, the artists built lighter versions with lower poly counts of 1800 to 3000. Then, using the normal mapping technique, they generated the normal maps from the high-poly models and applied the maps to the lighter models. As a result, the lighter models render almost like the dense models, conveying height and surface anomalies, revealing, for example, every wrinkle, cut, and crease on a demon's skin.

Meanwhile, the group generated the textures from photographic references and from scratch, and applied the surfaces to the models using Adobe's Photoshop. With Right Hemisphere's Deep Paint, the artists fixed and smoothed the exposed seams on the creatures' bodies. They then augmented the details by adding bump mapping to the flat surfaces, making them appear uneven and curved, a key feature because the light and shadows react appropriately based on the contour of the bump map.

To complete the game, the group devised a customized particle editor and effects compositing system for realistically generating fire, smoke, hair, and weather effects. The team also created a proprietary physics system, so if the player shoots a hanging light fixture, for example, it will swing back and forth, and the projected shadows will move accordingly. For the character and monster animations, the group used a commercial package, Alias's Maya, and for managing all the source code and assets (which total 2.5GB), it used Avid/NxN's Alienbrain software.

"This is the first shipping game title that gives you near-cinematic image quality in real time," says Duffy. To put the team's accomplishment into perspective: One level of *Doom 3* has more media and art assets than the entire *Quake III Arena* game, which is only a few years old.

Another of the group's hurdles was getting the title to run on a range of computers, as the team spent the last few months of the project tweaking the engine and the game so it would run on a "typical" gaming computer. Currently, Id is working on an Xbox version of the release, which is expected to be available next year and will incorporate new Xbox Live features including a cooperative mode. The console game will maintain *Doom 3*'s unique look and state-of-the-art features, since Carmack developed the *Doom 3* rendering core with the Xbox in mind. However, the console's memory limitations are requiring the team to rework some of the assets found in the PC version. Meanwhile, Id and Activision just announced *Doom 3: Resurrection of Evil*, an expansion pack for the PC version.

The dim, industrial style of the game's indoor environments, set upon a reddish Martian landscape, provide a sense of foreboding.

Without a doubt, *Doom 3* raises the level of graphic quality—and virtual terror—in a game, and has been called one of the scariest games ever by the Associated Press. Thanks to the slow pace, players embark on a suspenseful journey through the gloomy environments, where, lurking in the dark for their next victim may be some of the most nightmarish creatures ever conceived, from an array of flesh-torn zombies armed with their own brutal strength or weapons of mass destruction, to deadly demons of every size and shape, including a mechanical/organic bull-like creature with razor claws and needle-sharp teeth, to the gruesome, bodiless flaming heads whose shrill cries often can be heard in the distance as they search for their next soul.

"Doom is so dynamic, it's hard to not feel as if you are a part of this frightening experience," says Scott.

Nightmarish Effects

Fear hits home in Silent Hill 4, which uses compelling CGI and a terrifying tale to create a horrific 'head game'

By enhancing the features that have defined its *Silent Hill* brand of psychological horror—intense gameplay, dark, highly detailed imagery, and a bone-chilling story—Konami Digital Entertainment has raised the terror level in gaming with *Silent Hill 4: The Room*. "By transforming a would-be sanctuary—the player's room—into an unpredictable and inescapable nightmare, players will find themselves in uncharted territory as they explore a nightmarish alternate reality to unravel a truly unnerving mystery," says Wilson Cheng, *Silent Hill 4*'s product manager.

The story unfolds in a sleepy village near the infamous town of Silent Hill, the setting in the series's previous titles. It's here where the new protagonist, Henry Townshend, awakens from a nightmare to find that he is trapped in his apartment, where a portal has appeared, through which heinous creatures and the ghastly undead lie in wait.

According to sub-producer Akihiro Imamura, users who play horror-genre games expect to be horrified, and one way the team met that challenge was with a riveting narrative. "In a game environment, the player controls the main character, so it's necessary that the player relate to the character's emotions, or the story will

A Real Scare

Missing brings fear to life in this video-based reality game

In most computer games like *Doom 3* and *Silent Hill 4: The Room*, developers immerse the player in the action using a range of tactics: an engrossing story that elicits emotion, a first-person viewpoint that places the player in the middle of the drama, or compelling, lifelike imagery that helps suspend disbelief, if even for only a moment. Despite these efforts, a person is still usually acutely aware of playing a character in a game. However, in DreamCatcher/The Adventure Company's *Missing: Since January*, a player actually becomes a character in the game. The result is a frighteningly immersive experience unlike any other.

"In most games, you play someone else who has great superpowers, such as big firepower or unrealistic physical abilities," says Djamil Kemal, editorial manager at French game studio Lexis Numerique, which developed the title. "In *Missing*, you play as yourself, with your own skills."

The PC game also features an innovative blend of mixed-media gameplay in which the player uses a CD-ROM and the Internet to solve the disappearance of journalists Jack Lorski and his girlfriend while they were investigating a series of serial killings for a documentary. Soon after they vanish, SKL-Network, the agency Jack works for, receives a haunting CD-ROM showing video footage he had obtained throughout his investigation. But the disc is more than a prop in the story; it marks the start of a chilling game of cat and mouse between the player and a mad killer known as The Phoenix.

The player is drawn into the drama after the police and SKL-Network ask the public for help. The person is then provided a copy of the CD-ROM, which, in addition to the video footage, also contains a number of clues and puzzles constructed by the killer to draw the player deeper into his web. Yet, unlike other adventure games, *Missing* mixes the kind of arbitrary puzzles usually found in adventure games with a style of play that blurs the line between gaming and reality, and takes problem solving in computer games to a new level.

At times, players must use their Internet browser to search more than 300 Web sites—some are real-world pages, while others are phony, set up for the game. And little do players know that their progress is being tracked, and that as they work to unravel the mystery, they'll catch the attention of others involved in the case—other players and central story figures, as well as the serial killer.

"As the game progresses, the player will begin receiving e-mails from virtual characters as well as disturbing messages from The Phoenix," explains Kemal. Some of the messages are automatically generated; others are personalized by a real-life support team.

Mixed Emotion

One unique aspect of the game is that it blends fiction and reality on multiple levels so the player finds it difficult to distinguish between the two, from the e-mails to the Web sites to the locales in the video. Sometimes the information sought by the not be entertaining and the player will not experience the intended horror," he says. "From a story perspective, we created a strong motive, like how to get out of a locked room that is gradually being invaded. Early in the game, the room is still safe, but the player senses that something is wrong, and as the story progresses, we raise the level of horror, turning the room into a deadly place."

Image ©2004 Konami.

The artists augmented *Silent Hill 4*'s imagery with a grayish filter that gives this psychological thriller a dingy, institutional look.

The group set the player view to a first-person "real-world" perspective inside the room, making it easier for players to relate to the character. Alternatively, the game engine, developed in-house, uses a third-person "alternate reality" view when the player travels to horrific other worlds, allowing the player to witness the fear and pain of the main character as he encounters the monsters, says Imamura.

Complementing the story are stylized motion-captured characters, horrific creatures, and dreary, institutional-like environments filled with rusty, decaying objects, all created using Sony Computer Entertainment's development tool set and Alias's Maya. Because of platform limitations, the artists were forced to reduce the number of polygons for each character on the screen, making up for this deficit with rich, precise textures created in Adobe's Photoshop.

Using fog and other elemental effects, the artists created an unsettling game atmosphere. They augmented the style with an extra layer of "creepiness" achieved with a grayish filter that gave some scenes a grainy, scratched film effect. Aside from adding an edgy quality, this look becomes quite chilling when used with the haunting music, bizarre monsters, and dramatic narrative—so much so that players may never again feel safe in their rooms.

player is fake, and other times it relates to actual events, locations, and people.

When Lexis Numerique first devised the concept for the game four years ago, it had so-called actors begin laying a trail by sprinkling information on the Internet about themselves that would give them a "history," thereby making them seem real. Later, the developer spent another year setting up a more elaborate system of truths and deceptions, even soliciting actual news organizations to participate. "The missing person is a French journalist, and we knew that if this event had occurred in real life, every newspaper would have covered the story," explains Kemal. "So we asked news organizations to allow us to plant information regarding the characters on their sites. Many of them declined because of ethics. But, eventually, we were able to persuade some of them, including *Liberation*, one of the most important French daily newspapers."

In *Missing*, gameplay becomes real as players use the Internet and other media, including nearly an hour of video footage containing real and synthetic locations, to solve a contrived murder mystery.

The agreements came after the developer devised a technical solution, an Internet intelligence engine created in Java for the Internet search engines on partners' sites, to circumvent the issue of planting "false" information on legitimate sites. "Everyone who is playing the game knows the name of the missing person, Jack Lorski, so when they search legitimate sites, they will find the planted articles. Those not playing the game will not be looking for that person or even know who he is," explains Kemal. "But if a player sends a link for a fake article to someone else, a 'smoke' line appears saying the article is fiction."

Using this methodology, Lexis Numerique was able to sign on 300 official Web sites to embed game information. Players will even find fake book titles on online shops, though they will be "sold out." "We believe *Missing* is not just entertainment, but a form of art, and many of our partners wanted to participate on that basis," says Kemal. Augmenting the real pages are 100 "dummy" Web locations set up by the developer to serve as backups, ensuring that players will have access to the desired information. Players will not be able to distinguish between these and the authentic sites, which blurs the fact/fiction line even more.

"We provide the information in layers—with some locations containing totally useless data—to make the experience seem real," says Kemal, noting that players will have to search only about 25 or so sites, not all 400, to acquire the clues. Some of the hints are about actual events, which required the development team to thoroughly research locations, happenings, and people, including a real-life 17th-century alchemist who is at the heart of the killer's vengeance. How well players do and where they end up in the game, however, depends on how well they complete the research and decipher the clues.

The Web searches are just one function of the Internet engine's AI. The intelligence also determines whether a person is taking a break from gameplay or struggling to find a certain solution. And, it serves as the "eyes" of the serial killer, recognizing when to send e-mails, which usually occurs immediately after a major clue is found. "We want players to feel like this guy, this serial killer, is now watching them, and that he is a real person," notes Kemal. Moreover, the system must determine when the e-mail should be automatically generated or sent by a live person.

In addition, the engine analyzes a person's progress and, depending on how he or she is doing, will increase or decrease the difficulty to meet that level of play. In this way, the game appeals to a range of people, from hard-core gamers to casual players. For example, the engine may help the player along by sending e-mails from fake partners who are willing to share clues. "In this way, the game is playable by everyone," says Kemal. "And the process occurs seamlessly. If we were to ask the player what level of difficulty he or she wants to play, then the experience would become less real."

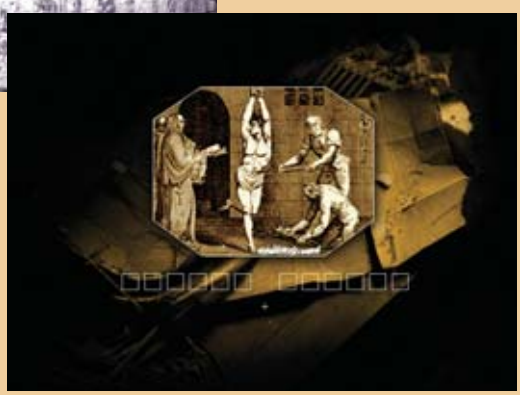
At times, *Missing* employs jittery video images to mimic a handheld camera look, adding a mysterious quality to the visuals. In fact, the game studio received a prestigious French film award for its video techniques used in the title.

Mixed Media

Taking another novel approach, *Missing* uses live-action video (nearly 45 minutes), rather than CG or animated cut-scenes, to

reveal past and present events that make the experience more authentic. Using Sony's TRV900 and PDX-10 digital cameras, the team spent one year filming those scenes in eight countries across Europe using a cast of professional actors. The group even added a scratchy quality to the video and introduced camera jitter to simulate a handheld look, as if the journalists took turns filming each other during their investigation. "We didn't want anyone to think there was a third person there filming the action," Kemal says.

After acquiring the footage, the group edited it in Adobe's Premiere and After Effects, augmenting the segments with effects or enhancements using After Effects plug-ins and proprietary software. "Many of the problems we faced were resolved through lighting. Everything was filmed outdoors and in many locations, and the lighting conditions were always changing," explains Kemal. "So we used the tools to create the same levels of density and contrast in the video."



In an unusual approach for a game, Lexis Numerique used video and 2D graphics that have an amateurish quality, which supports *Missing*'s story line that the killer himself has created the imagery.

According to Kemal, the group was challenged with achieving a high-quality video image that looked authentic and was crisp enough to let a player zoom into certain segments to find clues. The team solved this by making two movies for the same scene, with the exact same points of view, except that one was filmed in high definition and the other in standard definition. The software loads the HD movie only when the player wants to magnify the imagery, which eliminates computer RAM issues.

As a result of all its efforts on the video front, the developer received the prestigious French film industry's CNC Award for Interactive Creation, given for artistic and technical achievement.

In addition to the high-quality SD and HD video, the game contains an eclectic mix of 2D and 3D visuals, as well as photographs, documents, and drawings. The graphics, created in Adobe's Photoshop and Discreet's 3ds max, appear within the various puzzles and mini-games. According to Kemal, the team reviewed a tremendous amount of information about serial killers when it began exploring the game's art direction, and came up with a design that could have been made by The Phoenix, as opposed to an accomplished digital artist who would have tremendous programming skills. "The killer wouldn't have spent hours learning programming tools," Kemal reasons. "So we used Macromedia's Director; it's a program the killer could have learned to use in a short period of time."

Breaking New Ground

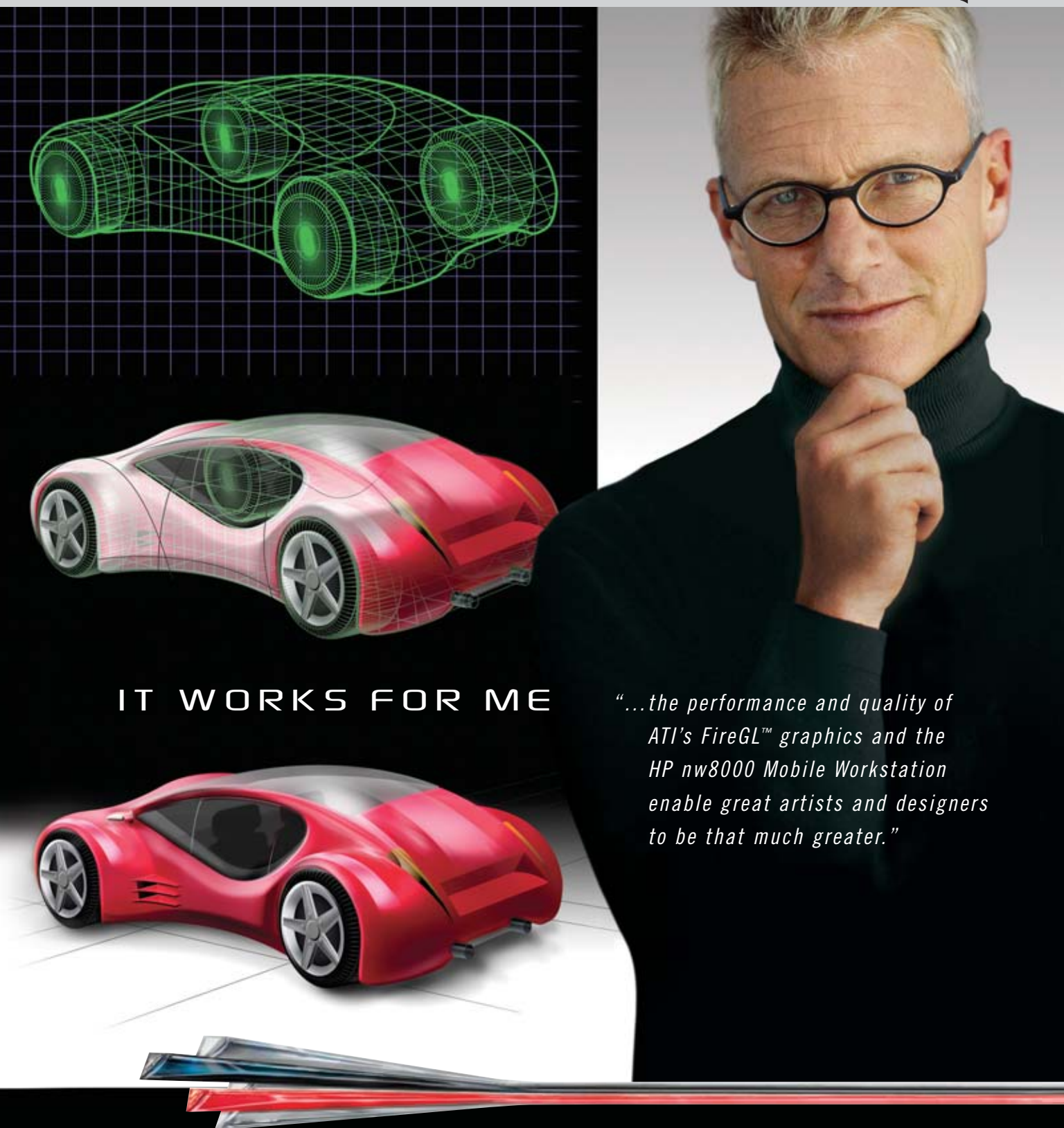
Enabling users to to play themselves in a computer game is indeed a unique approach. EA's *Majestic* attempted the concept earlier, but the game failed for a number of reasons, among them the communication methods—late-night phone calls and faxes—that proved too intrusive, a problem that Lexis Numerique appeared to have considered and overcome with its AI engine.

According to Kemal, it was only a matter of time before the various media—the Internet, movies, and games—converged. Yet, far more important than the particular technologies is the storytelling. "The technology is not supposed to be the core of the game, so we made it seamless to the player," says Kemal. Like in the early days of the film industry, games are slowly evolving from mere technical exercises to titles that evoke emotion. "Technology has reached a level where we see amazing CG in titles like *Doom 3*, but to make an experience seem all the more real, we need to generate feelings, and that's easier to do by showing real people," he says. "So after you see clips of the journalists interacting and slowly falling in love, you are far more affected by their abduction than you would have been if they were a pair of rendered characters."

In fact, Lexis Numerique's novel approach in *Missing* earned the developer a number of accolades for game innovation at this year's E3 game conference.

Perhaps the best comment Kemal has heard, though, concerning the game was from a player with bandaged knee. "He had been playing *In Memoriam* (Lexis Numerique's European version of *Missing*) and was so startled after receiving an e-mail from The Phoenix that he had jumped up and hit his leg on the table," says Kemal. "For him, the experience became real. And that was our intention." ⁘

***Karen Moltenbrey** is a senior technical editor at* Computer Graphics World.



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Consolation Prizes

Though the next-gen game consoles aren't here yet, current offerings provide plenty of engaging play and graphics

By Jenny Donelan

The "big three" next-generation consoles—Microsoft's Xbox 2, Nintendo's GameCube 2, and Sony's PlayStation 3—are expected to ship in 2005, or perhaps even in 2006. Though these units are frequently discussed and anxiously awaited by the gaming community, hard details are limited; the consoles' names and even their existence are officially "unofficial." A few particulars are considered common knowledge (see "Machines of Mystery," pg. 37), but for the most part, information about the next generation is being gleaned from a number of uncertain sources such as the companies' job postings for software engineers and the like.

Nokia's N-Gage game deck offers 3D graphics on a 4096-color screen, and multiplayer gaming via Bluetooth technology.

At press time, software development kits for the new platforms were either unavailable, top secret, or both. But the situation has hardly slowed game development. New titles ship every week, and highly anticipated games, such as *Halo 2* for the Xbox, continue to generate extraordinary end-user excitement, as seen in the first-day sales of the title, which reached $125 million.

For now, users' voracious appetite for computer games is being satisfied by the current generation of consoles, which are still evolving. Sony's PS2, for example, has a new, slimmer profile, while Microsoft continues to push online gaming with its Xbox-based subscription service, Xbox Live. This fall, Sony and Microsoft announced US price decreases for their systems—both are now available for about $150, and some experts were predicting further price drops in November.

Perhaps some of the most exciting developments in game consoles are in the handheld arena, with Nintendo's DS and Sony's PlayStation Portable (PSP) poised to do battle with each other. Pre-existing products—Nintendo's GameBoy Advance and Nokia's N-Gage game deck, for example—have their niches as well. GameBoy

obviously takes advantage of Nintendo's extensive and popular software library, including the *Mario* and *Final Fantasy* series, and the immensely popular *Metroid Fusion*. The N-Gage, sometimes referred to as a "game phone," features online 3D multiplayer gameplay over Bluetooth wireless technology. And Tiger Telematics' Gizmondo, released in the UK last month, is a sort of do-it-all entertainment device that features MP3 and MPEG 4 video playback, a digital camera, and gameplay, with multiplayer gaming supported via Bluetooth. Last month, Tiger completed a deal that will bring many titles from Microsoft Game Studios to the Gizmondo handheld, including *Age of Empires*.

Adding interest to the current development scenario are two new categories of console-type entertainment that aren't really consoles—Infinium Labs' Phantom, best described as a game subscription and delivery service, and the EyeToy, a camera-and-software package that works with Sony's PS2 to deliver a new kind of interface between the game and the player.

So, while the next-gen consoles are on the far horizon, content developers have plenty to concentrate on in the here and now, as online gaming, downloadable content, and hard-drive interaction serve as the current buzzwords in console gaming.

Image courtesy Nokia.

The Consoles

Microsoft's Xbox is based on a custom-designed 233MHz Nvidia graphics processing unit, which is a programmable 3D processor containing more than 60 million transistors. According to the company, polygon performance equals 116.5M/sec, with a pixel fill rate for textures equaling 3.7G/sec. All this contributes to the console's admittedly impressive graphics. The Xbox's built-in hard drive, claims a Microsoft spokesperson, "enables game developers to create larger, richer, more detailed worlds and game environments." Moreover, the Xbox's compatibility with Microsoft's Direct X API makes it especially attractive to PC game developers.

A major emphasis of late, as evidenced by Microsoft's vigorous Xbox Live campaign (there are nearly 3 million connected consoles to date), is online gaming. "Xbox," notes a company spokesperson, "is the only video game system designed from the ground up to harness the future of broadband online gaming with its built-in hard disk and Ethernet port."

Comparatively, Nintendo's GameCube is powered by IBM's customized Power PC chip, called the Gekko, which runs at 485MHz. Image-processing capabilities include fog generation, sub-pixel anti-aliasing, bump mapping, environment mapping, MIP mapping, bi-linear filtering, trilinear filtering, and anisotropic texture filtering. The GameCube handles polygons at the rate of six million to 12 million per second. Rather than a CD-size hard drive, it has its own 3-inch Nintendo GameCube Game Disc system, which holds 1.5GB of information.

Meanwhile, Sony's PS2 is getting slimmer, as the company announced a lighter version of the machine that's 2.8cm thick, compared to its former 7.8cm size. The PS2 now comes with a built-in Ethernet port for online gaming, feeding Sony's online console community of 1.4 million users, which the company claims is the largest in North America.

The PS2 is powered by a 300MHz CPU it calls the "Emotion Engine," and also by its own Graphics Synthesizer chip, capable of processing 75 million polygons per second. Complex graphics features like Z buffering, textures, lighting, and alpha blending have the Graphics Synthesizer outputting a sustained rate of 20 million polygons per second.

New Handhelds

Nintendo DS, the vendor's latest handheld, which is to ship in November, has a two-panel display that incorporates a built-in stylus for

Image courtesy Nintendo.

The Nintendo DS mobile gaming device features two screens for options such as simultaneous bird's-eye and close-up views of the action at hand.

Machines of Mystery

Microsoft, Nintendo, and Sony haven't had much to say about their next-generation consoles—the so-called Xbox 2, GameCube 2, and PlayStation 3. And in the absence of official announcements, the following speculation thrives.

Xbox 2: Microsoft chairman Bill Gates is scheduled to deliver the keynote address at the Consumer Electronics Show in Las Vegas this January, and many experts believe he will reveal the company's plans for Xbox 2 at that time. Meanwhile, one unsubstantiated but far-flung notion is that the company will use chips of its own design in the new console, rather than the silicon from Intel and Nvidia it employs in the current Xbox. Other sources say the company will switch to IBM processors, while others maintain the company will stick with its original Xbox sources.

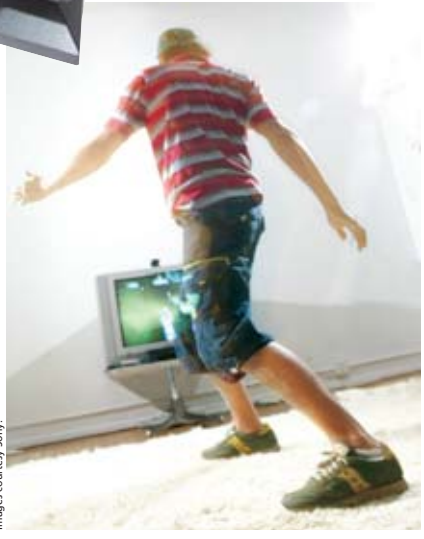
PlayStation 3: Sony Computer Entertainment's next console will almost certainly utilize the new Cell (also an unofficial name) processor from Toshiba and IBM. The Cell, which is made up of many small processors and is said to handle up to one trillion floating-point calculations per second, will also be used to power a variety of other electronic devices, including household appliances. Many experts believe that the PS3 will incorporate a broadband modem and a hard drive, underscoring manufacturers' recent emphasis on downloadable and online gaming.

GameCube 2: Little is known and even speculated about Nintendo's next-gen gaming console. The company is making no announcements at this time other than to drop hints that consumers should get ready for "something brand new."

use with the device's lower touch screen, a microphone for voice recognition, and wireless capabilities via local network and Wi-Fi. With two screens, players can experience the game from two perspectives at once. In a role-playing game, for example, action might take place on the lower screen while the player's tools appear on the upper one. So, in a football application, the whole field might be visible on the top screen, and the immediate action concerning the player might appear on the bottom. In the future, notes the manufacturer, titles could be created that allow users to play games on one screen while text-messaging a person on the other. Meanwhile, each backlit screen provides 3D viewing.

"Graphics on the DS will be better than those on the Nintendo 64 in terms of quality," notes Anka Dolecki, director of public relations for Nintendo of America. Games will run at 60 frames per second, and allow details such as fog effects and cel shading.

Image courtesy Electronic Arts.



Images courtesy Sony.

The EyeToy from Sony uses a camera on top of a TV (right) to film a player who interacts with software imagery on screen, as in the current EA title *Harry Potter and the Prisoner of Azkaban*.

Those developing content for the DS can utilize the dual-display capability or simply generate content for the single screen.

Meanwhile, the new handheld player on the block, the PSP from Sony, will run three-dimensional CG games that incorporate high-quality, full-motion video similar to that of the PS2, according to the company. The PSP will feature the UMD (Universal Media Disc), Sony's newly developed compact storage media, which is 60mm in diameter and can hold up to 1.8GB of digital data. Besides game content, a range of digital entertainment such as music video clips, movies, and sports programs can run on the UMD.

The PSP's shipping schedule includes an end-of-year launch in Japan, and release in Europe and the US in early 2005.

Something Different

A novel offering, The Phantom Game Service from Infinium Labs is not a console, but rather an on-demand game distribution system designed to appeal to casual as well as avid players. "The thing we hear over and over is that people like gaming but don't want to make the commitment," says Infinium Labs president Kevin Bachus. That's especially true, he notes, when it comes to buying a game, learning its ins and outs, and so forth.

With the Phantom, which consists of a keyboard, software, a receiver that sits atop the TV, and a networked library of games accessed through a broadband Internet connection, a person can download a game and play it on the television at will—once or many times. "Think of it as iTunes for games," Bachus says.

Users will pay a monthly fee of about $30 for the service, set to launch in 2005, which includes access to the Phantom games library as well as the hardware.

The Phantom is not really a new platform for content developers, as it makes use, at least for the time being, of existing content and supports multiuser play. Getting that content ready for streaming represents the R&D challenge, according to Bachus. Using proprietary algorithms, Infinium Labs analyzes the software registers, graphics structure, stability (with regard to crashing), and more of each game and prepares it for optimal streaming to users.

"It takes 10 or 15 minutes of buffering for players to get started, and then the rest of the game file streams during play," says Bachus. "It's completely transparent to the user." Once a game is downloaded, it resides on the Phantom receiver and no longer needs to be streamed.

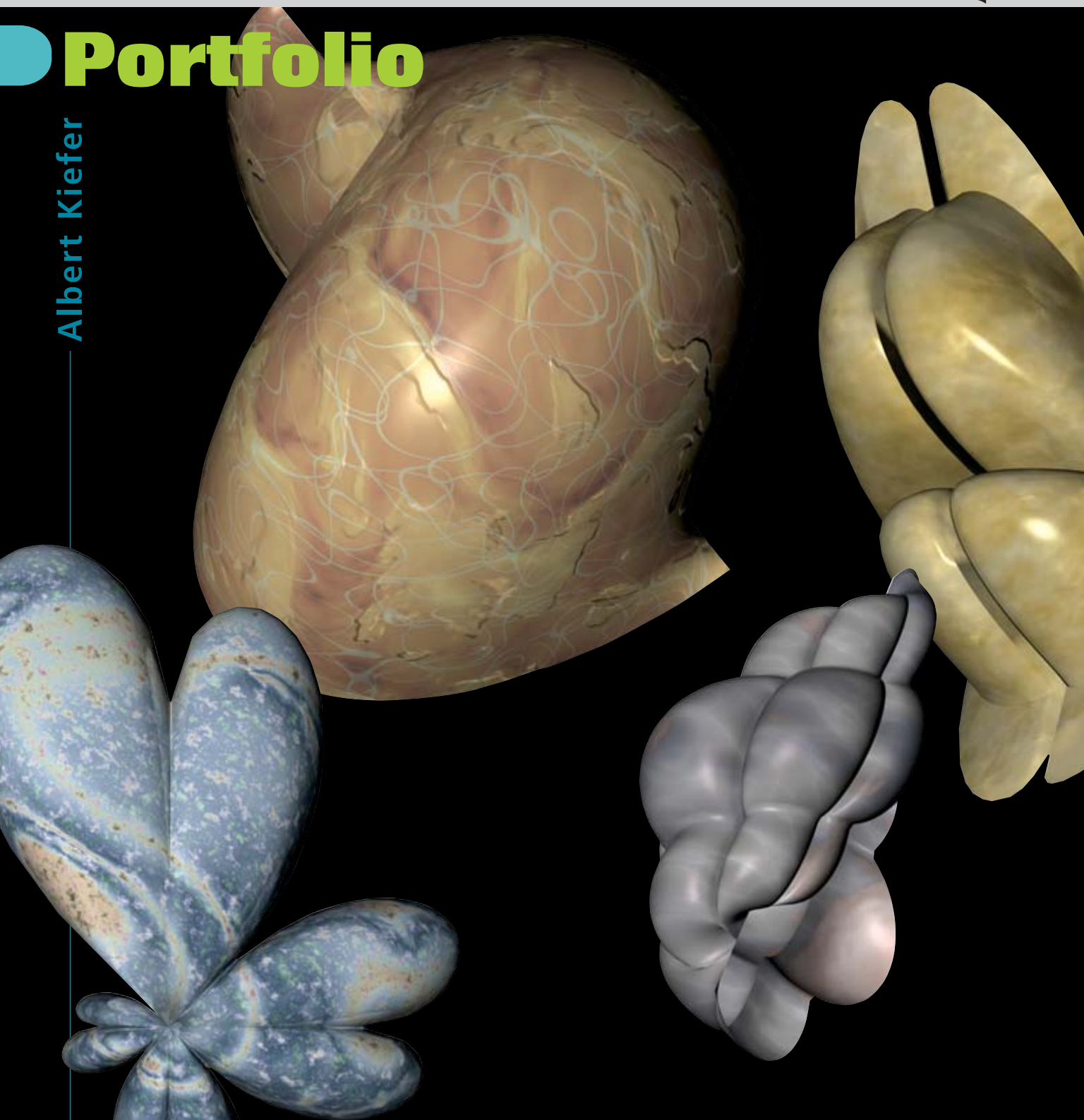
The other novelty item, the EyeToy from Sony, consists of a little camera that sits on the TV and EyeToy software (a PlayStation 2 is also required). To use the device, a game player stands in front of the TV, while the camera picks up the person's image and projects it on the screen amid game imagery such as attacking ninjas, as occurs in *Kung Foo*, part of the *EyeToy: Play Pack of Games*. The person uses his or her hands and arms to interact with objects on the screen by "swatting" them—in this case, batting away the marauding ninjas. Though most gamers seem to regard EyeToy applications as "party fodder" rather than serious gaming, the interface is unique and seems to beg for rewarding content.

The diversity of current gaming hardware—whether updates of pre-existing products or new handhelds, or even new game distribution systems—demonstrates that innovation and evolution are present in the marketplace, despite the hurry-up-and-wait atmosphere surrounding the next-generation consoles. The new offerings are also whetting the appetites of game players looking for something, anything, new and exciting in this space until the big three manufacturers release their next big things.

***Jenny Donelan** is a contributing editor for* Computer Graphics World. *She can be reached at jdonelan@adelphia.net.*

Portfolio

Albert Kiefer



While working on advanced plant research, Belgian scientist Johan Gielis discovered that any natural shape—circles, squares, stars, ovals—can be defined digitally by changing a few variables in one basic equation. This mathematical principle, which Gielis dubbed the Superformula, also is the underlying foundation on which the content creation software company Genicap was formed. Genicap's contention is that all graphic shapes derive from that single fundamental formula, and through the use of that formula (contained within its Supergraphx plug-ins or stand-alone programs), any computer graphics program can be enhanced to enable greater creativity and efficiency.

To illustrate the application of the Superformula, Albert Kiefer, 3D product specialist at Genicap, used the code to create naturally complex shell shapes that he calls Future Fossils. "I wanted to show the versatility of the Superformula, the infinite ways to vary shapes in 3D space," he explains. After mulling over several ideas about how to best explain this concept, he recalled a childhood friend's elaborate boxed insect collection that contained a variety of unique-looking creatures that belonged to the same species. This prompted Kiefer to digitally create a so-called species box, only this one comprises virtual shell-like shapes that evolved from the same family.

"Symbolically, the shells display digital diversity," Kiefer points out, "even

though they share the same 'genetic' digital code."

As Kiefer explains, shells are usually too complex to create with a standard 3D modeling program because they are asymmetrical, and they spiral and twist while changing width and height. However, he was able to generate dozens of unique shapes using the spherical variation feature in the software's 3D Shape Explorer. "With a typical 3D application, you would create a form and then, by tweaking the mesh, vary the shape in certain places to create new versions, but they still look like a variation of the original mesh," he says. "Conversely, the 3D Shape Explorer generates a variety of these shapes that look nothing like any other shape, using the built-in Superformula algorithms."

After generating the raw geometry, Kiefer exported the data into Maxon's Cinema 4D, where he textured, lit, and rendered the objects, turning them into natural-looking seashells.

"I see the 3D Shape Explorer as an idea catalyst," Kiefer says. "I can best describe it by comparing it to the proverbial ink blot, the cloud in the sky that sparks an idea."

A sampling of the untitled images from Kiefer's virtual Future Fossil collection appears on these two pages. *—Karen Moltenbrey*

Snapshot

3D Animation Software

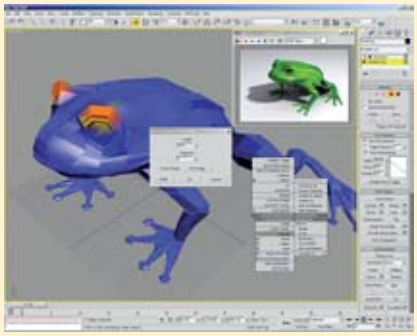
By Courtney E. Howard, Senior Technical Editor

In recent months, the industry has been buzzing with news, such as updates and price reductions, surrounding tools for 3D animation. As these pages indicate, today's market bears a wealth of options for professional 3D animators. Whether creating content for films and videos, games, the Web, or another medium, consider the solutions presented on these two pages to aid you in your work. To gain additional information about any of the products listed, visit the corresponding manufacturers' Web sites.

Alias Maya 6

The latest news surrounding Alias's Maya involves a new agreement with BOXX Technologies whereby Maya Complete and Maya Unlimited software are bundled with Boxx professional workstations. Alias also recently introduced Maya Unlimited for the Mac OS X operating system. Now available and priced at $6999, Maya Unlimited combines Maya Complete software with Maya Hair, Maya Fluid Effects, Maya Fur, Maya Cloth, and Maya Live for advanced special effects. Moreover, the company has launched the Maya Membership family—Maya Platinum, Maya Silver, and Maya Bronze Memberships—of programs to provide support, maintenance, and education to Maya and Maya Personal Learning Edition customers.

Alias; www.alias.com



Discreet 3ds max 7

Discreet has begun shipping Version 7 of its 3ds max professional 3D modeling, animation, and rendering software package. Version 7 benefits not only from an update to Mental Images' Mental Ray Version 3.3, but also from the full integration of the company's own Character Studio advanced character motion tool set. Helping streamline film production, Version 7 also incorporates normal mapping, a technology designed for game development in which detail is added to low-polygon models with high-resolution maps. 3ds max 7 is priced at $3495. Upgrades from Versions 5 and 6 are priced at $1295 and $795, respectively. In other news, Discreet revealed that 3ds max enjoys an installed base of more than 280,000 registered customers, including 3D artists and designers in film, television, games, and visualization. Turn to pg. 44 for a review.

Discreet; www.discreet.com

NewTek's LightWave 3D Version 8

NewTek has announced its intention to port its Emmy Award-winning LightWave 3D application, now in Version 8, to the Intel EM64T and AMD64 platforms. With this news, NewTek becomes the first company to publicly reveal its plans to port a professional 3D graphics application to the 64-bit format. The 64-bit version of LightWave will reap the benefits of 64-bit technology, including increases in both processing power and memory. For the production of complex motion graphics and visual effects, this higher-performance version of LightWave will benefit users with time-savings, increased efficiency, and higher-quality graphics. The 64-bit edition of LightWave 3D will become available when the 64-bit Windows operating system is released commercially.

NewTek; www.newtek.com

Carrara Version 4

Eovia has introduced an upgraded version of its Carrara 3D animation, modeling, and rendering application. Version 4 is available now in Standard and Professional versions, priced at $579 and $279, respectively. Carrara Version 4 is described in detail within this month's Spotlight on Products section, pg. 4.

Eovia; www.eovia.com

Cinema 4D Release 9

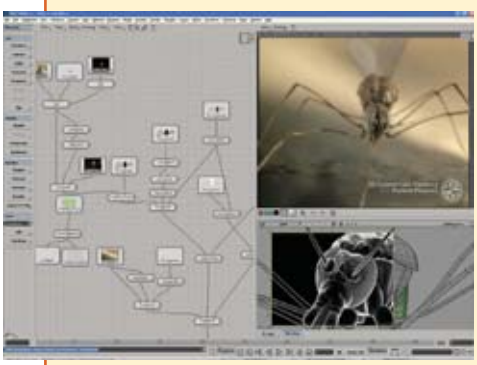
Maxon Computer has unveiled the ninth incarnation of its Cinema 4D software solution. Release 9 offers a re-engineered modeling core, new modeling tools, an enhanced user interface, and more than 100 new features. For specifics about Cinema 4D Release 9, turn to Spotlight on Products, pg. 5.

Maxon Computer; www.maxon.net

3D Character Animation Software

Softimage XSI 4.0

Softimage's new pricing structure for all versions of its XSI 4.0—Foundation for $495, Essentials for $1995, and Advanced for $6995—continues to be a topic of conversation among industry professionals. Yet, Softimage has been extending XSI functionality through key partnerships. The company has announced a strategic alliance agreement with Criterion Software, a provider of middleware for the gaming industry, that offers Criterion RenderWare users access to plug-ins



and import/export tools that enable the integration of 3D content created in XSI. Also, Softimage has entered into a technology alliance with Virtools, maker of interactive 3D authoring tools. As a result, characters, scenes, objects, and animations created with XSI software can be exported directly into the Virtools Dev 3 environment, thanks to a new Virtools exporter for XSI software.

Softimage; www.softimage.com

Caligari's TrueSpace 6.6

Caligari has announced TrueSpace 6.6, with roughly 24 general enhancements and more than 120 fixes to various tools and functionality. UV editing is improved by UV vertex welding, whereas the built-in particle system now provides interaction with TrueSpace physics, environments, and objects and control over life and particle type. Particles also have real geometry, enabling them to reflect and cast shadows. A new Viewer frees users to preview scenes and objects in Windows Explorer. And Version 6.6 boasts performance gains: Real-time preview of an animation is reportedly 300 times faster.

Caligari; www.caligari.com

Alias MotionBuilder 6

Having acquired Kaydara, Alias has unveiled MotionBuilder 6, an upgraded version of its character animation software. Alias MotionBuilder 6 incorporates hundreds of enhancements, including improvements to keyframe animation and character animation capabilities, the story timeline, inter-character rigs, scene management tools, and a simplified user interface. MotionBuilder 6 Standard is priced at $995, whereas the Pro version includes 12 months of support and upgrades at a cost of $4195.

Alias; www.alias.com

Curious Labs' Poser 5 and Shade 7

Curious Labs has released its Poser 5 figure design and animation solution for the Mac OS X operating system. The OS X version of Poser 5 sports displacement mapping, collision detection, procedural textures, photo-based facial mapping, new 3D human figures, Dynamic Hair, Dynamic Cloth, and a Morph Putty tool. The company also introduced Shade 7, a 3D graphics suite for designers, illustrators, and architects that encompasses modeling, rendering, and animation tools. For the creation of 3D imagery and animations, Shade offers bezier curve/surface modeling, integrated plug-ins, and a global illumination renderer. Shade 7 is available in Standard, Designer LE, and Professional versions.

Curious Labs; www.curiouslabs.com

Side Effects Software's Houdini 7

Side Effects Software has upgraded its Houdini 3D animation package to Version 7, as well as introduced Houdini Escape, a new product designed to work seamlessly with the Houdini family of software. For animators, lighting artists, and effects artists, Houdini 7 is intended to streamline the animation work flow with the help of such enhancements as interactive viewing, improved transform handles, and a new online help interface. Also new to Version 7 are expanded support for RenderMan and advanced character rigging tools. Houdini Escape, priced at $1999, provides professionals an environment for modeling, animating, texturing, lighting, and rendering. The company also announced that its Houdini Developers Kit (HDK) is free with all Houdini workstation products, including the Houdini Apprentice Edition.

Side Effects Software; www.sidefx.com

Swift 3D Version 4.0

Electric Rain has introduced Mac OS X versions of its recently upgraded Swift 3D 4.0 stand-alone application and Swift 3D Xpress plug-in. Swift 3D Version 4.0 aids designers in creating and exporting vector and raster 3D animations to Macromedia Flash or another format, whereas Swift 3D Xpress enables users to convert 2D art and text to 3D animations within Flash. Currently available for Windows and Mac OS X operating systems, Swift 3D and Swift 3D Xpress are priced at $189 and $129, respectively.

Electric Rain; www.erain.com

Hash's Animation:Master

Designed for advanced and beginner animators and priced at $299, Animation:Master from Hash is newly available in Version 11.0 for the Windows platform and Version 10.5 for Mac OS X and 9. The program offers spline-based modeling, animation, and rendering, as well as IK, UV decal mapping, lipsync keyframing, motion libraries, and skeletal, morphing, and bending actions. It also provides channel-based motion control, patch-based animation, rotoscoping, onion skinning, and other features.

Hash; www.hash.com

reviews

3D MODELING/ANIMATION

Discreet 3ds max 7

A popular 3D tool gains new features and functionality

By George Maestri

The new skin shader for Mental Ray takes advantage of subsurface scattering to produce realistic results.

Discreet has begun shipping 3ds max 7, the latest version of its venerable 3D modeling and animation application. The upgrade includes new modeling and texturing features, as well as an update to Mental Ray rendering. And Discreet's popular Character Studio is now included in the base application.

The interface to Version 7 is almost identical to the previous editions. This is good news because I find 3ds max to be one of the easier 3D packages to use. The new version is incredibly stable and fast. Subtle interface improvements include a flat shaded view, for better viewing of lit models, and new snapping and array tools.

Version 7 improves on 3ds max's polygonal modeling tools. The poly surface type in 3ds max has been very popular, as it has built-in subdivision surfaces and a number of other cool features. The new Edit Poly modifier is one of my favorite new features. Edit Poly (finally) allows you to create a stack of modifications to a Poly object without turning the object into a mesh. One of the best aspects of Edit Poly is that it enables you to animate virtually any parameter. It also offers the ability to automatically bridge open parts of a model, as well as to relax and smooth parts.

Paint deform provides tools similar to Maya's Artisan, enabling modelers to sculpt a polygonal surface by pushing, pulling, and smoothing vertices with a paintbrush-like interface. The new paint-selection tool enables you to select vertices using a brush, a method that is more interactive and easier to use than selecting pixels with a lasso. Other modeling enhancements include a Turbosmooth modifier, which simplifies 3ds max's Meshsmooth modifier, making it work more quickly.

Rendering is improved with the inclusion of Mental Ray Version 3.3. This renderer is more tightly integrated with 3ds max. All of Version 7's new rendering features are geared toward Mental Ray. New Mental Ray features include subsurface scattering, which simulates the scattering of light within a surface and is helpful in creating semi-translucent surfaces, such as human skin, marble, translucent plastics, and other organic surfaces. Discreet has written several new Mental Ray shaders that ship with 3ds max, including a robust skin shader and an ambient occlusion shader that serves as a good alternative to global illumination without the render times.

Lighting for global illumination is made easier in Version 7. Lights now automatically adjust the number of photons emitted depending on the size and intensity of the light. It makes rendering easier, and automatically optimizes the scene for faster rendering. Mental Ray shadows are improved, and now allow for transparent shadows.

Artists, such as game developers, who work with low-poly models will appreciate 3ds max's new normal mapping tools. Normal mapping takes the surface information from a high-resolution model and applies it as a bump map to a low-resolution model. The results are quite amazing, essentially adding detail to a low-res model for the price of a texture. This technique is taking the gaming world by storm; many developers are using normal maps to increase the fidelity of their console games.

Animators will be happy that Character Studio 4 is integrated into 3ds max. A complete character animation tool, Character Studio provides built-in skeletons, called bipeds, that have the intelligence of human motion. It is a great tool for anyone using motion capture, creating crowds, or doing character animation in general.

New deformation tools make rigging characters easier. The Skin Wrap deformer uses a piece of geometry to guide the deformation of an object. It can be used in a number of ways, from creating realistic muscles to making sure clothing doesn't intersect with a character's body. Along similar lines, the Skin Morph deformer is a stack-based modifier with which to control the way a skeleton joint deforms a mesh. I find it easier to use than the deformation controls in 3ds max's skin modifier, and the separate modifiers are much easier to manage.

Special effects animators will appreciate the new Reaction controller, which creates a relationship between objects so that animation on one object can control another. The Reaction Manager replaces the old method of setting up connections.

3ds max, a powerful modeling and animation tool, competes well with any package on the market. It is great for creating high-end animation and special effects.

George Maestri *is president of Rubber-*

stats

3ds max 7

Price: $3495

Minimum System Requirements: Windows XP Professional, XP Home, or 2000; Intel Pentium III or later or AMD processor running at 500MHz minimum; 512MB of RAM; 500MB of swap space; and a graphics card supporting 1024x768 resolution, 16-bit color, and 64MB of RAM (OpenGL and Direct3D supported)

Discreet
www.discreet.com

reviews

MULTIMEDIA

Adobe Atmosphere

Adobe's new tool enables rich, interactive experiences

By Doug King

Atmosphere's easy-to-use tools aid in the creation of impressive environments for publishing online.

Interactivity. Real-time imaging. Immersive environments. These buzzwords have floated around the industry for years. Software developers continue to produce products that change these words into reality, even virtual reality. Adobe is no exception. The company launched Atmosphere, a software tool for creating interactive, immersive, 3D multimedia environments to be delivered via the Web or PDF.

Through 3D objects, directional sound, streaming audio and video, SWF animations, and physical behaviors, Atmosphere creates what Adobe calls "Stages," using a live-theater metaphor. Visitors to (or, more appropriately, viewers of) Stages can freely navigate and interact with the environments.

Atmosphere is an easy-to-use authoring tool for the creation and publishing of real-time environments. It is essentially a game engine in a box. I am impressed by the ability to create great-looking environments. This solution holds potential for visual effects specialists, film producers, multimedia designers, and architects. Yet, I am most excited about its application by authors.

Imagine reading *Alice in Wonderland* online or in a PDF document and coming to a beautiful image of the Mad Hatter's tea party. Clicking in the picture, you enter the illustration and move around as the action unfolds. Click on the teapot and find the dormouse sleeping inside. When finished with the scene, you return to the story where you left off and read on until the next immersive illustration. This is the beginning of interactive storytelling.

Atmosphere's interface is not the most intuitive, and will take some getting used to. The opening screen defaults to a rather cramped work environment; yet, thankfully, every floating palette can be resized and moved to provide more elbowroom. The one World View defaults to Top View, but I changed it with a few simple hot keys. Other palettes include Object Hierarchy, Scene Hierarchy, Light, and Inspector.

A Player window boasts a real-time preview of how a scene will look when published. Each change made in the work environment is updated instantly in the Player view, where I could easily navigate the scene using the mouse or arrow keys.

The package includes basic 3D modeling tools. Overall, the modeling in Atmosphere is rudimentary; it would take some time to build anything other than simple primitives fitted together. The best option is to import models or sets from a 3D program. Such imports must run through Viewpoint's media format, as only MTX and MTZ file formats are accepted. I hope future versions will offer a greater selection of file formats for import. Atmosphere supports a variety of image graphics and multimedia formats.

Placing textures on an object is simple. First, add Texture Presets in the Paint Presets palette and then simply drag and drop onto the object you wish textured. You instantly see the texture in the Player Window. Tools for adjusting a texture are found in the Inspector palette.

One of Atmosphere's best features is the Havok physics engine. And more than 20 scripts are included for dynamic lighting effects, physical effects, and interactive controls. Applying these to your scene could not be simpler. Add them to your Object Preset palette and click in the scene or on the object to which you want the script applied, and you're done. Fine-tuning can be completed in the Inspector palette.

When creating an environment, you set the entry point for the viewer and any portals that allow you to change Stages seamlessly when a viewer passes through. It offers the ability to create what appear to be vast, complex environments; in fact, they are many small files that launch automatically when a user passes through a portal.

When your environment is complete, publishing your work is simple. Selecting Publish from the File menu creates both an AER file, which is the environment itself, and an HTML file. You can upload the files to a Web server, or place the AER file into a PDF file with Adobe Acrobat Professional.

One of the first commercial uses of Atmosphere is by 20th Century Fox for *I, Robot*. At www.irobotmovie.com, you can navigate a robot manufacturing room and custom-build your own servant robot (see "Build a 'Bot," August 2004, pg. 12). The experience is a good example of what this exciting program can do.

Atmosphere is heralding an age when buzzwords used to excite us are realistic descriptions of what a program offers. Atmosphere helps non-programmers create and publish fantastic-looking environments for real-time, interactive experiences, and Version 1 is a fine platform from which to grow.

Doug King, *a contributing editor based in Dallas, develops animated projects for his company, Day III Productions.*

stats

Atmosphere

Price: $399

Minimum System Requirements: Pentium III or 4 processor, Microsoft Windows XP, 128MB of RAM, 50MB of hard-disk space, and a high-end graphics card

Adobe Systems
www.adobe.com

A Graphic Arts Contest From Computer Graphics World:

What's in your Dreams?

As the magazine of innovation in visual computing, *Computer Graphics World* has a rich history of recognizing what's new in the digital arts. Now we are proud to put the spotlight on the future: the talent and imagination of student artists and animators. To showcase the creativity of this new generation, we are pleased to announce a student art contest for the Fall of 2004, titled "**What's in Your Dreams?**". Open to anyone enrolled in a college-level program, the contest seeks to identify the most promising new digital artists and reward them with prizes and recognition.

When to Enter:

The contest begins September 15 and closes November 15, 2004. The awards will be announced in March 2005, and the selected images will be featured in *Computer Graphics World*.

What to Enter:

Any digitally created or enhanced still image will be accepted that illustrates the theme "**What's in Your Dreams?**". Please do not submit any copyrighted, trademarked, or sexually explicit images. Images will be selected and featured that are most suitable for a professional audience.

How to Enter:

Please submit your entries at our website, **www.cgw.com**, where you'll find instruction for uploading images. Please include your name and contact information. We are accepting JPEG files, 7 x 10 inch @72dpi.

Judging and prizes:

The entries will be judged by the *Computer Graphics World* staff and other professionals in the industry. Prizes include graphics software, a workstation, design software, and more. Plus, the selected images will be featured in *Computer Graphics World*.

More information:

Complete contest information can be found at:

www.cgw.com

PennWell

products

For a direct link to more product information and vendor Web sites, click on: www.onlinecenter.to/cgw

SOFTWARE

TRACKING

A New Generation

Win • Mac • Linux Boujou Three, the third generation of 2d3's 3D camera matchmoving software, takes advantage of a new feature-tracking engine. With improved accuracy and performance, the latest version is effective in tracking thousands of features in

each frame of a shot, despite motion blur, variable lighting, and a fast-moving camera. Moreover, it is designed to work well with sand, snow, and sky shots having little detail to track and shots with repetitive structures or patterns. Adding to the upgrade are a new automatic solver for lens distortion, automated tracking of free-move zoom shots, and path-smoothing algorithms. Boujou Three also sports a lens distortion plug-in for Shake, a new timeline design, and support for a wider range of bit depths and file formats, including Maya IFF. Boujou Three is available at a cost of $10,000 per license.

2d3; *www.2d3.com*

RENDERING

RenderPipe Release

Win ART VPS, Ltd. has updated its RenderPipe software with support for the company's own Pure and RenderDrive raytracing hardware systems. Moreover, the plug-in gains support for Discreet's 3ds max 7, various Maya 6 render nodes, bitmap files measuring 200MB or larger, and high-dynamic range imaging (HDRI). Rounding out the upgraded software are faster transfer times for meshes having up to 30 million polygons and a new light-sampling engine designed to adjust lighting effects as necessary. Free to current ART VPS software subscribers, the RenderPipe upgrade is offered to non-subscribers for $360.

ART VPS, Ltd.; *www.artvps.com*

HARDWARE

DISPLAY

Multimedia Monitor

Mintek Digital has launched the DTV Series, a family of HDTV-ready flat-panel displays. To date, the new product line boasts a 17-inch DTV-17 and 23-inch DTV-23, both offering a wide viewing angle of nearly 180 degrees. The

two models feature a built-in, slot-load DVD player, HDTV-ready television tuners, Memory Stick and SD Memory Card readers, and a USB port. Priced at $800 and $1500, respectively, the DTV-17 and DTV-23 also sport DVI, VGA, PC audio, S-video, and two-channel audio inputs, as well as AV input/output.

Mintek Digital; *www.mintek.com*

STORAGE

Seven Feet Tall

Ciara Technologies has introduced the VXR-96, the latest product in its line of VXRack ultra-dense servers. A compact cluster technology, VXR-96 is capable of hosting up to 96 of the company's VX-Blades inside an 84-inch rack enclosure. As a result, the 7-foot VXR-96 is able to accommodate a maximum 192 Intel Xeon processors with a 800MHZ system bus based on Intel's new E7520 chipset, up to 1.5TB of DDR/DDR2 ECC/registered memory, a maximum 24TB of aggregate local storage, and 192GB of network throughput.

Ciara Technologies; *www.ciara-tech.com*

events

JANUARY

10–14
Macworld Conference and Expo, held in San Francisco. Contact www.macworldexpo.com.

25–27
Video Forum 2005, held in London. Contact www.videoforum.co.uk.

FEBRUARY

2–5
Imagina 2005, held in Monte Carlo. Contact +377-93-10-40-54 or www.imagina.mc.

MARCH

7–11
Game Developers Conference, held in San Francisco. Contact www.gdconf.com.

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Trends in Graphics Board Technology
from July 13 presentation

Next-Generation Workstations: Technologies, Trends, and Forecasts
from Sept. 28 presentation

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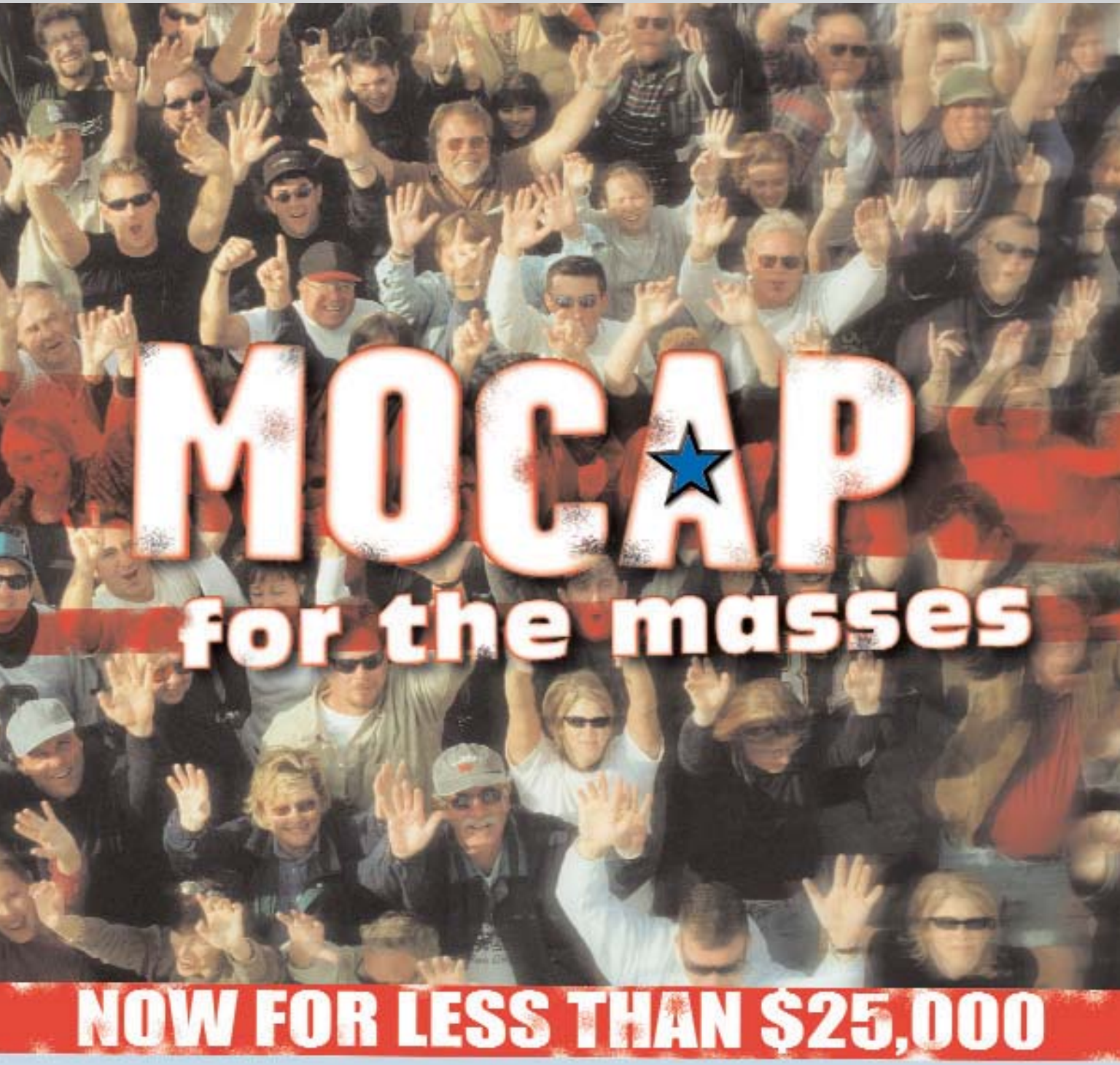

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