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ComputerGraphics^{World}

June 2004 www.cgw.com

Bond, Game's Bond

Players assume the role of digital 007 in the cinematic
adventure game *Everything or Nothing*

The Big Chill

Day After Tomorrow's
deep-freeze effects

On-line Test Track

Chrysler's advergames
rival console racing

Fast Footwork

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gulfstream.com

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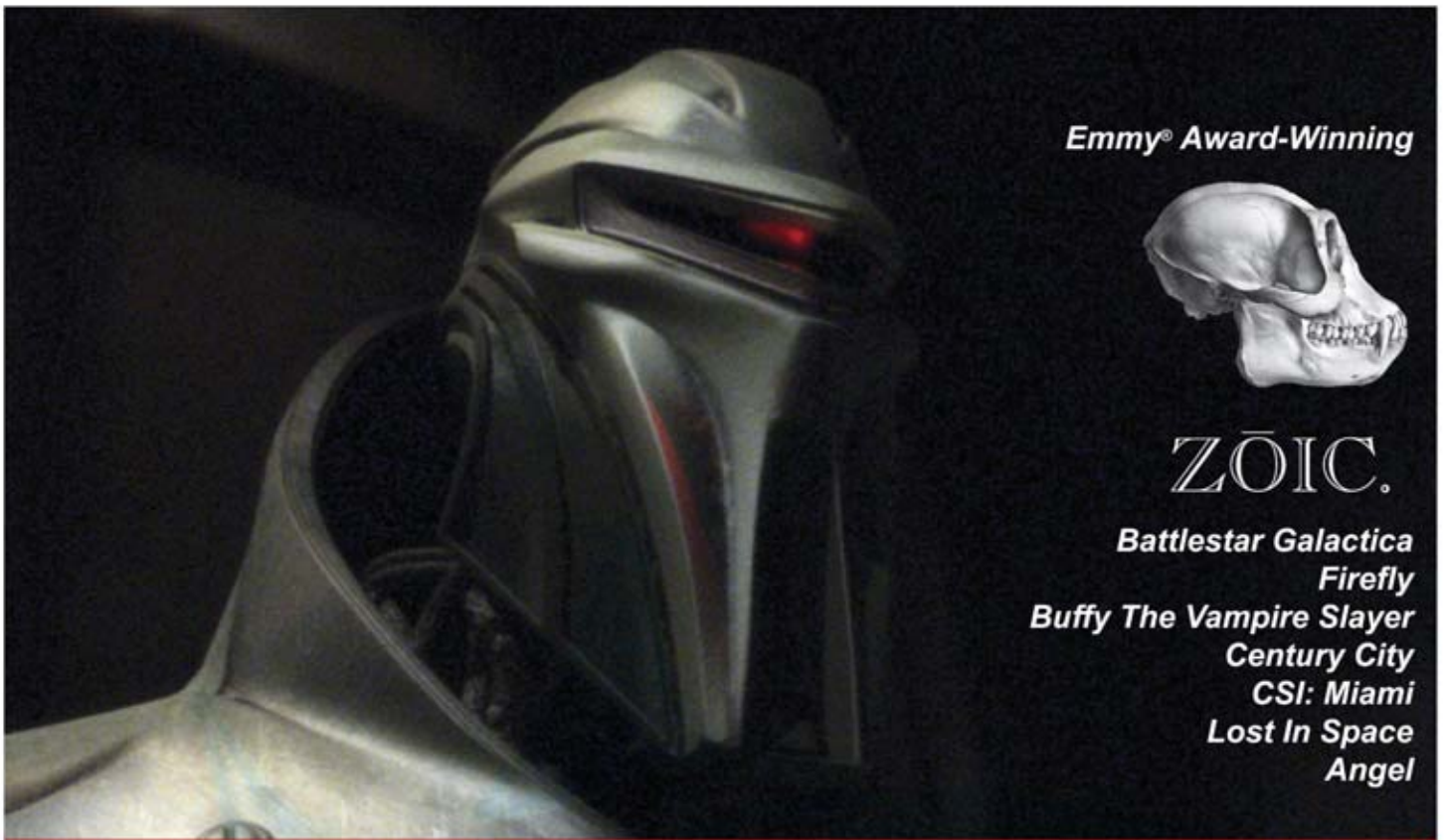
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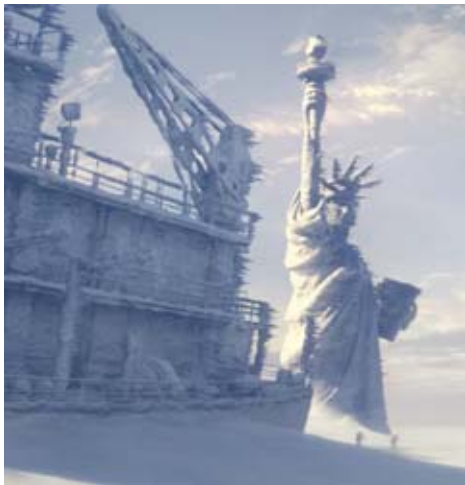
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By Karen Moltenbrey

On the cover:

Pierce Brosnan's digital double in EA's new James Bond title *Everything or Nothing* reigns as computer gaming's most true-to-form character. See pg. 16.





Phil LoPiccolo
Editor-in-Chief

Life-Altering Art

For most new technologies, proof-of-concept presentations are often dry demos of basic research in search of an application. In computer graphics, they can be works of art.

That's clearly the case for the latest graphics research that will be on display in the Emerging Technologies gallery at the upcoming SIGGRAPH 2004 conference. In fact, of the more than 30 installations—which showcase the brightest new technologies to spring from the world's top academic and corporate labs—a third are defined as art.

Does this high percentage of art-related projects suggest a lack of value of these technologies? Not at all, contends Heather Elliott-Famularo, chair of this year's Emerging Technologies exhibit and assistant professor of digital arts at Bowling Green State University. "The art emphasis was deliberately encouraged to demonstrate the potential of the technologies and spark new applications," she says. Here are several examples that illustrate the theme:

Calm Computing: An interactive display called "Lumen" (top image) presents slowly changing organic motions intended to produce an aesthetically pleasing and calming effect on viewers. Users run their fingers over a "smart-skin" surface containing motion sensors, and a series of illuminated cylinders rise and fall accordingly. The system, developed by Ivan Poupyrev and colleagues at Sony's Computer Science Lab in Japan, can be scaled up to create wall-size displays for home or office environments.

Wearable Art: Using sound-activated LEDs and electro-luminescent wires that can be applied to fabric, a novel concept called "HearWear" creates moving light patterns on clothing from noises in the environment. Developed by Younghui Kim and Milena Iossifova of Missing Pixel/Absurdee, the system uses a sound-recognition module to characterize noise patterns and light the LEDs and wires accordingly—in this case, to create flashing patterns on a ladies' skirt (above). The device can also be used in concerts, for example, so that performers' costumes could be illuminated interactively by their music.

Interactive Impressionism: A real-time painting technique, created by Daniel Shiffman at the Tisch School of the Arts, "Swarm" captures a live-video image of a viewer and automatically alters the colors on the screen according to what the camera sees. Based on Craig Reynolds' Boids flocking-behavior model, the painterly rendering algorithm scrambles and smears specific areas of the screen. Swarm can be used to enhance public and private spaces—such as art galleries,



Merging art and technology may be the key to creating the most successful applications.

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For customer service and subscription inquiries only:
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POSTMASTER: Send change of address form to Computer
Graphics World, P.O. Box 3296, Northbrook, IL 60065

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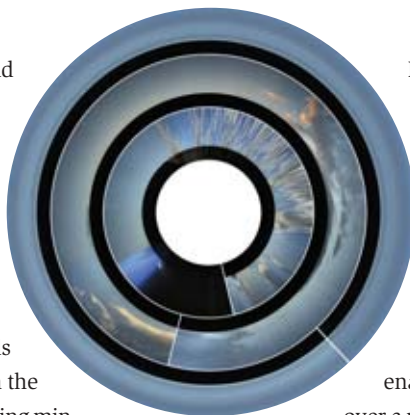
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lobbies, conference rooms, homes, and so forth—with artwork that lets viewers see themselves inside impressionistic portraits (below).

Clock Video: Rather than simply telling the current time, this unique clock (right) uses video camera feeds to display recent events. Called “Last,” the timepiece presents a brief history of time using hands that sweep around three concentric rings, with the outermost ring indicating seconds, the middle ring minutes, and the innermost ring hours. The rings contain imagery sent from live video cameras, and as hands rotate around the rings, they leave a trace of what has transpired in front of the cameras during the last minute, hour, or half day. For instance, a camera pointing at the sky can display a record of cloud cover at that location. The feed can be from any source, such as a camera mounted on the clock itself, a remote camera streaming video over the Internet, or a TV signal feeding images directly to the clock.



Developed by Jussi Angeseleva of Media Lab Europe and Ross Cooper of Ross Cooper Studios, Last can display a record of local, remote, and media events.

Are there more practical uses that these new technologies could eventually serve? Poupyrev believes the smart-skin technology in the “Lumen” calm-computing installation might eventually enable people to both see and touch each other over a network. Kim thinks that “HearWear” could include devices that broadcast sound data and create real-time noise maps that raise public awareness of noise pollution. Shiffman foresees “Swarm” being used to automatically generate special effects in films, perhaps for dream or title sequences. And Angeseleva envisions that “Last” could be used to open a channel between remote places, so friends and family members could continually sense each other’s presence, or that it could be used to show the dynamics of a given space—for example, to show a recent history of traffic patterns on a highway.

For now, these emerging technologies remain more in the artistic realm. But it doesn’t take much imagination to see how they could cross over to be of greater utility. Merging art and technology may well be the key to creating the most successful applications of all. Indeed, it was with this notion in mind that Elliott-Famularo put out a call for participation in the Emerging Technologies gallery and encouraged submissions “that enhance life, both physically, through gadgets, and spiritually, through art.”

The submissions cited here appear to have achieved that goal. And while they may be enhancing life only as art, perhaps technologies that create a sense of calm or that entertain or that convey information in new ways are enough of an end in themselves. #



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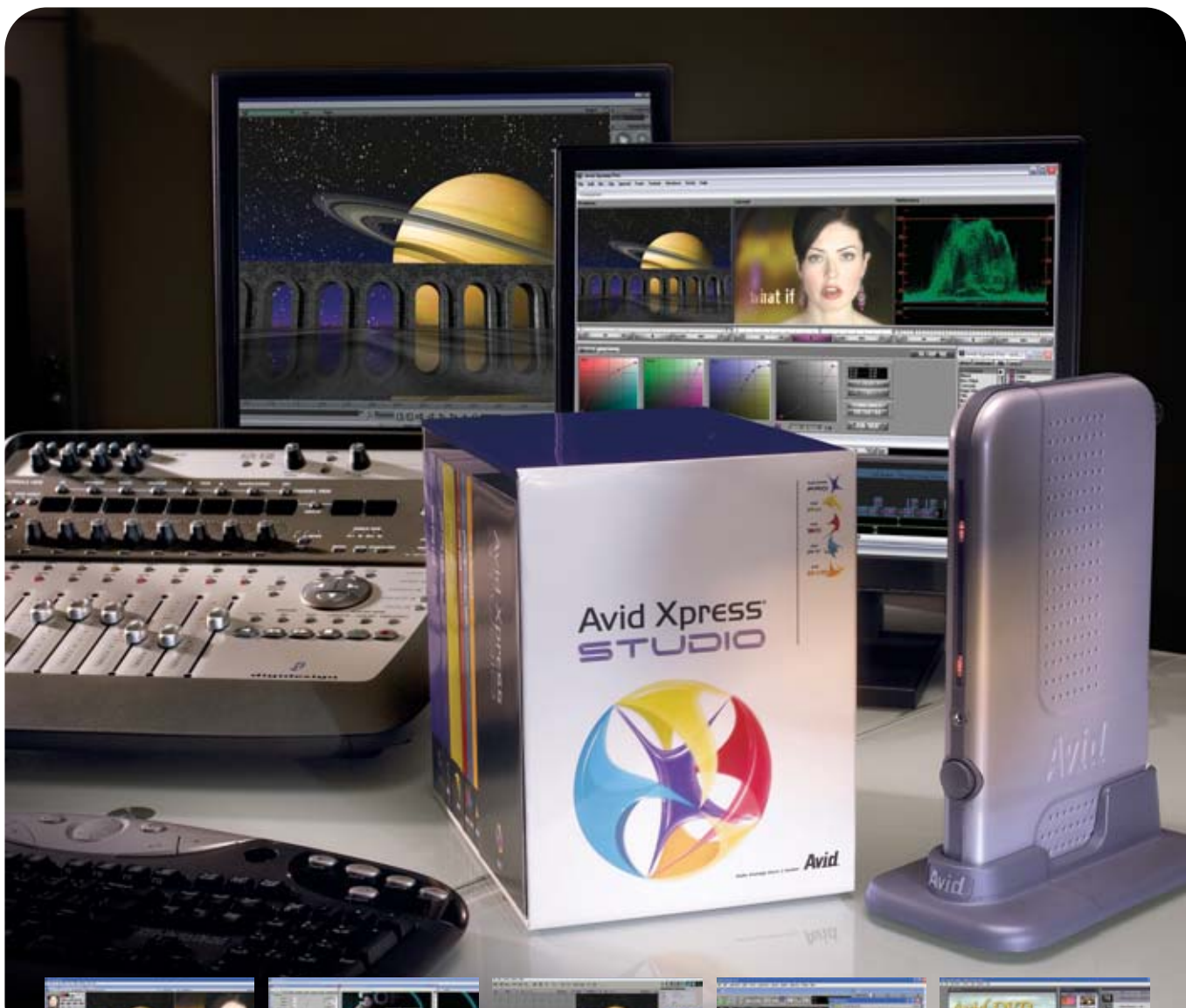
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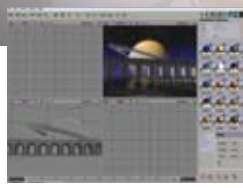
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products | modeling/animation

Softimage Debuts XSI Version 4

Softimage has released an upgraded version of its non-linear 3D production environment, Softimage|XSI.

Softimage infused XSI 4.0 with new capabilities, enhanced performance, and increased support to simplify and speed the creation of high-end 3D content. Among these are new advanced biped, quadruped, and hybrid rig systems and a Character SDK for customizing rig creation, animation, and editing. Additionally, its FX Tree compositor takes advantage of Matador technology to deliver new 2D raster- and vector-based, resolution-independent paint tools.

The new Custom Display Host enables the integration of external applications, tools, or custom runtime engines with the Softimage|XSI core, whereas its XML-based UI engine provides centralized per-scene control with configurable interface layouts, scenario-specific Relational Views, and more. Version 4.0 is further improved by BatchServe Web-based

processing and rendering queue management, a new graphic synthesizer that ensures fidelity between in-context visual feedback and final output, and the ability to host custom plug-in renderers, views, and display engines via the XSI RenderCore plug-in.

Softimage has made XSI available in three configurations: XSI Advanced, XSI Essentials, and the entry-level XSI Foundations. Version 4.0 of Softimage|XSI Advanced, Essentials, and Foundations are priced at \$8995, \$3995, and \$1995, respectively. Designed for users of Version 4.0, the new Softimage Production Series of DVD training materials centers on real-world production situations and is available via the company's Web site. —CEH

■ **Softimage;** www.softimage.com
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Image courtesy Softimage.

products | modeling/animation

Alias Unleashes Maya 6

Alias has begun shipping Maya Complete 6 and Maya Unlimited 6, offering hundreds of new and upgraded features to 3D artists in the film, broadcast, game development, digital publishing, and visualization fields.

Maya 6 boasts a wealth of character creation and animation enhancements, such as re-architected Trax non-linear animation and new motion re-targeting and redirection capabilities. Its new Maya Hair tool set sports an integrated dynamic curve-simulation engine, Maya Fur can now be rendered in Mental Ray, and Maya Cloth boasts new stitching options and provides visual feedback of cloth stress.

In response to customer requests, Maya 6 incorporates a new Soft Modification utility and offers users the ability not only to apply deformers to particles, but also to use polygon meshes with Maya Paint Effects. Contributing to performance gains, Maya's Smooth Proxy tool is now up to 18 times faster than previous incarnations, whereas Subdivision Surface proxy manipulations are up to eight times faster.

Version 6 features new connectivity with Adobe Photoshop, bi-directional support for Alias StudioTools, a Web browser embedded within the Maya panel, and support for new file formats, including DDS and PNG files. Maya Complete 6, available for Windows, Irix, Linux, and Mac OS X environments, is priced at \$1999 for the full version and \$899 as an upgrade. Maya Unlimited 6 for Windows, Irix, and Linux includes Maya Complete, Maya Hair, Maya Fluid Effects, Maya Fur, Maya Cloth, and Maya Live at a cost of \$6999 for the full version and \$1249 for the upgrade. Also available is Maya Bonus Tools, a collection of Maya scripts and plug-ins that include extended character rigging tools and an attribute collection for UI building. —Courtney E. Howard

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■ **Alias;** www.alias.com
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ViewSonic Enhances High-End VP2290b Display

ViewSonic has upgraded its popular high-end, digital LCD, the VP2290b. Well suited to the entertainment, gaming, and graphic arts communities, the upgraded monitor is designed to display high-quality, realistic graphics and images without image artifacts.

The new ViewSonic VP2290b-3 is a wide-screen, flat-panel display sporting a 22-inch, 9.2-megapixel TFT LCD. The new display is capable of a 3840x2400

maximum resolution and a pixel density of up to 204 pixels per inch. The VP2290b-3's 48Hz refresh rate and 400:1 contrast ratio ensure high image definition with no pixel jitter. Film and photographic editors are among the users expected to benefit from the LCD's ability to display images with enhanced detail and color management. The VP2290b-3 is perfectly flat, eliminating image distortion and ambi-



ent light reflection, and is compatible with IBM PC and Macintosh systems, as well as high-performance scanners, cameras, and digitizers. —CEH

■ **ViewSonic;** www.viewsonic.com
infoNOW 102

Sony Upgrades Vegas to Version 5

Sony has announced the latest version of its professional non-linear editing application, Vegas. Vegas 5 boasts such upgraded features as 3D track motion and compositing, keyframable Bezier masks, network rendering, and transition progress envelopes. The new



version also adds the ability to import Flash SWF files, export subtitles/text to DVD Architect software, and support ACID software loop properties and external Sony hardware devices. Customizable interfaces and keyboard mapping, media subclips, and real-time A/V event reverse round out Sony Vegas 5. Vegas 5 and the Vegas + DVD Production Suite are now available and priced at \$700 and \$1000, respectively. Both offerings ship with a stand-alone version of Boris Graffiti 3.0 LTD and Red Giant Software's Magic Bullet Movie Looks plug-in. —CEH

■ **Sony;** www.sony.com/mediasoftware
infoNOW 103

Imagineer Systems Presents Monet

Imagineer Systems has unveiled its newest offering for broadcast, film, and video postproduction: Monet. The unique technology behind Monet was developed in conjunction with Cinesite for use on *Harry Potter and the Prisoner of Azkaban*.

Monet enables users to insert moving and still images into DV, SD, HD, and film footage. Contributing to significant time-savings, Monet offers tools for performing such complex tasks as logo replacements, product packaging alterations, and product placement in moving footage. Monet includes tools for 2D plane tracking for motion estimation, manual augmentation of tracking data, aspect ratio conversion, per-pixel motion blur application, color highlight extraction, grain handling, and analysis of lens distortion, scene lighting condition, and intensity change.

Imagineer Systems anticipates shipping Monet by the end of the month in a workstation configuration. It will come complete with an Accelerata software acceleration card from Aspx Technology and support for video I/O cards. —CEH

■ **Imagineer Systems;** www.imagineersystems.com
infoNOW 104



broadcast

user focus

A Spot from Broadway

The cast of the Broadway musical *Wonderful Town* recently made its broadcast debut in a stylized television commercial promoting the show's current run.

With help from production facility Boomtown and postproduction house Kinetic, the spot—which adopts the look of a 1950s postcard—condenses the spirited “small town girls live it up in the big city” plot of *Wonderful Town* into a brief but vibrant 30 seconds.

The live action focused on the show's two female leads singing and dancing through a series of romantic New York City settings. A motion-control camera rig was used to film the entire cast and crew of the musical production against greenscreen as they interacted with a limited number of practical set pieces. The action was

then tracked in 2d3's Boujou so it could be later integrated with the virtual elements.

Director Ryan McFaul designed the spot and created a number of the digital environments, including multi-plane sets for several New York City night scenes and a subway interior using Adobe's After Effects. Meanwhile, animation house Pixel Monkeys created a number of city park and nightclub backgrounds in Discreet's 3ds max. Most of the compositing was also performed by McFaul using After Effects.

Key to the spot's success was the final integration of the digital and actual elements, which was accomplished in After Effects. The software was also used to color the imagery and lend it a



Working in After Effects, digital artists created a highly stylized 1950s look for this live-action ad.

washed-out style to match the period look of the musical. —Karen Moltenbrey

KEY TOOL: After Effects, Adobe
www.adobe.com
 infoNOW 105

multimedia

user focus

Supersized Graphics

When Click 3x created a branding campaign for electronics giant Samsung, the artists had to think big. That's because they were creating the graphics package for display on a giant screen at one of the world's biggest and most famous landmarks—New York City's Times Square.

Click 3x designed the pieces, employing bold renditions of the Samsung logo. The artists then created the graphic elements using mainly Alias's Maya, in addition to Softimage's XSI. In particular, the Samsung products were accurately modeled down to the smallest detail. The team also used Discreet's Flame for rotoscoping and Adobe's After Effects for compositing.

Half the campaign consists of sophisticated logo treatments with the company's name appearing in fascinating guises. In one, stylized electronic circuitry pulsing throughout the frame resolves into the wings of butterflies circling the logo.

Another, inspired by M.C. Escher, features people walking on the top, bottom, and sides of the frame while using Samsung products. The other half of the campaign contains intricate, photorealistic animations involving the company's new products. One features a Samsung refrigerator in an architectural rendering of a house that comes to life.

The segments are currently being shown on Samsung's 45x40-foot SuperSign. The massive screen size required Click 3x to produce the CG elements in “super high def” so that the frame is as wide as a standard HD image but is considerably taller to match the screen's 4:3 aspect ratio. As a result, it often took several hours to render a single frame of the animation.

Additionally, the artists resized and reformatted the animation for delivery in HD and SD for use in television and other media outlets worldwide. “As television viewership continues to fragment, alternative media is becoming increasingly important,” says Click 3x president Peter Corbett. “Advertising is no longer confined to a 30-second TV spot.” —KM

KEY TOOL: Maya, Alias
www.alias.com
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Artists designed a unique branding campaign for Samsung's huge Times Square SuperSign.



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Flat-Panel Face-off

By Jeff Sauer

When it comes to next-generation monitors, digital content professionals know that thin is in. But as they explore which technology is right for their specific applications, they find that the two flat-panel technologies—LCD and plasma—display highly contrasting strengths and weaknesses.

The distinctions stem from the fundamentally different methods the technologies use to produce

images. LCD monitors operate by shining light through a thin-film transistor layer and using filters to produce specific colors. Plasma screens zap neon gases trapped inside a pixel matrix to create ultraviolet light, which, in turn, excites red, green, and blue phosphors.

These descriptions are simplistic, but they shed light on the pros and cons of the two options. Indeed, LCD makers face a serious challenge with back-lighting because of the difficulty of evenly defusing light over larger panels. As a result, despite the enormous popularity of LCD monitors for the desktop, LCD panels still can't match the physical size of the larger plasma displays. In fact, any LCD panel that measures 24



inches or more diagonally is classified as large, and the largest thus far measures just over 40 inches. By comparison, plasma displays generally range in size from 40 to 62 inches, with the largest reaching 76 inches.

However, plasma display manufacturers face different obstacles. For example, it's been difficult for them to squeeze the gas mixtures into ever smaller pixel grids. The resulting shortcoming in resolutions, VGA at best, is one reason why there are so few plasma panels on the market less than 40 inches (a 32-inch model is the smallest). What's more, reducing the overall size of the pixel matrix does not dramatically lower the cost, which makes smaller plasmas impractical from a price perspective.

For video professionals, that's too bad, because plasma screens do a better job than LCDs of producing vibrant and accurate colors. With plasma monitors, the viewer is looking directly at the light and color source, and the higher video quality is apparent in side-by-side comparisons. Also, the responsiveness of phosphors enables plasma displays to avoid the motion refresh and ghosting problems associated with LCDs. And a smaller distance between pixels on plasma screens creates a more natural appearance.

Good-Enough Quality

LCD panels, on the other hand, do a better job in higher ambient light environments than plasma or CRTs because they don't reflect as much light. Thus, LCD panels ultimately are finding increasing success in video production environments. For example, while many LCD monitors may not appeal to color-correction experts or high-detail producers, they have proven invaluable where space is tight, as in production trucks and control rooms. The technology also uses less power than CRTs and plasmas, which can be an advantage on location. In any case, the bottom line is that while LCD video quality is not up to the level of plasmas or CRTs, it is now good enough for all but the most demanding applications.

LCD panels also outshine plasma displays in video applications where burn-in might be a problem, as is the case with constantly visible time-coding or logos. Fortunately, with the constantly changing images of motion video, plasmas tend to burn in more evenly and less overtly. Yet longevity is still a potentially critical shortcoming of plasma monitors. At best, phosphors age and create a loss of contrast over



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.

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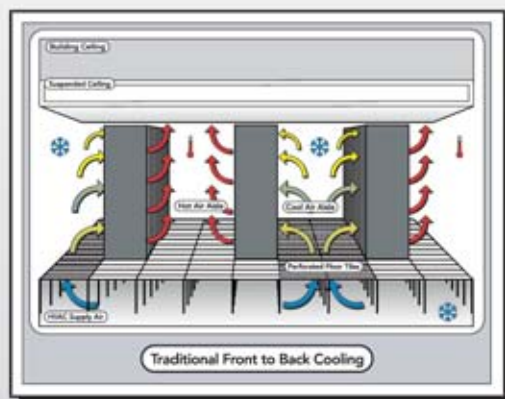
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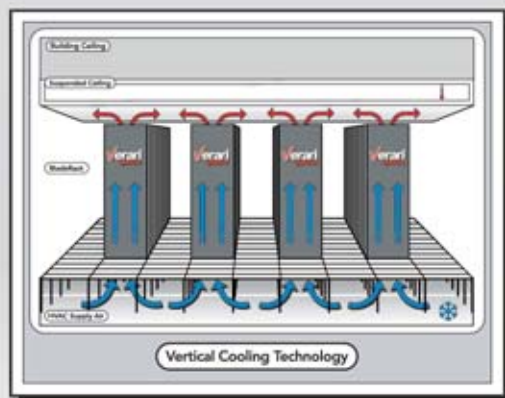
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time. At worst, burn-in leaves permanently ghosted graphics or text.

Further, LCD monitors support much higher resolutions than plasma, up to 1920x1200 in high-performance models. Therefore, they tend to have a crisper, sharper appearance. Plasmas can't match that resolution because of the physical space required for the pixel grid and, therefore, rarely exceed Wide XGA resolution. The exception is alternate lighting of surface panels (AliS), which claim higher horizontal resolution but light only half of it at a time.

So is it simple enough to say that plasmas are good for video and LCDs are good as computer monitors? Perhaps. Odds are that if plasmas could become small enough, those rack-mounted panels of video production monitors might well be plasmas. Perhaps we'd also see plasmas on airplanes and in the backseats of minivans.

But, that's not likely. For those uses, LCD solves specific problems, and because of the R&D dollars being invested in LCD, the technology is improving rapidly. And the popularity of LCD-TV products from companies such as LG Electronics, Samsung, Sharp, Sony, and ViewSonic suggests LCD is advancing in video applications.

Size Matters

Plasma monitors that are 40 inches and larger currently have a quality and price advantage for video applications. Although a similarly sized LCD would offer higher resolution, it might cost 50 to 100 percent more. Given that, plasma may be the better choice for large-panel video applications for at least the next few years.

Still, LCD makers enjoy the huge economies of scale from volume laptop and desktop monitor sales that may ultimately overwhelm plasma. For instance, LCD makers are now working with promising new ways to backlight panels, such as with LEDs, that may dramatically increase the color range and brightness uniformity of LCDs. In contrast, the plasma maker's biggest R&D hurdle is eliminating burn-in, which is likely to take many years to overcome.

In professional video production applications—for which LCD has reached high-enough levels of image quality and fast-enough refresh rates—users are already finding that space-saving is more important than the drop-off in image quality. When bigger is better for video, 40 inches and above, plasma is still the choice. That may change, but the competition will mean that LCD quality should continue to improve as well and make "thin" an even more capable solution for professional video editing and graphics. ■■

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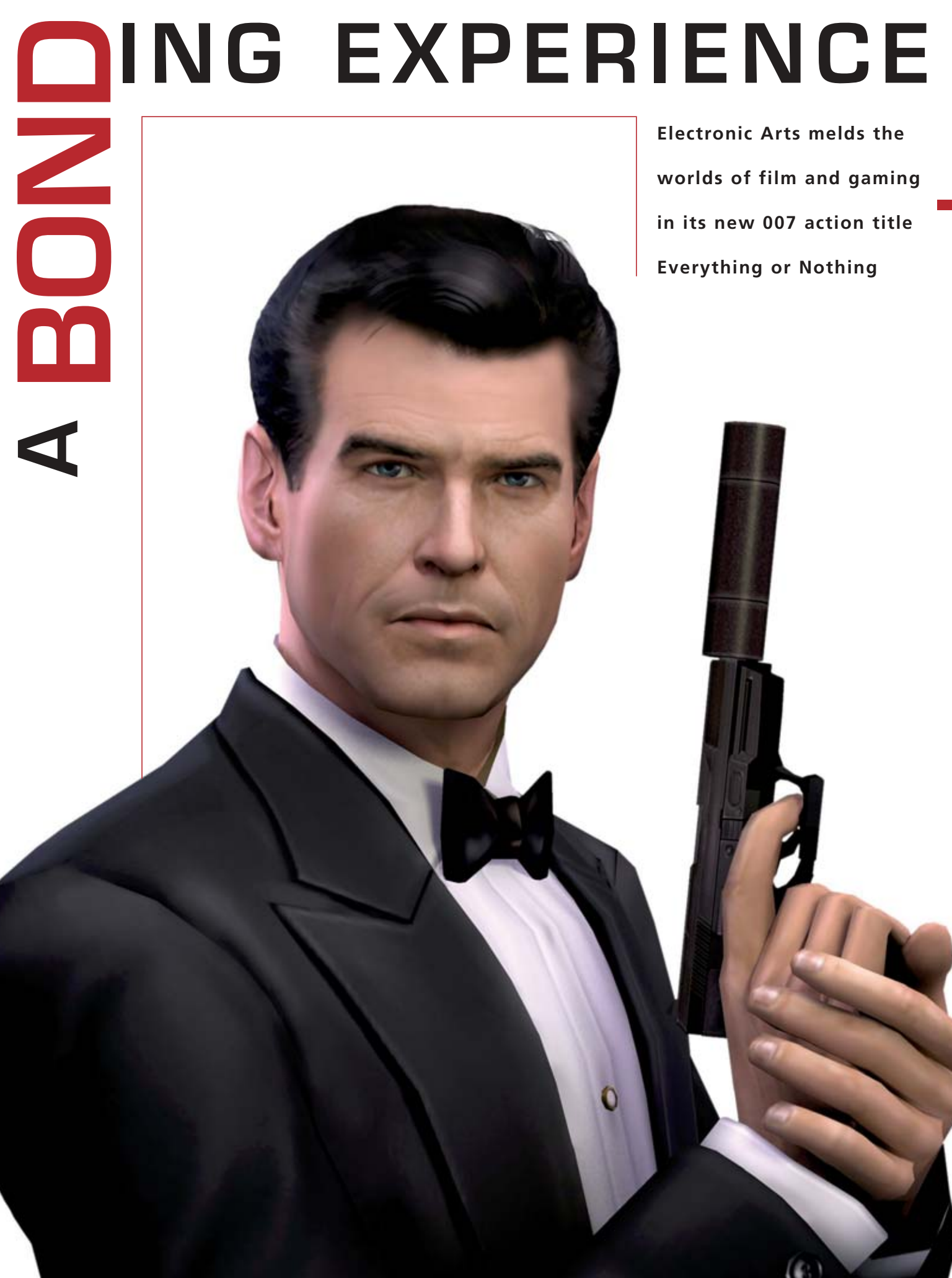
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A BONDING EXPERIENCE

Electronic Arts melds the worlds of film and gaming in its new 007 action title **Everything or Nothing**



By Martin McEachern

With the relentless pace of advancements in gaming graphics, the dream of projecting oneself into a movie and playing the hero has been slowly becoming a reality. From casting celebrities for their voice talent, scanning their faces, and motion-capturing their movements, to simulating cinematic lighting, staging, and camera movements, game developers have been trying to re-create a cinematic experience for players. Recently, the artists at Electronic Arts (EA) have taken all these steps—and several more—to transport gamers into an interactive version of one of the most popular and enduring film worlds of all time: that of the unflappable secret service agent James Bond.

Billing itself as a real-time, cinematic action/adventure, *James Bond 007: Everything or Nothing* leaves players hard-pressed to find the slightest crack in its mirroring of a *Bond* film. The fade-in of the iconic roaring lion of the MGM logo, the signature showstopping pre-title action sequence, the salacious opening credits set to an original song, and the writing by veteran *Bond* screenwriter Bruce Feirstein—it's all in the game.

Also included are performances by a complete cast of real movie stars, many of whom starred in past *Bond* films. Reprising their roles and lending both their voices and cyberscanned likenesses to the game are Pierce Brosnan as Bond, Judi Dench as M, John Cleese as Q, and Richard Kiel as the steel-mouthed Jaws. The all-star cast also includes Willem Dafoe as



EA used cyberscans of actors to create their digital counterparts for the game, including (clockwise from far left): Pierce Brosnan as Bond, Willem Dafoe as the villain Diavolo, Heidi Klum as Dr. Nananova, John Cleese as Q, Mya as an NSA agent, and Richard Kiel as Jaws.

the villain, and Shannon Elizabeth, Heidi Klum, and Mya as the new Bond girls.

The result of this cumulative effort is the most complete cinematic experience yet in the interactive world of computer gaming.

On His Majesty's Secret Service

The prologue to Bond's latest adventure involves the disappearance of nanoroboticist Dr. Katya Nananova (Klum) and the theft of her metal-eating nanobots, which are crucial in Nikolai Diavolo's (Dafoe) diabolical plan to seize control of his native Russia and return it to hard-line Communist rule. After Agent 003 disappears while investigating anomalous plutonium levels near a mysterious mining operation in Peru, 007 sets out to find him. Eventually Bond locates him and tracks Diavolo to his secret facility on a Louisiana plantation in the Bayou and then to

New Orleans, where Jaws (Kiel) plans to unleash the metal-munching nanobots on the steel-supported city.

The story unfolds with cinematic suspense and pacing, leading the player through myriad plot points without restricting the open-ended interactivity of the gameplay or the number of paths available to the player. "It's a balance to maintain, between giving players as much freedom of choice as possible and the feeling that they are playing the Bond character," says senior producer Scott Bandy. "Our solution was to construct a plot that Bond unravels in his inimitable style, and at the same time build an action game that gives players a broad range of tactical choices to overcome the obstacles in their path."

Indeed, the characters and conventions of the *Bond* universe have become such a permanent fixture of pop culture that, for the artists, the greatest challenge

was to meet the player's preconceptions about the behavior, personality, and appearance of Bond, the villains, and the girls, as well as the expectations of the cars and the action in both the real-time and prerendered settings. EA was meticulous in capturing every nuance of the Bond mythos—dispatching enemies with cool detachment, performing death-defying stunt work in his Aston Martin, making puns, and seducing women with equal aplomb. To help it achieve this digitally, the company enlisted film-effects specialists from the senior levels of ILM and PDI.

Polygons Are Forever

To create the CG characters, EA contacted Gentle Giant Studios (Burbank, CA), which dispatched a crew to the Santa Monica, California, recording studio where most of the voice-overs for the game were being recorded. There, the group scanned Cleese, Klum, Elizabeth, and Kiel using a Cyberware 3030 mobile scanner. The capture system was then flown to Pinewood Studios in England, where Brosnan was scanned in high resolution. Not only did they capture the base expressions of the actors, but to ensure even greater fidelity to their studio performances, also captured a wide range of emotional expressions, which helped significantly in the modeling of the blend shapes for the faces.

The cyberscanned heads were extremely dense—some pushing 100,000 polygons. So EA used the data, as well as the scanned and orthographic images, as references for constructing lighter, game-ready models, totaling approximately 1800 triangles apiece, in Alias's Maya. As a result, the rendering engine could quickly draw



EA's priority was to create a Bond character that reflected not only the look, but also the mannerisms and movements of the well-known 007, played by Brosnan in the franchise's most recent films.

Because of the manageable sizes of the character models, including M (Judi Dench), only one level of detail was needed for each CG head used throughout the game.



the heads in real time at any proximity to the camera.

Working in Adobe's Photoshop, the artists used the scanned texture maps as templates for hand-painting the final game-ready face maps, since those produced by the scan contained harsh lighting. "Painting brought out the personality and essence of each actor," notes Bandy. "Without these touch-ups, they looked like digital mannequins." Artists, in fact, spent weeks on each face map, carefully painting the specular maps that not only deliver the light-reflecting highlights of the skin, teeth, and eyebrows, but also modulate the glossiness and shininess of the hair, stubble, lashes, and brows.

Studying photographic and video references, the team modeled more than 30 blend shapes for each character. The greatest difficulty in using the likenesses of celebrity actors were encountered during the lip-syncing, which was done by hand. The more the animators studied the actors, the more apparent it became that many of them, particularly Brosnan, had undergone considerable voice training, so the way their mouths formed words differed widely from the way typical manual and automated facial animation methods form words. Consequently, the animators had to collaborate much more closely with lead character modeler Darren Pattendon to revise the modeled phonemes.

Smooth Moves

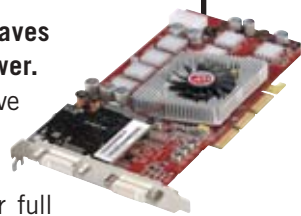
Subscribing to the old adage that action is the determination of character, EA invested countless hours in developing one of the most sophisticated real-time animation blending systems, ensuring that each character captured the spirit of his or her real-life counterpart's personality and performance. In *Everything or Nothing*, Bond appears in the third person for the first time, forcing the team to pay extra attention to the way he moves, talks, and glances. "We spent an enormous amount of time studying the way our Bond runs, walks, shoots, and takes cover, and we experimented with new ways to make him seem like that character we know and love," Bandy says. The artists also re-created Bond's

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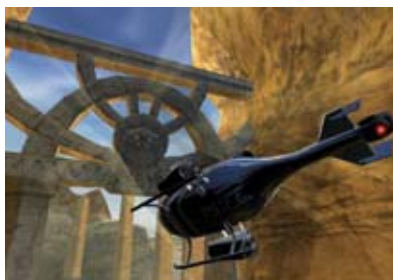


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The game worlds are permeated with hundreds of environmental textures that the artists generated in Photoshop. Using a custom particle-simulation engine, they also created a range of dynamic effects, including explosions, fire, sparks, bullet hits, and more.

their casting often complicates the data refinement process. While various algorithms and data filters were scripted to synchronize the

suspicious and aggressive, which clue the player to dangers lurking outside the camera frame. And interspersed throughout are “Bond moments”—actions performed with 007’s unique debonair flair.

The process of creating the thousands of character animations began with extensive motion-capture sessions conducted at House of Moves (HOM) in Los Angeles and EA’s own motion-capture studio in Vancouver, Canada. Employing more than 30 Motion Analysis cameras and Motion Analysis’s Eva Real-Time software, EA captured countless run and walk cycles, hand-to-hand combat techniques, as well as punching, kicking, dodging, rolling, and diving variations. Meanwhile, using a Vicon 8 motion-capture system with 24 specially designed, high-speed MCams, HOM acquired dozens of individual “character minutes” of data, often recording as many as four performers simultaneously. Then, EA used Kaydara’s MotionBuilder software to map the data to its Maya game skeletons, and HOM used its proprietary Diva software to process and convert the motion data into Maya files.

Since celebrity actors are rarely available for mocap sessions,

data to each actor’s specific proportions, the results were rarely perfect, necessitating hours of finessing. According to Bandy, because the in-game animation system is so dependent on certain common poses and requires extremely refined and explicit starts, stops, and blend points, the team couldn’t just insert the mocap file and expect it to blend seamlessly with the other movements. Therefore, while the mocap data remains largely unmodified in the prerendered sequences, EA used it primarily as reference for crafting the final in-game animations.

Meanwhile, EA’s sophisticated animation blending system transitions the characters’ motions from idle to running. Moreover, it can skip the slower motions yet still play a starting and stopping transition between them. Also, all the run cycles used for Bond and the non-player characters (NPC) can turn into various forms of staggering and limping. In addition, the characters’ upper torsos were designed for maximum flexibility so they can be smoothly and dynamically articulated into a wide range of positions.

Animators crafted each piece of animation to dovetail with any of the other 1800 pieces of animation used in the game; these were culled from a total of 5000 permutations created during the

EXPLOSIVE EFFECTS

While the game allows seamless transitions from on-foot action to driving missions behind the wheel of the cars, it’s astride the Triumph Daytona 600 motor-



bike that players will experience an unparalleled tour de force of visual effects. ILM’s Habib Zargapour and his crew developed several innovative effects to maximize the sensation of speed and the loss of control.

Zargapour, inspired by the Hollywood camera tricks developed by Rick Fichter to convey supersonic speeds in the film *The Right Stuff*, applied the same effect to Bond’s Triumph. At maximum velocity, the bike enters a kind of speed zone wherein the sound of the engine drowns out everything else as the surrounding air condenses to produce “speed contrails,” an effect that enhances the sensation of break-neck speed.

The game also boasts dynamic effects for heat ripples, sparks, and small particles that streak through the air and enhance the speed contrails, all of which EA created using a custom particle-simulation engine. In addition, the game worlds are permeated with hundreds of environmental textures, created in Photoshop, that dictate the friction, collision, and other physical properties of the objects to which they’re applied—for instance, objects mapped with a wood texture will crack and splinter like wood when struck violently. Each texture is also associated with an array of particle effects, so that driving on dirt will cast plumes of dust around the car, and motoring through puddles will cause the splashing and spraying of water. — ME

development of the system. Completing the system took six months of prototyping and hundreds of experimental variations of the blending procedure.

Live and Let Drive

No *Bond* adventure would be complete without high-speed chases through exotic locales, and *Everything or Nothing* delivers 10 vehicle-based missions that rival, if not surpass, those found in the best racing games. Missions involve off-roading in a Porsche Cayenne Turbo, flying through Egyptian canyons in an armored helicopter, racing through the streets of New Orleans in an Aston Martin V12 Vanquish, speeding across rooftops on a Triumph Daytona 600 motorcycle, and invading Red Square in a platinum-coated futuristic tank.

In fact, the graphics engine used for the driving sequences is a direct descendant of the one that powered EA's *Need for Speed Porsche Unleashed* PC title. However, the differences in the programming demands of *Bond*'s high-impact, stunt-heavy driving missions require a much higher level of interactivity within the environments. For example, the vehicles of the player and the NPCs are outfitted with artillery, and when these weapons discharge, the impacted surface must react appropriately to the ballistic properties of the weapon. Surfaces must be capable of disintegrating, exploding, or registering scorch marks, and given their high level of breakability and deformability, all the vehicles must manifest progressive damage and changes in surface properties. This forced EA to improve significantly on the *Need for Speed* engine by developing a more comprehensive animation system, and a better world collision and detection system.

Aside from the programming provisions made for the weapons, EA also had to cope with the driving action's second major departure from conventional racing games: the absence of timed races. "Most of the missions involve several staged objectives and typically contain hundreds of triggers and rules all painstakingly arranged by our mission editors," says senior program-

***Everything or Nothing* features a number of exotic licensed vehicles used by the characters in the requisite action-packed race and chase scenes.**

As femme fatale, the CG Klum required a range of expressions—neutral, happy, anger—captured during the cyber-scanning process.



mer Brad Gour. Moreover, since all the driving missions unfold in the same settings as the on-foot adventures, the artists also had to confront the challenge of diversifying the same environments for the two experiences.

The solution lay in creating worlds of extraordinary size. Working from detailed top-down maps, the team used placeholder geometry to construct the worlds, carefully plotting out the track and the intricacies of the driving experience, which had to remain part of the connective tissue of the story, bearing all the danger, intrigue, and suspense seen in the other facets of the game.

For the game's three licensed vehicles—the Aston Martin, Porsche Cayenne, and Triumph Daytona—the team conducted extensive photo shoots that yielded a library of 200 pictures for each that were used as references during the modeling and texturing processes. The artists



built the cars in Discreet's 3ds max; then, working in Photoshop, they used the reference photos to create a small swatch texture—16x16 pixels—for coloring the body paint, while relying on baked-in vertex lighting for shading the rest of the vehicle. In fact, *Everything or Nothing* marks the first time EA has implemented dual parabolic reflections on all the vehicles, which resulted in more realistic, high-resolution, real-time reflections.

World Domination

Artists used Maya's rigid-body dynamics for most of the collateral damage effects and collapsing structures, implementing them in a built-to-scale replica of Moscow's Red Square, whose walls are completely destructible. This huge feat of memory management was accomplished through EA's new proprietary technology for processing and streaming massive amounts of data. In fact, *Everything or Nothing* features the most expansive free-roaming levels yet in a *Bond* game. The data-streaming technology was, therefore, crucial to managing the graphical content of such levels as the Peruvian jungle, set in a massive open city where the architecture is adorned with unique murals and mosaics. For this high-altitude area offering deep vistas through the villages, the artists employed traditional matte-painting techniques that afford almost limitless views.

In the Egypt level, the team placed multiple tracks across the vast desert, carefully coordinating the dual obstacle-laden routes of the vehicles with a train that intersects them at the precise time for the execution of the stunts. According to ILM effects wizard Habib Zargapour, the key to successfully integrating the stunts into the driving gameplay was creating a terrain that's fun to navigate without overly compromising the physics. The stunts are further complicated by the swarming jeeps and an endless onslaught of rockets, missiles, and explosions.

The Living Daylights

Led by senior lighter Larry Weiss, the team illuminated the wide range of environments using a combination of vertex-based lighting for intricate, geometrically complex surfaces and light maps for large, planar surfaces such as floors and walls.

To light the outdoor exteriors, the group used ambient and directional lights arranged in a dome array. For the indoor locations, the team relied on a combination of points, spots, and directionals to capture the unique luminance of light bulbs, hall lighting,

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chandeliers, table lamps, and other artificial light sources, using them as well for key, fill, and backlights to produce a sculptured look. Meanwhile, the graphics engine is capable of lighting Bond with up to four lights at a time, thereby enhancing the mood of a scene with dramatic, high-contrast shadows that backdrop 007's stealth or cast him in the proper lighting, no matter the setting.

Additionally, the EA group developed a proprietary tool used to generate the flashes of lightning during a torrential storm in New Orleans. The program includes adjustable parameters that enabled the group to alter the lightning's frequency, noise level, amplitude, color, and thickness.

An All-Time High

Never before has such an impressive cast of actors been assembled exclusively for a video game. And, if *Everything or Nothing* proves precedent-setting, Bandy believes that enlisting high-profile actors may become as critical to the marketing and success of a game as it is to a film.

"Bringing such a great cast to our players lent a sense of authenticity to the game, and the result puts you right in the middle of the Bond universe," he says. "Not only are we telling you that you are Bond, Pierce Brosnan is telling you that you are Bond."

Yet the game represents the apex of the new genre of cinematic action/adventure by not allowing its gameplay to succumb to the trend toward "Hollywoodification." "We could have had all the talent in the world, but if the game wasn't fun, the fans would have rejected it," says Bandy. "Many of our team members were worried about the glamorization of games in general, and I think this concern is what finally drove us to achieve *Everything or Nothing*'s balance of gameplay and cinema." ■

Martin McEachern, a contributing editor for Computer Graphics World, can be reached at martin@globility.com.



Bond's adventures lead him to a number of exotic locales, most of which are teeming with a colorful array of non-scanned characters that were modeled and painted by hand.

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chilling effect

Visual effects studios depict
the consequences of global warming for
this summer's big disaster film, *The Day After Tomorrow*

By Barbara Robertson

The threat of global warming was put in chilling terms on January 9 when David King, the UK government's chief scientific advisor, wrote in *Science* magazine that climate change is a greater threat to the world than international terrorism. In February, Canadian Environment Minister David Anderson echoed King's words, and later that month, the Pentagon released a report on the dire effect climate change would have on national security. Even so, there was no outpouring of public outrage. That could change this summer.

As we've all learned, pictures often have a more dramatic impact than words. And when it comes to drama, few pictures

can match a Hollywood spectacular. Thus, the image of the effect of global warming that will now be in many people's minds is not the one painted by scientists but, rather, the storms and the frozen New York City in 20th Century Fox's *The Day After Tomorrow*.

And that seems to suit many scientists and environmentalists just fine. Although noting that the film is not scientifically accurate, the science community is aware of the film's potential impact. A May 12 BBC news story reported that King stated he hoped many Americans would see the film. Speaking in London, he described *The Day After Tomorrow* as "a spectacular action film which portrayed the switching off of

the Gulf Stream and the Northern Hemisphere's subsequent plunge into a new Ice Age."

Directed by *Independence Day* director Roland Emmerich and starring Dennis Quaid, the film rolled into theaters Memorial Day weekend, giving moviegoers a view of nature that has never been seen before, which made this vision of the future an obvious candidate for digital effects.

Eye of the Storm

Visual effects supervisor Karen Goulekas engaged several studios to help realize Emmerich's vision, including Digital Domain, Hydraulx, The Orphanage, ILM, Tweak Films, Yu + Co, Dreamscape Imagery, and Zoic, with Schematic providing weather graphics for various monitors. It was a massive undertaking that

ILM used a combination of 3D graphics, matte paintings, and miniatures for this shot of New York City at the dawn of a new Ice Age. The huge ship at left was a miniature tanker dressed with geometry to provide extra detail made necessary by the softening effect of the snow. The Statue of Liberty is 3D, as is the snow; the sky is a matte painting.

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often resulted, by the end of production, in several studios working on individual shots. "I believed that work had to be done at large facilities," she says. "And that was true until a few years ago because software wasn't as good. Now we can go to studios based on their strengths, not their size."

For example: "Digital Domain created elements for the storm tide shots—the water, people, and buildings seen from the ground angle—and Hydraulx composited them," says Goulekas, "but the aerial storm tide shots went to Tweak."

Goulekas began working on the project in May 2002, the same time as the storyboard artists. "I hired eight previz artists and one [Apple] Final Cut Pro editor," she says. "I paid people one salary if they brought their own computer and another if we brought it."

By August, the main sequences were developed in Alias's Maya. When Goulekas went to Canada for principal photography in October, she took previz artists with her. "When we got back, we took the bluescreen plates from the Avid and added the previz environment so [editor] David Brenner had something to cut the film with," Goulekas says, and laughs, "so, it was like 'post' visualization." (Goulekas is the author of *Visual Effects in a Digital World*, a glossary of 7000 visual effects terms.)

The film begins with the ominous cracking of the ice shelf in Antarctica and ends with the starkly beautiful image of an icy-white New York City as seen from the shoreline, the harbor completely replaced by drifts of snow on ice, through which the top of the Statue of Liberty protrudes. Three studios worked on these

shots—Hydraulx on the ice shelf and a frozen interior in New York, and ILM and The Orphanage on the long end sequences.

The Ice Melts

Describing the opening shot, Goulekas says, "We have a flyover of the icebergs that I think is the longest fully digital shot in a [live-action] film. It's beautiful. The ice cracks, crevasses form, chunks of ice fall off."

The six-and-a-half-minute sequence was created at Hydraulx, a 40-person studio in Santa Monica. The team started by creating the ice shelf in foam. The sculpture was then scanned with a Polhemus scanner, converted from point-cloud data

into geometry with Headus's CySlice, and imported into Maya. Hydraulx also used two Maya plug-ins: Syflex's cloth simulator for water dynamics and Kolektiv's Stroika for particles.

With the scanned data, the team created a finely detailed 3D model in Maya and adjusted it to work with live-action plates of an ice base filmed on a blue-screen set; 2d3's Boujou handled the camera tracking. The model detail was important because of a rendering issue: The studio wanted to output separate rendering passes that would be composited on Discreet's Inferno systems. So, for efficiency, they wanted to quickly render matte passes in Maya and, separately, "beauty" passes in Mental Ray.

Unfortunately, the two software programs calculated displacement maps differently. "Everything else looked the same—the camera, the objects, the animation all lined up," says Greg Strause. Thus, rather than render everything in Mental Images' Mental Ray, they eliminated the displacement maps. "We physically modeled every little detail except where we could use bump maps," he says. "We had 10 million polygons per file." Even so, rendering the 10 to 15 layers, which included subsurface scattering to make the ice translucent, took 2-1/2 to 3 hours per frame on dual-processor Intel Xeon with 6GB of RAM. The Linux-based renderfarm was assembled by Dell, as were the Nvidia-based workstations.

To animate the falling chunks of ice, rather than rely on a rigid-body simulation, Hydraulx assigned character animators to the task. "The character animators could pound through massive scenes with 500 to 600 chunks keyframed and do a shot in two days," Strause says. "To get a random simulation to look right might have taken two weeks."

The sky was painted. "We created huge matte paintings in Adobe's Photoshop of the cloudy sky from 11 megapixel still pictures shot on a Canon 1DS digital still camera that we assembled into 360-degree sky tiles," says Strause. Adds Colin Strause, the other half of the partnership, "Once we assembled the tiles, the sky-painting files were over 2G in size."

Once compositing was completed, rather than editing with Final Cut Pro as usual, Hydraulx created edits of the sequence with sound on the Inferno. "Every Inferno has 2TB of storage on it, so we had real-time playback of the shots," says Strause. "Roland could sit with us and look at uncompressed, 2K-resolution shots on the Inferno and on HD monitors. He could sit with one artist, and composite and color correct shots in real time at film res and drop them back into the edit."



Images © 2004 20th Century Fox. All rights reserved. Courtesy of Hydraulx.

Hydraulx used 3D geometry to create the ice shelf and global illumination to bounce light into the 15-foot-wide, curving, 300-foot-deep crevasse.

Back to Nature

In the film, the melting ice sends frigid water into the usually warm Gulf Stream and, with a compression of time designed to shock and awe moviegoers, triggers an Ice Age within minutes. Tornadoes rip through Los Angeles taking the Hollywood sign with them (thanks to Digital Domain), hail the size of baseballs batter Tokyo (thanks to Hydraulx), people in the US race to Mexico, a storm tidal wave heads for Wall Street, and the wolves, who sensed the change coming and escaped from the zoo, begin hunting for food. One person goes against the tide: paleoclimatologist professor Adrian Hall (Quaid) who tries to save the world and rescue his son Sam (Jake Gyllenhaal), who was in New York City when the world began to freeze. Now the wolves hunt him.

"Roland had real wolves on set, but they were very, very shy and sensitive to noise," says Gregor Lakner, CG supervisor. "They quickly don't do what you want them to do." Because the script called for the wolves to be hungry hunters, the real animals lost their chance for stardom. ILM brought the wolves into its studio to study, photograph, and measure, and then created digital doubles (see "Making Wolves," pg. 27).

To animate the wolves, ILM motion-captured two dog performers. "We had a detailed set of animatics created by Digital Domain," says associate animation supervisor Scott Benza, "so we knew exactly what we wanted."

The dogs wore form-fitting Lycra suits into which motion-capture targets were sewn. "The blue suit extended to their



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When real wolves were brought on set, they proved to be too shy to act like hunters. So ILM created hungrier digital doubles.



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Making Wolves

To create a pack of four digital wolves, ILM modelers started with anatomy books and three real wolves brought into the studio from a refuge near Sacramento, California, that they observed and photographed. The photographs, taken of a wolf on a rotating pedestal by two synchronized cameras—one above and one at wolf level—were used for reference and, later, to check the models. In addition, the crew measured the wolves' bodies and coats. "We measured every bit of fur with a ruler," says Gregor Lakner, CG supervisor. "We were told not to make any unexpected moves or unexpected noises."

The three wolves brought into the studio—a black wolf (Titan), a nearly-black wolf (Thor) and a yellow wolf (Jasper)—were modeled in Maya and ILM's

ISculpt and rendered with Renderman. A fourth, gray wolf (Big Gray), was cloned from Jasper.

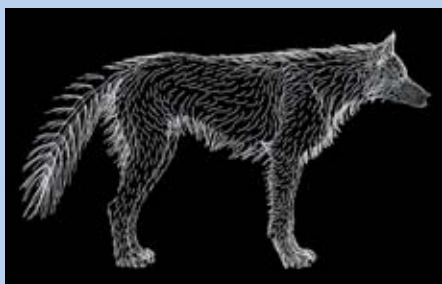
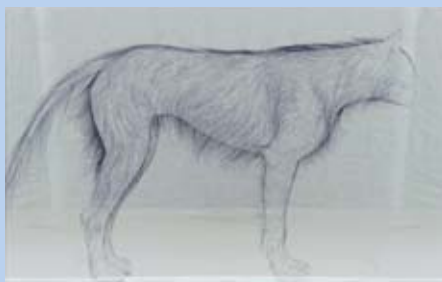
After the digital models were skinned, painted texture maps were applied. "Without that, we would have seen through the hair," Lakner says. "It would have been too expensive to render as much fur as a wolf really has."

To create the fur, CG supervisor Christopher Townsend's team placed guide hairs that would later be interpolated to form the animals' coats, creating longer hairs on the animals' backs so that the digital wolves could raise their hackles. By placing transparent models of a digital wolf over photos of the real wolf, they were able to place guide hairs to match. "We tried to mimic the length of the hair, the placement, and the curl," says Lakner. "Otherwise the

dynamics wouldn't look right." A rendering of the guide hairs alone gave the team an idea of what the final simulation would look like; testing the dynamics on the guide hairs gave the team a sense of how the simulated coat would move.

The yellow wolf, it turned out, had to be treated differently from the black wolf. "None of his hair was straight," says Lakner. Also, the black wolf's coat was shinier. "Black hair is oilier," explains Lakner. "It absorbs and refracts light differently than yellow or blonde hair does, so we had to simulate that."

The different light components—diffuse, specular, and ambient—were rendered separately. "On one hand, hair is very complex," says Lakner, "but it's also forgiving. You don't have to place the light exactly as it is in nature because it's scattered so much." —BR



At top, head shots of digital Jasper. At bottom, Jasper's guide hairs had a slight curl (at left, bottom). Titan's guide hairs were straight, as this rendering shows (at left, top). Digital hair density is checked against a photo of the real Titan (above). Big Gray (at right, above) is a Jasper clone. A side view of digital Jasper with the real wolf in the inset (at right, bottom).



ankle area, and a strap went between their toes,” says Benza. “We also had targets on their heads. They looked pretty unhappy.”

The only part of the dogs’ bodies not tracked were their tails, which were animated procedurally using parameters based on reference videos, and their ears, which were keyframed. “We captured 90 percent of the motion for the shots, but we altered the data in almost every shot,” says Benza. Two tools written for the film by James Tooley helped make the motion-capture sessions efficient and the animation task easier: one tool could mirror the mocap data to change a right turn into a left turn, for example, and the other could blend data from different takes so that a dog captured making a left turn on level ground could transition into running up stairs.

Because the German Shepherds being captured were smaller than the wolves would be, the crew built the set at 75-percent

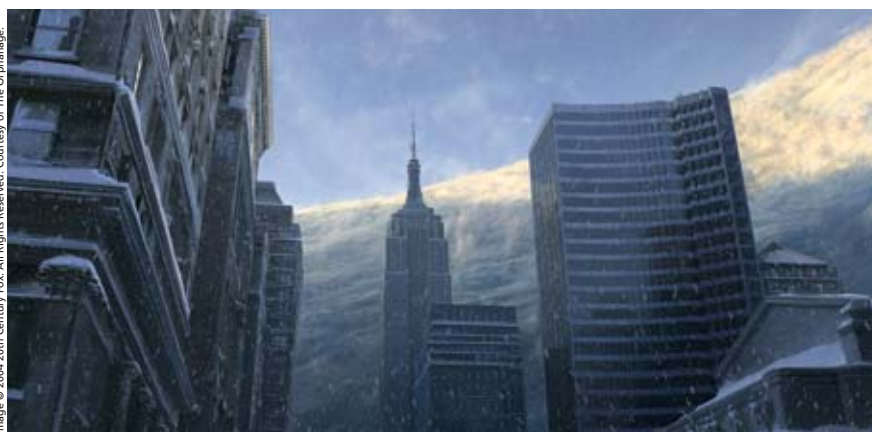


The Orphanage sent procedural texture maps down the side of a building and revealed a painted frozen building through frost for the big freeze.

particles driving the movement of the volumes. Then they warped the painting with Adobe’s After Effects. The storm was rendered in Sitex Graphics’ Air, a Renderman-based renderer. “The movement was cool and slow and had scale,” Rothbart says. “Sometimes the most artistic solution may not be the most technical.”

When the storm reaches New York, ice happens, both inside the

buildings, thanks to Hydraulx, and outside, thanks to The Orphanage and ILM. To create the frozen city, The Orphanage again used a combination of 2D and 3D techniques, this time projecting painted maps onto 3D geometry to create 3D matte paintings using Photoshop and Discreet’s 3ds max rather than rendering complex 3D geometry for the entire city of New York. “Roland [Emmerich] and I have a bad knee-jerk reaction to matte paintings,” says Goulekas, “and The Orphanage used a lot of matte paintings as projection maps. I had never seen them used that extensively. I thought it was



The Orphanage developed projection maps on 3D geometry to create a frozen Manhattan. Matte paintings, volumes, and particles were used to create the big storm.

scale to more easily place the digital wolves’ feet on the live-action plates. In one of the shots, however, the wolves were composited into a synthetic, snowy background created by The Orphanage.

Frozen Manhattan

The Orphanage, under the supervision of Remo Balcells, delivered the storm that freezes New York City. “It’s like a hurricane but larger,” says Jonathan Rothbart, Orphanage co-founder. “Because we didn’t have much time and were working with 300-frame long shots, we decided to start with a matte painting and layer volumetrics on top as wisps rather than create an entirely volumetric effect.”

Using Photoshop CS to take advantage of the 16-bit logarithmic color space, the team painted a huge storm base. On top of that, they layered voxel “marshmallows” created in Maya with

brilliant.” But rather than calling the result a matte painting, they referred to the process as “projection onto 3D surfaces.”

The 3D surfaces, simple representations of skyscrapers, were created in 3ds max. “We’d texture-map the buildings and render them from angles that could be seen based on the animatic,” Rothbart says. “The painters would paint on top of the texture maps and then we’d project those detailed paintings onto the 3D geometry seen in

each frame.” Because the parts of the buildings that could be seen were always highly detailed, the process made it look as if the camera were moving through a fully rendered 3D environment. “Creating the city took tons of projections and a lot of shot planning,” says Rothbart. The studio uses an in-house system called Donkey Base to manage the digital assets; editing is accomplished with Final Cut Pro. Throughout the sequence, blowing

Moving Data

The Orphanage used a total of 6TB of on-line disk space. The studio’s workstations are connected via Gigabit Ethernet to a cluster of SGI and Linux servers that deliver data from multiple SGI RAID-5 disk arrays connected via Fibre Channel. The studio also uses Nexsan ATAboy disk arrays for HD-resolution, real-time throughput in editing applications.

Hydraulx used 4TB of direct-attached Fibre Channel RAID storage for its 3D files, and its 3D workstations were connected via Gigabit Ethernet to Linux file servers. The studio’s storage vendors included Discrete and Xyratex.

snow created in Maya was added in layers and composited in After Effects. For rendering, the studio used Splutterfish's Brazil.

In one shot, a 3D building becomes frozen from the top down. "We used a procedural texture map to have the freeze travel down the building, and then painted a frozen building that is revealed through procedural frost," explains Rothbart.

The same semi-transparent look and procedural ice was also applied to a digital double of a helicopter pilot in a downed chopper that had flown into the cloud and crashed. The helicopter and the cloud were CG. Particles created in Maya and volumes created in Sitni Sati's AfterBurn, a 3ds max plug-in available through Afterworks, were used. The Orphanage create the cloud volumes. Particles were rendered with in-house software, the helicopter with Brazil.

To work in extended-range linear color space, The Orphanage's Stu Maschwitz wrote a software tool called eLin that works with After Effects 6.5. Available from Red Giant Software, the tool helped, especially, with the helicopter's rotor blades, which are difficult to render with correct motion blur. "Extended linear color pulls color saturation into the blade to get the true motion blur," says Rothbart. For compositing, the studio primarily uses After Effects

but also Apple's Shake and Eyeon Software's Digital Fusion.

ILM adopted a similar strategy for creating the complex details of a totally frozen city. "To have created the city entirely in 3D would have required a horrendous amount of data. It was more



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Some snow is baking soda, some is CG. The buildings in the foreground are 3D, and those farther back are 3D matte paintings created and composited at ILM.

economical to paint," says Lakner. Thus, when they could, the crew relied on ILM's Zenviro software, with which painters working in Photoshop paint textures on simple geometry seen from one camera angle; the textures are automatically applied to 3D surfaces. "We had to create 20 miles of New Jersey that vanishes to a single point, so we needed information all the way to the horizon," Lakner says. "We had a 3D team start from the camera, and a Zenviro team start from the horizon. Zenviro was faster."

"When we heard Roland [Emmerich] didn't want us to use matte paintings, we were in shock for a while," says Lakner. "But we had a meeting and decided rather than talking about 'matte paintings,' we would talk about 'procedurally generated textures.'"

The snow on the ground was sometimes baking soda on a miniature, sometimes a particle simulation. Helicopters were CG as was the Statue of Liberty, and the tanker enmeshed in ice was a miniature. "We took still photos of the miniature and applied those to the CG geometry, and added 3D snow," says Lakner. Although most of ILM's shots were composited in the studio's proprietary Comptime software, the sky for this shot was fabricated from photos and composited in Shake. For digital asset management, the studio uses an in-house system, and for editing, an Avid system.

"I've done a 180-degree turn on so many of my beliefs," says Goulekas. "It's a changing climate."

As David King said in that BBC news story, "The film brings events together into a highly unlikely or even impossible scenario. It's very difficult to explain the physics of it. But...[it] gets the basic message across." ■■

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By Karen Moltenbrey

With so many console and PC game titles available, why would a person spend time playing advergames—on-line mini-games created by vendors to promote their product lines? The answer, simply, is that they provide an entertaining way to learn about a particular company or product. And, more important, they are free. Now, because of enhanced streaming technology, users have another reason to play them—they offer high-quality content and gameplay.

The *Island Rally Racing Series* from the Chrysler Group, one of the latest advergaming titles to employ next-generation compression and streaming technologies, delivers a console-quality racing title over the Internet in real time. Created by on-line game publisher WildTangent, *Island Rally* is the first Web game to utilize WildTangent's recently released Web Driver 4.0 platform, which includes a robust game engine originally developed in partnership with Microsoft for its popular Xbox *Music Mixer* title,

along with WildTangent's re-tuned compression and streaming technologies.

The custom-published game series, created to help promote the launch of the car manufacturer's new lineup of vehicles, features separate titles for the Chrysler, Jeep, and Dodge brands. Because the main focus is to advertise the vehicles, it was imperative that the games portray the true design characteristics of each car and truck, in appearance as well as performance.

To accomplish this feat, the WildTangent artists began with the actual CAD data that Chrysler's engineers created when designing the vehicles. Each of these Dassault Systemes Catia files comprised millions of polygons, which had to be converted into lighter Discreet 3ds max versions for use within the game engine. After the conversion, the data still proved too large, forcing the artists to further reduce the information. In some instances, though, they simply used the CAD information as a reference for re-creating the game models, each of which is approximately 1MB in size.

Using Adobe's Photoshop, the group applied photographic textures to the car

models, then added reflection mapping and various particle effects, "all the things you would expect to see in a high-quality console/PC game," says producer Jay Minn. After the team completed the models, Chrysler checked them to ensure that the colors and various details, such as the headlights and taillights, were accurate.

Additionally, Chrysler provided gear ratio and torque information, as well as a plethora of technical and engineering details, that were then programmed into each model's physics. "As a result, every vehicle in the game handles and performs as it should," says Minn. "You can tell the difference between a vehicle with rear-wheel drive, front-wheel drive, and four-wheel drive." In all, the group created 11 vehicles for the series.

On the Road

The cars and trucks were then put on the virtual road in an island setting. Each game title (*Jeep 4x4 Adventure*, *Chrysler West Coast Rally*, and *Dodge Racing-HEMI Edition*) can be played using a keyboard, game pad, or gaming wheel on one of three unique tracks: coastline, metro, and outback/off-road. To better educate consumers about the various vehicles, each model performs optimally on the track

that is better suited to its particular characteristics. For example, the Jeep Wrangler 4x4 handles best on the rugged outback course.

To play, users must follow a link on Chrysler's Web site or log on to one of the game sites:

<http://chrysler.games.yahoo.com>,
<http://jeep.games.yahoo.com>, or on

Adver-Driving

Chrysler and WildTangent set the pace with a new series of console-quality advergames

WildTangent used its Web Driver 4.0 platform, which includes a sophisticated game engine and integrated compression and streaming technologies, to create a set of high-end advergames for the Chrysler Group.



to <http://dodge.games.yahoo.com>. Next, the user chooses a vehicle as it spins around for 360-degree viewing, and then selects a color option, a driver (a unique man or woman is available for each brand), and a track. If, for example, the player chooses a four-wheel-drive vehicle, then a previously closed section of the off-road mountain course will automatically become available.

After users choose a vehicle and a track, WildTangent's proprietary Web Driver compresses and streams the information to the user for fast, efficient delivery. Then, while the players are scrolling through that information, the remaining car and track data is streamed to them. The entire game, compressed at a 10:1 ratio, is approximately 12MB in size, and can be played on a 56K dial-up connection. However, users must have a PC with at least 120MB of RAM, 16MB of video RAM, a 3D graphics card, Windows 98 or 2000, and Microsoft DirectX 8 or higher.

After all the selections and the downloads are complete, the driver hits the road, earning credits while navigating the course and racing against other on-line players. The points then are spent at a virtual car shop, where players can upgrade the vehicles. This capability excited the brand managers, Minn notes, because it highlighted specific vehicle features, like the HEMI engine for the trucks that enable players to drive faster and, in turn, earn more credits.

Points also can be used to add Mopar accessories, such as chrome tubular bumpers and a chrome grille. Mopar, a major parts supplier for Chrysler vehicles, provided the artists with catalogs and pictures of the var-

ious items to ensure that the models and the effect each would have on a vehicle were presented accurately.

Although the vehicles are the focus of the game, just as impressive are the lush, realistic courses, complete with reflections on wet city streets and sun glare on the

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open road. So, when a person drives under a tree, the branches are reflected in the car's windows. In addition, the artists generated dirt particles that spray from the tires during a speedy getaway.

"The amount and quality of the terrain is unexpected for an advergaming, with all the graphic touches and polish," comments Minn. "In the city level, for example, we added animated billboards and neon signs." These high-end effects, he notes, are generated through the hardware-acceleration capabilities and features available in DirectX 8.

Moreover, players can select from either a first- or third-person view, and race accordingly. A hotkey allows players to take quick backward glances at the vehicles behind them. Additionally, there is a rearview mirror feature with a limited viewpoint—a unique option but one that requires the game to be rendered twice.

Driving the Point Home

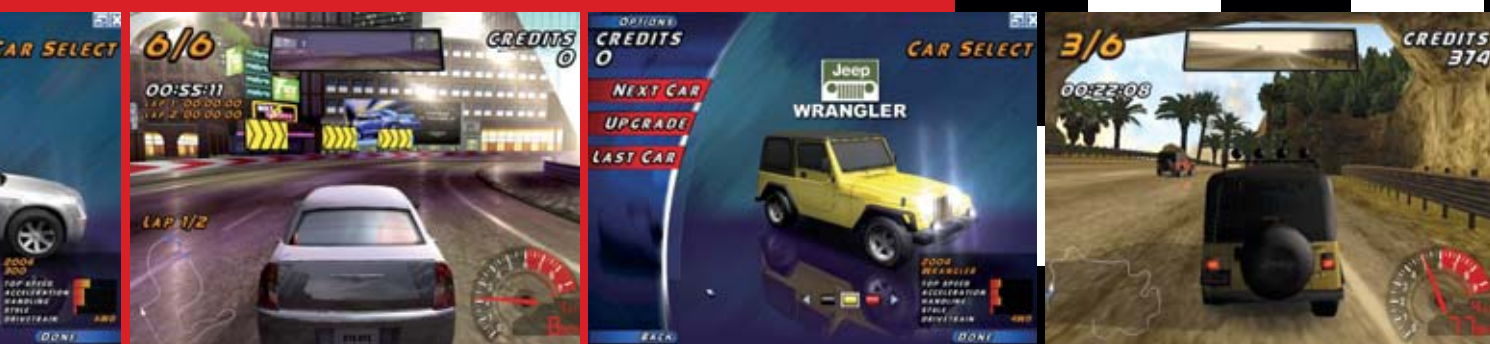
"The goal of the game is to build up all the cars to their maximum upgrade," explains Minn. "You have 11 vehicles, each with 12

upgrades, operating across three tracks—that's a lot of content." And it's a good deal of gameplay—more than 15 hours total. Users can play the first game without registering, but after that, they must answer a few questions, provide their zip code, and register with the Chrysler Group. Then they can continue playing, still without charge. In return, the car manufacturer collects valuable customer information, including a tally on the favorite makes, models, colors, and more. "Gaming provides a fresh alternative to the usual marketing approach," says Jeff Bell, vice president of the Chrysler Group. "It immerses the user in the brand while delivering key marketing messages. It's also a realistic way to let consumers experience the performance capabilities of our vehicles. We're not just doing games to do games."

So, does advergaming work? Bell believes so, attributing the sale of more than 1000 Jeep Wrangler Rubicons to the 2001 on-line advergaming *EVO*, created for the Jeep brand. As of last summer, Chrysler's previous advergaming have logged more than a million users—and that was before *Island Rally*, the latest and most sophisticated title yet, which Bell expects will boost those figures far higher.

Minn concurs. "The *Island Rally Racing Series* is competitive with the best racing games out there because it plays well and looks fantastic. I believe it's the greatest free game of all time, and players are proving this to be true." ■

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



Artists kick things up a notch in a

TV commercial featuring two intricately
animated mechanical crabs

fancy footwork

By Karen Moltenbrey

Two mechanical crustaceans—as well as the digital artists who created them—recently proved their mettle on an unusual field of play.

In a 30-second nationwide TV commercial, two robotic street crabs—both sporting Nike's new hard-surface soccer boot—demonstrated some fancy footwork while engaging in a rough-and-tumble game of football, as soccer is often called. While this match was entirely virtual, the challenge that it presented to the artists at The Embassy Visual Effects boutique in Vancouver, Canada, was entirely real.

Delivered in less than a month, the commercial features a blend of live

action and computer-generated imagery, including detailed character animation, dynamics, and photorealistic rendering. The spot, directed by The Embassy's Neill Blomkamp, was originally intended to feature a beach setting. However, after conferring with Nike's international ad agency, the group opted for a South American urban set instead, despite the

Digital artists put their best feet forward when animating these soccer-playing robot crabs for a recent Nike shoes commercial.



fact that the live-action back plate was filmed in Alameda, California.

The spot opens with a shot of an abandoned warehouse lot littered with debris. On the dusty, barren ground, a manhole cover slides open, and out crawls a giant robotic crab, with each of its six legs clad in the new soccer boot. Soon another crab arrives, this one dribbling a large soccer ball. The two face off, aggressively kicking the ball back and forth, using an old bookcase as a makeshift goal. After one of them scores, the camera pulls back, and the term “NIKELAB.COM” appears.

Guerrilla Style

Surprisingly, very little work had to be done to prepare the live-action set. According to The Embassy president Winston Helgason, the desolate location was suggested by someone at the studio who had discovered it while working on a film project nearby. After rearranging a small amount of debris, Blomkamp spent two days shooting the background plates “guerrilla style” using a Canon GL2 DV for a handheld camera look.

“I wanted you to feel like you were right there watching these things play soccer, and have it be totally convincing,” explains Blomkamp. “And nothing does that better than filming it like a tourist holding a consumer-level DV camera.”

Before filming the backgrounds, Blomkamp created a basic design for the crabs. After receiving approval, he and modeler/ animator Dan Dixon constructed the highly detailed creatures using NewTek’s LightWave. For the animation, they created a rough animation block that reflected the desired motion—delicate crab-like movements coupled with precise, robotic action—and set up the animation rig to reflect their vision.

Next, the team created the bone structure and the weight maps in LightWave, and then animated the models with a simple IK rig before adding the geometry back in.

All told, the crabs contain some 250,000 polygons apiece, so that in the close-ups, the models stand up—especially in shots showcasing the legs as they swivel, shuffle, and kick with robotic precision.

Textured with Adobe’s Photoshop, the models were later rendered using the native LightWave renderer running on generic PCs with dual Intel Xeon processors, the same hardware used for the content creation. The workstations were also equipped with Nvidia’s Quadro4 750 XGL graphics cards.

In addition to the crabs, a number of other CG objects appeared in the scene, including the shoes,

the soccer ball, a dumpster, light boxes, the manhole cover, and the empty bookcase. To ensure that the shoes—the main focus of the spot—were modeled accurately, Nike sent the artists a prototype, which they used as a reference while crafting the

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virtual pairs by hand in LightWave. Near the end of the commercial, for the shot in which a crab kicks the ball into the bookcase and knocks it over, the artists used Impact, a simulation tool from Dynamic Realities, for accurate physics calculations.

Next, the group seamlessly incorporated the multiple CG elements into each of the 15 effects shots in the commercial using 2d3’s Boujou automated tracking software. Altogether, the artists tracked more than 100 frames for the project. The group later composited the imagery using Apple’s Shake. Editing was accomplished in Apple’s Final Cut Pro, where the footage was treated with filters to give it a washed-out, yellowish tint to create the feel of a sunny South American city.

Despite the unrealistic nature of the spot, the mechanical crabs blended perfectly into the live-action environments thanks to detailed modeling and animation, giving the commercial an extra kick. ::

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





Clockwise from top left:

Kitten "The concept of a child with a cat says a lot about innocence and ferocity."

First of Days "Some of us are never really born and remain forever in a self-imposed womb."

Companion "Real skin is multicolored, translucent, and full of pores, freckles, and veins, all of which must be re-created in CG for it to look real."

Bubbles "A child blowing bubbles is a symbol of the fragility of life."

Bride (with inset study) "I collect textures, like these, the way some people collect little silver spoons."

Every picture tells a story, but in the case of artist Ray Caesar, his digital imagery speaks volumes. His work has been described as immaculate fragments that when layered together are more like puzzle pieces than individual pictures. While the pieces appear related, they never completely fit with any of the others. As a result, his visual narrative changes depending on the order in which the pieces are viewed. The main cast members in Caesar's story are mysterious doll-like children from the turn of the century that are vibrantly colored and, despite their depiction in a portrait style, appear to be brimming with life.

"I don't really think I chose the style; it's just been part of my work since childhood, whether I'm working in 3D, paint, or pencil, and the imagery keeps evolving," Caesar says. "I'm not sure I can work any other way." Having a major impact on his style was the joy and sadness he wit-



nessed while working in the art and photography department of a children's hospital. Also influencing his work were the deaths of his mother and sister, which triggered "a series of strange dreams that encouraged me to pursue my dream of producing fine art."

To create the pieces, Caesar models the children with NURBS in Alias's Maya, adding a bone structure that allows him to pose and position the figures within a 3D environment, while an intricate facial rigging system enables him to achieve a wide range of expressions. The texture sources vary: Some are hand-painted in Photoshop; others are acquired from photographic sources that he collects. After rendering each object separately, he composites some 60 to 70 layers for each image.

A sampling of Caesar's work is featured on these pages. Additional information about the artist can be found at www.raycaesar.com. —Karen Moltenbrey

From top to bottom:

Merchant of Dreams (with inset study) "I often dream of this lighthouse on Presquile Point, which was within walking distance from where I grew up. I have a great admiration for those who build and maintain these structures. If unconditional love looked like anything, it would be a lighthouse."

The Healing Light "I see my pictures as reflections of the human soul. For 17 years I worked in a hospital where so many children couldn't live their dreams, so I decided to live my dreams for them through my artwork. Isn't it too bad that there aren't any superheroes with the power to just heal the Earth?"

Graphics Cards

By

Welcome to the premiere of Snapshot, a new section devised to supply you with up-to-date, industry-specific information about products integral, and critical, to the way you work. This first installment delivers details about the latest innovations in graphics cards from leading manufacturers.

Perhaps no other technologies advance at the same rapid rate as computer processors and the graphics accelerators that harness their power. For more on any of the companies or products presented, visit www.onlinecenter.to/cgw or the manufacturers' Web sites directly. And visit www.cgw.com to learn about our Next-Generation Graphics Technology Webcasts.

3Dlabs

3Dlabs has unleashed its Wildcat Realizm graphics technology. The new graphics architecture combines a next-generation Visual Processing Unit (VPU) and a Vertex/Scalability Unit (VSU) to enable a new family of graphics accelerators ranging from a single-VPU AGP 8x solution to a dual-VPU configuration that takes advantage of PCI Express. Keep an eye on Wildcat Realizm, which has been designed to boost graphics productivity in the DCC and visualization communities. The new technology should go a long way in accelerating today's shader programs written in such high-level shading languages as OpenGL and Microsoft DirectX 9.0.

3Dlabs; www.3dlabs.com

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Matrox Graphics

Matrox Graphics' latest release is the Parhelia PCI 256MB graphics card, offering support for video and composite I/O, as well as multi-board configurations. Priced at \$699, the graphics accelerator sports 256MB of DDR memory and a PCI-X interface designed for 33MHz and 66MHz buses. Its multi-display technologies enable the card to power 9.2-megapixel panels at 3840x2400 through the implementation of dual 400MHz RAMDACs. Equipped with dual-DVI and dual-display plus TV output functionality, this new board can drive dual 1600x1200 analog outputs and a video monitor via a single chip.

Matrox Graphics; www.matrox.com

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ATI

ATI Technologies introduced a unique pairing: the Radeon X800 Visual Processing Unit (VPU) and Ruby, a digital character developed to demonstrate the new card's functionality. Appearing in *The Doublecross* on ATI's Web site, Ruby was born with the help of RhinoFX, a design firm with vast experience in both film and television; designers at ATI, who created shaders and other elements for Ruby; and Alias's Maya.

Running in real time on the X800, the Ruby EXE file illustrates how the Radeon X800 contributes to a higher-performance, immersive gaming experience, dubbed High-Definition Gaming by ATI. The Radeon X800 XT takes advantage of 16 parallel pixel pipes and six vertex pipes to process more than 8 billion pixels and nearly 800 million vertices per second.

ATI's Radeon X800 is offered in the XT Platinum Edition with a 1.12GHz data rate GDDR3 memory, 16 pixel pipes, and a 256-bit memory interface for \$499, and the X800

Pro, having a \$399 price tag, a 12-pipe pixel processing engine, a 256-bit memory interface, and GDDR3 memory with a 900MHz data rate.

ATI

Technologies;

www.ati.com

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Nvidia

Without uttering a word, the digital spokeswoman for Nvidia's GeForce 6800 Ultra, Nalu the Mermaid, speaks volumes about revolutionary 3D graphics. Nalu, the Hawaiian word



for wave, is an impressive creature who demonstrates Nvidia's latest technology. Her skin is illuminated by light refracted through the water's surface; her body and hair cast shadows on her form as she swims; and her hair is simulated in real time and lit by a deep shadow technique. Render-to-texture capabilities ensure that her silhouette blocks lighting filtering down through the water, whereas a detailed scale shader produces bump-map and bio-luminescence. The first in the new GeForce 6 Series of Graphics Processing Units (GPUs), the 6800 Ultra is reportedly the first GPU to support Shader Model 3.0, a key feature of Microsoft's DirectX 9.0. The GeForce 6800 Ultra offers compatibility with Nvidia's ForceWare software with the Nvidia Unified Driver Architecture (UDA), a 256-bit graphics core and memory interface, a 16-pipe design, and 400MHz RAMDACs.

Nvidia; www.nvidia.com

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Industrial Models

...for Human Subjects



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Engineering
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Virtual Reality



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Houdini 6.1

The recent upgrade proves powerful

By George Maestri

Houdini is the secret weapon of many top effects and animation houses. Perhaps not as well known as other tools, Houdini is one of the most powerful effects and animation packages on the market. It enables artists and technical directors to create complex scenes easily. Houdini 6.1 builds on the strengths of the software tool with a number of nice, incremental improvements.

Houdini runs on Windows or Linux and comes in several flavors. Houdini Master, the complete suite of tools, has all the Houdini features and, at a cost of \$17,000, represents a substantial investment. A subset of Houdini Master geared for modeling, rendering, and animation, Houdini Select is modestly priced at \$1299. Side Effects Software will soon release Houdini Escape, with tools geared toward character animation, and Houdini Halo, for compositing and 2D image manipulation. Houdini Apprentice is a free version available to anyone interested.

Installation went off without a hitch. The interface is clean and uncluttered. The user can select from a number of pre-configured desktops specialized for tasks such as modeling, animating, and particles. Houdini's speed of operation was impressive, even on my two-year-old workstation; yet, a powerful system is a must.

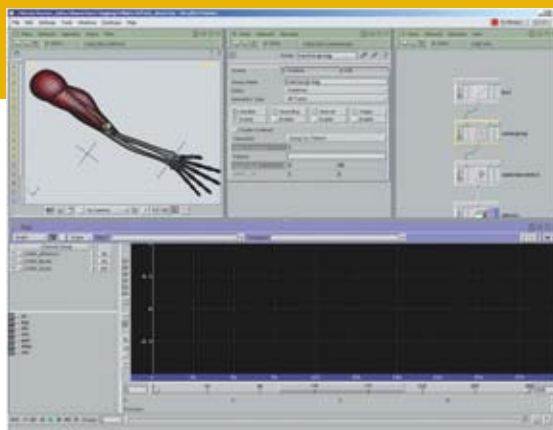
Houdini works on a much different par-

adigm than most 3D applications. It was built from the ground up as a flexible, procedurally based package. Most Houdini experts prefer to work with the tool's many procedural operators—surface operators (SOPs), particle operators (POPs), and so on—that can be connected much like a visual programming language to create custom scenes and effects. You can connect anything to anything: An animated character can trigger particle systems as it steps, which in turn cause other effects and animation. A new on-line help system and the ability to perform most operations in a standard viewport aid new users in overcoming the learning curve.

Houdini has a large array of features, from modeling to non-linear animation to compositing and special effects. It has fully featured NURBS and subdivision surface modeling, incredible particle systems, non-linear animation, high-end texturing, rendering, and compositing. It can do just about everything, eliminating the need for a lot of third-party offerings to fill in the gaps.

Houdini is most popular for its special effects and particles, but it also has one of the better character animation tool kits on the market. Rigging characters in Houdini is exceptionally easy, thanks to its procedural nature and easy rigging tools that assist you in mirroring skeletons and automatically "capturing" a mesh for easy deformation, for example. Animation is also robust, particularly with CHOPs and a robust non-linear editor.

One of the best new character rigging tools is the Inflate SOP, with which you can deform a surface by pushing it with other surfaces. A wire



Houdini's Inflate SOP can create realistic musculature by having virtual muscles deform the mesh of a character.

deform tool allows you to use a simple spline to deform a mesh, which is great for facial animation, particularly eyebrows. Animators will appreciate a new pose tool that helps create character poses quickly. Poses can then be combined to create animation using the CHOPs editor.

Another feature that is useful for character animators is asset control. Houdini allows you to create pre-defined assets, such as characters, that can be dragged into a scene complete with their own user interface. You're not limited to character animation; assets can be used to create "canned" effects, for example. Need an explosion? Just drag it into the scene and adjust the parameters as needed.

Those doing complex texture mapping will appreciate the new UV pelt feature. It lets you unwrap a model's UV texturing coordinates using cut lines determined by an edge selection. The selection is then flattened and stretched automatically to create a UV layout ready for texture application.

Houdini also has a number of innovative brush tools for painting attributes on a model, even in 3D. The new UV brush tool lets you modify UV vertices using a brush paradigm. You can drag, dilate/contract, and relax UVs in the texture viewer.

Houdini has found a home in top studios for a reason. One of the most powerful and robust solutions on the market, it can do virtually anything demanded of it. ■■

George Maestri is president of Rubberbug, a Los Angeles-based animation studio specializing in character animation.

Houdini 6.1

Price: \$17,000

Minimum System

Requirements: Windows XP or Linux OS, 256MB of RAM per processor, display with a minimum of 1024x768 resolution and 15-bit color depth, accelerated OpenGL support, texture memory, a three-button mouse, a CD-ROM drive, and a sound card with a compatible MIDI port or dedicated MIDI hardware interface (required for CHOPs MIDI input and output capabilities).

Side Effects Software

www.sidefx.com

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Discreet Combustion 3

Version 3 is worthy of attention

By Michael Hurwicz

Discreet's Combustion is a robust, efficient 2D and 3D compositing tool with a host of capabilities that set it apart from the crowd. Among them are intensely cool 2D particle effects, industry-leading color correction and keying, real-time playback, integration with 3ds max, and nondestructive vector paint tools that preserve your ability to tweak and transform each shape and brush stroke. The most recent version, Combustion 3, adds animation using JavaScript functions, output to the Flash file format (SWF), morphing and warping, basic non-linear editing, timeline markers, and a stained glass effect for 3D composites that allows you to use one object like a gel to project light patterns on another object.

Animation using JavaScript functions (called Expressions in Combustion) is a feature with huge potential. Complex geometric animation paths often can be implemented in a few lines of relatively straightforward JavaScript, for example. Version 3 also provides a visual interface to a set of pre-built functions.

The largest block of code is a single JavaScript function, which controls a single channel. A channel, in turn, controls a property—position, rotation, scale, speed, or transparency—in a layer or operator. It is also possible to use one channel to control another channel. Scripted animation can be converted to keyframes (but not vice versa). Expressions can be exported and imported,

making it easy to share them. The scripting capability is powerful and welcome, yet limited in comparison with other environments, including Discreet 3ds max, where MAXScript enables you to script almost every aspect of the program's use, in addition to creating new tools and modifying the user interface. Discreet has only scratched the surface of what scripting can do in Combustion.

Artists creating Macromedia Flash content benefit from SWF output, saving time by eliminating the need to render to an intermediate format. It maintains paint objects as vector graphics in SWF, so they remain crisp and sharp at any resolution. Artists importing Combustion SWFs into other environments, such as the Flash MX authoring tool or ToonBoom Studio, can continue to transform and animate each vector graphic as a separate object.

Bitmaps do not export to SWF by default. This means that anything you do with the paint bucket, eraser, magic wand, or text-selection tool will not normally show up in the SWF. The same is true if you apply an operator, such as a distortion, to a paint object. Thanks to the creativeweb.net Combustion forum, I discovered that I can output bitmaps to SWF using Combustion's Reveal mode. The new SWF output feature is solid and

robust: I have not seen a glitch or an artifact in a SWF created by Combustion.

The new morphing and warping feature adds significant value to Combustion. Functionally, it is not to be underestimated. You never know when a client will want you to morph a beer can into a silver bullet. In



Even before its upgrade to Version 3, Combustion 2 was a world-class 2D and 3D compositing program.

addition, morphing and warping can be used for more mundane tasks. For instance, they can accurately and relatively quickly “paint out” an unwanted object that temporarily comes into frame: Just create a morph of a background object, starting on a frame before the unwanted object appears and ending on a frame after it disappears. RE:Flex Motion Morph creates in-between frames without the object. Nothing about morphing and warping appears in the printed manual or the Help files. I had to go to the Discreet Web site to get enough information to start making intelligent mistakes.

The new Edit operator, along with new features like Slip Layer and Split Layer, can save time by eliminating the need to export to an NLE. It's not going to replace NLEs like Adobe's Premiere or Sony's Vegas, but it's great for simple transitions, cuts, and trims.

Combustion is not easy to learn. Yet, once you get the hang of it, the software solution enables you to produce superlative results with relative ease. Version 2 of Combustion was a world-class compositing tool at a reasonable price. New features offer enough sizzle to make Version 3 a no-brainer upgrade for most users of Version 2. For those who have never used Combustion, it's definitely worth a look. ■■

Michael Hurwicz (michael@hurwicz.com, www.hurwicz.com) is a freelance writer specializing in 2D and 3D.

Combustion 3

Price: \$995

Minimum System Requirements:

Apple Power Mac G4, 800MHz or higher, running Mac OS X 10.2. or later, or an Intel Pentium III, Pentium 4, or AMD Athlon XP CPU, 850MHz or higher, running Windows XP or Windows 2000; a 20Gb hard drive with 120MB of free space, 512MB of RAM; and a video display card with 4MB of VRAM.

Discreet
www.discreet.com
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Appro Scorpion WH300

A new graphics model performs well

By George Maestri

Appro is a respected name in the server market. The company sells high-end servers for a variety of applications. In addition, it uses its expertise in high-end computing to produce graphics workstations. The Scorpion WH300 workstation is a dual-Opteron machine with plenty of raw horsepower.

The Appro Scorpion is fairly compact and housed in a non-descript black case. On the front of the workstation reside the requisite power switches, two USB ports, a floppy, and two exposed 5-inch bays, one of which is taken up by a DVD drive. Opening a door along the front reveals a bay containing a large fan, which can be removed, and the bay filled with a five-drive, hot-swap SCSI or SATA RAID array. The back of the machine has keyboard and mouse connectors, as well as three USB, FireWire, Serial, Parallel, Gigabit Ethernet, and audio ports. I noticed that the power supply didn't have a separate on/off switch, forcing the user to unplug the system should it ever hang.

The Scorpion opens upon removing two screws and sliding off the side panel. The inside of the Appro workstation is very tidy: all the cables are tied down and routed efficiently. The motherboard is a Tyan with one 8x AGP slot and five PCI slots, all but one of which are 64-bit. The motherboard supports both Serial ATA and ATA 133 drives. Inside, there is room for up to six hard drives or the five-drive hot-swap array. The case has two large and powerful fans, and plenty of ventilation.

The workstation booted up just fine, and I must say that it is one of the quieter machines I've reviewed. The reason is

probably the oversized case fans, which move plenty of air without the high-pitched whine of the smaller fans that many vendors use. The workstation was a bit misconfigured upon arrival, being loaded with Microsoft Windows Server 2003, rather than XP Professional, which is the preferred OS for high-end graphics. The two OSs are based on the same core, however, and I had no problems running graphics applications on Server 2003, though it may have impacted the benchmarks slightly.

The Appro Scorpion is the first machine I've reviewed to sport Opteron processors. AMD's first 64-bit processor, the Opteron offers a 32-bit instruction set for backward compatibility with 32-bit applications. The 2GHz Opterons installed in this workstation run at a slower clock speed than other chips, but because the data path is doubled, performance is on par with the fastest Intel Xeon chips. Applications ported to 64-bit code should receive another performance boost. As for benchmarks, I used Sandra 2004. CPU Integer speed came in at 18956 Mips, which is excellent. Floating point was at 6159 Whetstones, which is a bit slower than a comparable Xeon.

Accessing memory is quite fast, due to the 64-bit data path. Benchmarks came in with a speed of 4165MB/second, equating to nearly twice that of most top-end Xeon chipsets. Higher memory bandwidth is particularly important when handling large data sets, such as big 3D models or textures. Another advantage of the 64-bit data path is the ability to install more memory. The Appro can accommodate up to 16GB of system RAM, four times that of most 32-bit machines.

The workstation I used came equipped with an Nvidia Quadro 980XGL. Considering that it is the



Appro has packed a powerful machine, complete with dual Opteron processors, into a compact system.

company's previous generation card, it is fast, but by no means the fastest. Running Viewperf 7.1 produced a Pro/E score of 12.66, a UGS score of 19.18, and a 3ds max score of 11.25. These results are a bit slow, but Appro can configure the workstation with current generation cards, such as the Quadro FX series or the ATI FireGL cards. Although it is a fast machine, I recommend installing the better graphics cards, which should more than double the graphics performance of the one I tested.

Application performance was excellent. I tested the machine against 3ds max and some 2D apps, such as Adobe's Photoshop and After Effects. The response time was very good. Given that it was my first time testing a machine with Opteron processors, I was a little worried about application compatibility. Those fears were completely unfounded: All the applications I tried worked flawlessly. I can't wait until all the major applications go 64-bit; this machine will do very well.

Overall, the Appro Scorpion is a very nice workstation. The box is simple, but well designed. The dual Opteron processors provide very good speed and excellent memory bandwidth; and, as applications migrate to 64-bit, the workstation will perform even better. Graphics on this particular system were not stellar due to the older Nvidia card, but configuring the machine with a high-end card should make it an excellent all-around performer. ■■

George Maestri is president of Rubberbug, a Los Angeles-based animation studio specializing in character animation.

Scorpion WH300

Price: \$4235 as configured

Minimum System Requirements:
Not applicable.

Appro
www.appro.com
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products

For a direct link to more product information and vendor Web sites, click on:

www.onlinecenter.to/cgw

SOFTWARE

PLUG-INS

In the MaPiZone

Win Allegorithmic has upgraded its maps modeling plug-in, MaPiZone, for Adobe's Photoshop, Adobe's Illustrator, and Jasc Software's Paint Shop Pro to Version 1.5. The upgrade sports more than 300 new preset effects, including fully editable, non-photorealistic rendering styles, filters, texture effects, color patterns, and grayscale maps. The latest version also features improved speed, anti-aliasing, and support for 16-bit images. MaPiZone 1.5 is available at a cost of \$99. Users of MaPiZone 1.0 or 1.1 can download a free upgrade from the company's Web site.

Allegorithmic; www.allegorithmic.com

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events

JULY

12-15

Macworld Conference & Expo 2004, held in Boston. Visit www.macworldexpo.com.

AUGUST

2-5

LinuxWorld Conference & Expo, held in San Francisco. Contact 800-657-1474, www.linuxworldexpo.com.

8-12

SIGGRAPH 2004, held in Los Angeles. Visit www.siggraph.org.

15-27

2004 Oregon3D Film Camp, held in Portland, Oregon. Contact Oregon3D at 866-626-9100, www.oregon3d.com/filmcamp.html.

Automatic RE:Flex

Irix RE:Vision Effects has debuted RE:Flex, a new morphing and warping plug-in set for users of Discreet's Flint, Flame, Fire, Inferno, and Smoke. RE:Flex includes two plug-ins—RE:Flex Warp and RE:Flex Morph—that support 8 and 12 bits per channel and batch processing. RE:Flex directs warping through drawing tools with splines and polylines, rather than through a grid of mesh points. And RE:Flex is reportedly the first morphing program to combine hand feature-matching



with automatic image registration. After users position the hand-matched shapes, RE:Flex automatically aligns the remaining sections of the image. RE:Flex is offered for Irix systems at a cost of \$995.

RE:Vision Effects; www.revisionfx.com

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HARDWARE

GESTURE RECOGNITION

Graphical Gestures

Win • Mac • Linux FingerWorks has unveiled its Zeroforce iGesture Pad series of gesture-based user interfaces for Windows, Macintosh, and Linux platforms. The company's ultra-thin, hand-size touchpads serve not only as a mouse, by supporting such functions as point, click, drag, scroll, and zoom, but also as a multi-finger gesture input device. Priced at \$159, these single-hand MultiTouch interfaces offer password-gen-



eration and gesture-customization utilities, enabling users to map any gesture to any function—including cut, copy, paste, undo, save, and exit—in a favorite software application.

FingerWorks; www.fingerworks.com

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VIDEO

Going Solo

Adtec Digital's Soloist 3 digital media server combines the functions of a digital video recorder, player, switcher, and server in a single solution. Soloist 3 boasts advanced video scaling, broadcast time delay, and multi-layer features with multiple-region text and graphic overlays. Equipped with a two-slot design,



Soloist 3 enables MPEG 1 and 2 encoding from analog and Serial Digital sources, and transcoding of DV formats from NLEs with FireWire.

Adtec Digital; www.adtecinc.com

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3D SCANNER

Surface Scanning

Roland DGA has introduced the LPX-1200 desktop 3D laser scanner bundled with Pixform Pro reverse modeling software. Well suited to animation applications, the LPX-1200 boasts rotary and planar scanning modes, 5x8-inch scanning volume, an accu-

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rate non-contact laser sensor, and support for polygon-to-NURBS conversion. Streamlining the data editing process, Pixform Pro aids users in merging scans, changing the shape around curved surfaces, sharpening edges, extending shapes, adding thickness, and performing Boolean operations. Roland's LPX-1200 with Pixform Pro is priced at \$21,995.

Roland DGA; www.rolanddga.com

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BOOK CORNER

REAL-WORLD READING

Charles River Media has released a new text, *3ds max 6 Essentials: A Real-World Approach*, on Discreet's popular 3D software tool. Written by David Kalwick, a Discreet Certified Instructor, the new book guides readers through complete 3D projects, teaching them how to use the software's essential tools and features. *3ds max Essentials* includes a detailed overview of the user interface, the program's fundamentals, useful tips, and practice tutorials. *3ds max Essentials: A Real-World Approach* is available in the US at a cost of \$49.95.

Charles River Media; www.charlesriver.com

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PROBLEM-SOLVING WITH PHYSICS

Game Physics, by David H. Eberly, is the latest volume in the Morgan Kaufmann and Interactive 3D Technology Series of reference texts. *Game Physics* provides an introduction to ideas and techniques behind the development of physically realistic 3D graphic environments. The author presents key problems, solving them with mathematical and physical concepts. Algorithmic foundations, code examples, and working source code combine in a large collection of physical simulations.

Elsevier Science; www.elsevier.com

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A GEM FOR GRAPHICS PROFESSIONALS

Addison Wesley Professional announced the availability of *GPU Gems: Programming Techniques, Tips and Tricks for Real-Time Graphics*, which carries a retail price of \$59.99. The full-color, 816-page text is a collection of articles on practical real-time graphics techniques based on the research and practice of developers from Alias, Brown University, Industrial Light & Magic, Nvidia, Softimage, and other notable universities and corporations. Among the topics covered in the book are natural effects, materials, and lighting and shadows. *GPU Gems* is accompanied by a CD-ROM offering examples and sample programs.

Addison Wesley Professional; www.awprofessional.com

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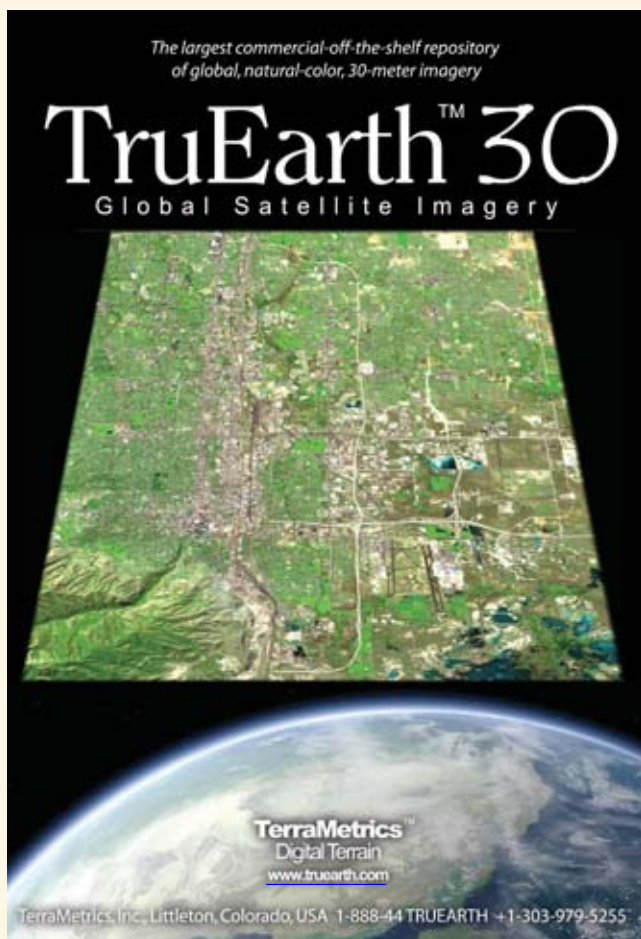


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June 2004, Volume 27, Number 6: *COMPUTER GRAPHICS WORLD* (USPS 665-250) (ISSN-0271-4159) is published monthly (12 issues) by PennWell Corporation. Editorial & Production offices at 98 Spit Brook Rd., Nashua, NH 03062-5737. Corporate officers are Frank T. Lauinger, Chairman; Robert F. Biolchini, President & CEO; Adam Japko, President & COO, Advanced Technology Division; and Mark C. Wilmoth, CFO. Corporate offices: 1421 South Sheridan Road, Tulsa, OK 74112, Tel: 918-831-9497; Web Address: <http://www.pennwell.com>. Periodicals postage paid at Tulsa, OK 74112 & additional other mailing offices. *COMPUTER GRAPHICS WORLD* is distributed worldwide. Annual subscription prices are \$55, USA; \$75, Canada & Mexico; \$115 International airfreight. To order subscriptions, call 847-559-7500.

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Scott Bandy is senior producer of James Bond 007: Everything or Nothing, a new game from Electronic Arts. For more information about the making of the title, see "A Bonding Experience," pg. 16.

Interactive Cinema

Games that let users play their favorite film stars represent a new art form and a new challenge for developers

Q *Why was it so important to re-create real movie actors for the new James Bond game?*

A James Bond is the most successful, enduring film character in history. When creating a visual experience that takes place in the Bond universe, the characters that the audience has grown to know and love over the last 40 years need to be present in order for the experience to be credible. Moreover, when we reached the decision to move into a third-person perspective, the quality bar for the visual representation of these characters, whose features are so well known and identifiable, is raised to the highest level possible. If we were to deliver characters that failed to meet players' expectations, their presence in the game actually might have detracted from the experience.

Q *What are the trade-offs of playing a game in the third person (as Bond, in this case) versus the first person?*

A The main advantages of playing a game in first person, beyond some small gain in bandwidth due to polygon and texture savings, are the immersion of the player into the avatar they are controlling and a simpler camera-management scenario. Conversely, a third-person perspective allows the gameplay to evolve into a more complicated set of mechanics, such as greater strategic and tactical movement in a space, obstacle nav-

igation, and the ability to accommodate a more robust hand-to-hand experience.

Q *Why did you re-create the Bond movie format rather than build a new game environment?*

A Reinforcing the James Bond movie experience makes sense when you consider that this is how the audience got to know him. If we were introducing a unique character, or one unique to the interactive space, an alternative approach may have made more sense. But when that iris appears and the James Bond theme hits, there's no question in any player's mind what lies ahead.

Q *How did you go beyond the cinematic form?*

A With an interactive space, we are not limited by real-world physics, so we can construct locations and characters to virtually any vision our artists and designers can dream up. Also, if we decide that an over-the-shoulder shot, for example, is the most appropriate camera angle to support the experience, we don't have to solve how we are going to physically assign a camera to that shot while James hurtles down the face of a cliff.

Q *How did you construct a plot that remains true to the Bond story and style, yet give free will to the player?*

A This is indeed the challenge of an interactive experience. Maintaining the balance between the gameplay and the need to advance the fiction was a focal point for the team throughout the process. There are gameplay sequences that went through 100 iterations, many times due to a story line need. Alternately, we went through many script iterations as well, as we sought that balance. Details both large and small, from the costume James was wearing to the specific weapon being grasped, needed to be tracked and verified to eliminate any issues with continuity.

Q *Does so-called interactive cinema—in which the player becomes part of the movie and all the characters and sets are interactive and dynamic—represent a new art form?*

A Yes, and it will continue to evolve. As the technology driving gaming platforms continues to advance, developers will have fewer limitations to fully express their visions. If you look at the ways technological advancements have changed the content and vision of films, we believe there is a clear correlation that can be expected to occur in the interactive space as well. Given that film is an established, well-understood, and integrated part of the entertainment landscape, it is logical that elements of that art form will continue to manifest themselves in interactive titles. ■■

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