

Sixth Annual CJ Field Announced

Product of the Year Award Nominees

Every year has its year-end routines. Close the books, buy gifts, resolve to do better next year. Around the CEJ offices, our favorite is "get ready for the Virtual Reality Product of the Year voting".

The *CyberEdge Journal* Virtual Reality Product of the Year Awards are the only awards in the VR industry. They are the vehicle for recognizing the very best people, products, applications, and companies in the virtual reality business. Each marble obelisk carries with it the respect and admiration of an industry. Since the first awards ceremony, at London's Virtual Studios in 1992, we have presented just 37 awards. Each one was earned with hard work and effort. This year's winners will be equally deserving.

Presenting the CJs is the high point of the year for me. Each year we have a festive party or banquet to provide the proper setting. Last year was especially rewarding, because I presented the first VR Pioneer award to Doctor Ivan Sutherland, for his life-long contributions to VR science and technology.

This year we will present the second VR Pioneer award, now called the *Sutherland Award* in honor of its first recipient. It will highlight an evening when we will once again recognize the very best people, products and companies in our industry; the winners of the Product of the Year awards for 1996. The presentation will be during the Conference Banquet at the Virtual Reality WorldWide Conference.

We have a large, varied, and deserving field this year. I am especially excited to see 23 applications nominated. This is by far the most applications we have ever had, and almost twice as many as last year. This shows the maturation and health of the VR industry. Many people are solving real problems with VR, and making or saving a lot of money in the process. This is good news for all of us.

Vox Populi

We are adding a new feature to our voting this year. Last year we opened the VR Pioneer vote to the

Continued page 3.

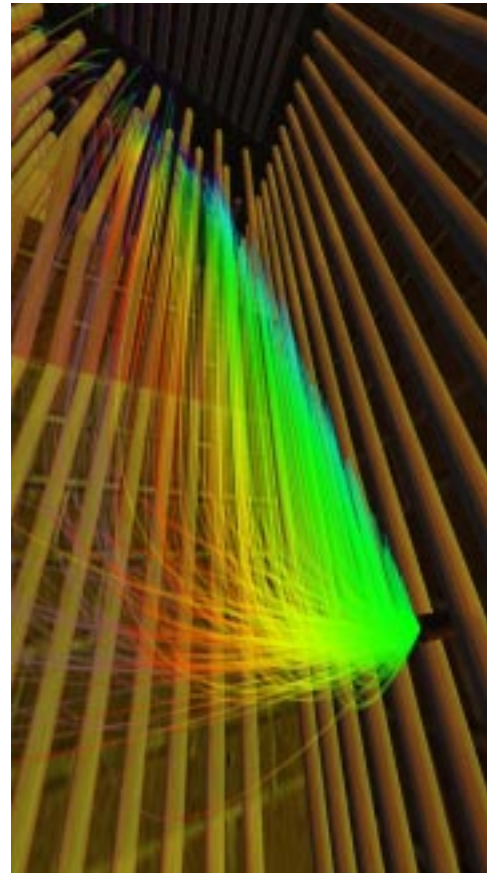
A 100:1 Solution: Nalco Fuel Tech

Cleaning Up Boiler Emissions

by Ben Delaney

Throughout the world, dirty air is a problem of growing concern. A company in the heartland of the United States is using supercomputers, VR technology, computational fluid dynamics (CFD) and the CAVE to find emission control solutions for old, dirty industrial boilers.

Nalco Fuel Tech has worked on hundreds of industrial boilers, providing the know-how and equipment to lower the output of polluting gasses, especially nitrogen oxides, referred to as NOX. One technology they often use consists of adding chemical reagents to the combustion chamber of the boiler. These



Inside a the firebox of a massive boiler, a carefully placed injector releases chemicals that reduce air pollution from emissions.

chemicals, which neutralize the NOX, are injected through nozzles installed on the interior walls. Installing this equipment is no easy task. Planning can take weeks, since the capacity, spray configuration, and placement of each nozzle is critical to optimizing the system.

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On The Edge

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- To promote the open and free exchange of ideas and information related to the role of cybernetics in the future.
- To encourage the synthesis and growth of new ideas and devices.
- To assist in the development of commercial products incorporating these new concepts and technologies.

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Electric!

**It's
CJ
Time
Again!**

CyberEdge
Virtual Reality
Pioneers

Ivan Sutherland
For his insight and seminal contributions to computer graphics, from which the foundations of Virtual Reality developed

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Boiler Emissions

Continued from page 1.

Physical installation is time-consuming, and needs to be done right the first time. Obviously, the boiler must be shut down and cooled. But adding to the difficulty is the scale of the equipment. These boilers can be a hundred meters tall, with meter-thick walls. Shutting one down is a complex, expensive procedure.

Before teaming up with the National Center for Supercomputing Applications (Urbana, Illinois, USA), Nalco used powerful office computers to provide a CFD-based solution to the question of where to place the injectors for optimal effectiveness. The computations could take hundreds of hours, so Nalco would need several weeks to deliver a plan. If, as was often the case, they were asked for an alternative plan, they were back at the console, often running day and night to provide a timely answer to the questions posed by the modifications.

In addition, explaining the solution to the customer was difficult. The output of the CFD program was a printout of nozzle placement data that is nearly meaningless to anyone not trained in reading it. Even if one could climb into an operating boiler (unlikely at best), the gasses in question are impossible to see. So explaining the rationale of a solution was a bit akin to faith healing. Adding to the seriousness of the situation is the major costs of fixing any errors in the installation, no matter what the cause.

Nalco needed a faster way to process their CFD calculations, and a better way to visualize the results. NCSA was able to provide both, with an unexpected extra benefit.

A team from the nearby Argonne National Labs, including Darin Diachin, Tom Canfield, Lori Freitag, Daniel Heath, and Jim Herzog, worked with Nalco's William Michel to develop a better technology, using the supercomputers at NCSA, and the CAVE at Argonne.

Inside the virtual boiler

They arrived at a solution with several distinct components. Modeling the injectors, the combustion within the boiler, the gas flow in the boiler, and the chemical reactions is one operation. Creating a physical model of the boiler is another issue, related to visualizing the gas flows within the unit. Finally, designing a distributed computational system was the third big challenge they met.

The team chose a commercial CFD program, called *Phoenix*, to calculate the gas flows. Optimizing this computation is essential to providing maximum emission reductions, and also has an affect on the life cycle cost of the system. While these calculations are rigorous, a parallel-processing algorithm was designed to optimize the processing. Using distributed resources, including an IBM SP system, has reduced the time required greatly, from hours to seconds.

The visualization of the solution is where Nalco's system is truly unique. Nalco's engineers have created several generic,

virtual boiler models, which are quickly customized to fit the specs of each particular project. They make basic starting assumptions regarding injector placement, and calculate the effectiveness of the configuration. The results from the CFD computations are sent to a custom visualization module, and displayed in the CAVE. Using a menu built into the system, users can change the boiler walls from texture-mapped solids to wire frames, change how the flow field (of gasses and injected chemicals) is represented, add more chemicals, and otherwise configure the system in real time. Different viewing modes make it possible to see the direction, velocity and temperature of the gas flows.

The work was done so well that when one uses the system, the whole process looks easy. Instead of poring over sheets of numbers, the engineer steps into a CAVE, and moves about in a 3D model of the boiler/injector system. She can grab and move injectors, modify gas flows, and change her point of view. Changing how the flows are represented enables the user to visualize different gaseous components. Changing the boiler model from texture-mapped solids to wire-frame lets the engineer look through the system, so she can see the entire flow system (which typically has several bends and turns) from one vantage point. She can even move outside the system, to get an sense of how the entire system is working.

William Michel, Nalco's Manager of Advanced Computing systems, told *CyberEdge Journal* that the *Boiler Maker* system saves weeks on the design and optimization process. He explained, "conventional methods take four to six weeks for [boiler] system design and analysis." Using the new software and the CAVE allows Nalco to go from a blueprint to a working visualization in about a week, with spray system optimization adding less than one day.

Michel sees a big payback in using the CAVE system for injector visualization. He told us that when one looks at the costs of shutting down an boiler, installing the emission-control system, and the potential fines and other costs associated with mistakes, the CAVE actually provides major cost savings. Nalco's marketing people like it, too. That's the unexpected benefit. They have a flashy demo to show potential customers, and thanks to the quality of the system, they can guarantee emission levels after the job is done. Nalco expects to use their *Boiler Maker* system 200-300 times this year. That's a really big return on their VR investment!

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Fuchs Feted

At the recent Medicine Meets Virtual Reality Conference, Professor Henry Fuchs, of the University of North Carolina, Chapel Hill, was presented with the Satava Award for his unique vision and commitment to the transformation of medicine through communications. Dr. Fuchs is seen here with (L to R) Jannick Roland, Richard Satava (the namesake of the award), Walter Greenleaf, and Steven Ellis, presenters of the award.



CJ Nominees

Continued from page 1.

public, on our web site, *CyberEdge Electric!* The response was so positive, that this year we are asking you to vote directly for your choice in all the categories. Our panel of expert judges will make the final decisions. But we feel that by asking the people who are using VR on a daily basis what they think, we will get an even better sense of the industry.

To vote for the companies and applications that truly deserve to win 1996 CJs, just visit *CyberEdge Electric!* and click

on the "Vote Now" icon on the home page. That will take you to the CJ ballot. You can vote for as many Applications, Hardware and Software nominees as you like. You can nominate a candidate in the Arts and Events Category. And you can cast your vote for our Sutherland Award winner. Just remember: only one vote per Email address! (we're watching, you know!)

So be sure to get your vote in early. Then, come to the Awards Banquet at Virtual Reality WorldWide, April 4, 1997, to see who won!

The 1996 CJ Nominees

Product	Description	Company
Applications Category		
Aerophobia Treatment	Virtual Therapy	Max North, et al, Clark Atlanta University
AlphaWorld	Social computing environment	Worlds Inc.
Big Book 3D	Data navigation application	Big Book
Durham Bull Virtual Baseball Park	Virtual sports facility	Virtus/Durham Bulls
Gas flow visualization for Emission Control	Design evaluation system	Nalco/Fuel Tech/UIC
Great American Virtual Home	Design evaluation system	Mike Rosen & Associates
LogicQuest	Edutainment 3D maze	Learning Company
MistVR	Surgical Training System	Virtual Presence
Old Faithful	Virtual travel destination	Worlds Inc.
Pac Man VR	Game	Virtuality
Pyramid of the Ancient Astronauts	Marketing game	Straylight/Jim Beam Brands
TactX Simulator	Dismounted Infantry simulator	Interface Technologies
TeleInVivo	Ultrasound diagnostic tool	Fraunhofer Center for Research in Computer Graphics
Total Recoil	Game	Virtuality
Trip to Mars	Virtual travel destination	Smithsonian Institution/SENSE8/NASA
truck driVR	Driver evaluation system	Bravo Multimedia
UniCenter TNG	Network visualization and management	Computer Associates
Virtex 96	Virtual trade show	Virtex/Superscape
Virtual Stonehenge (in situ)	Archeological tour of Stonehenge	VR Solutions
Virtual Stonehenge (on the Web)	Archeological tour of Stonehenge	Superscape
VR Climber	Exercise equipment	Tectrix
VR Gorilla Exhibit	Virtual Gorillas in Zoo	Zoo Atlanta, Georgia Inst. of Technology
Yahoo! 3D	Data navigation application	Yahoo!/Caligari
Hardware Category		
CAVE	Large, multi-user, 3D display environment	Pyramid Systems/Univ. Illinois Chicago
CyberTouch	Tactile feedback glove	Virtual Technologies
DataVisor 80	High resolution. Wide FOV HMF	n-Vision
Duo/Immersive Workbench	Two-user desktop 3D display	Fakespace

Continued next page .

CJ Nominees

Continued from previous page

Flostation
Glint 500TX
ImmersaDesk

Interview 28hd96 Monitor
MotionStar
O2 Workstations
Obsidian Graphics System
Omnidirectional Treadmill
Onyx2 Reality Monster
PRO-1000
Simuleyes VR
Spaceball 3003
TDZ RAX
V6 HMD
Virtual Binoculars
Visette Pro
VR360

VR environment
3D graphics accelerator
Desktop 3D display system

16:9 aspect ratio monitor
Wireless 3D tracking system
Computer
3D graphics accelerator
3D navigation controller
Graphics supercomputer
3D Graphics accelerator
Shutter glasses
3D navigation controller
3D graphics accelerator
VGA HMD
Hand-held 3D display
VGA HMD
3D hybrid tracking system

Flogiston Corporation
3DLabs
Pyramid Systems/Univ. Illinois
Chicago
Intergraph
Ascension Technology
Silicon Graphics
3DFX
Virtual Space Devices/STRICOM
Silicon Graphics
Real 3D
Stereographics
Spacetec IMC
Intergraph
Virtual Research
n-Vision
Virtuality
Intersense

Software Category

3D Studio Max
CyberLife/CyberHub
CyberPassage
D I guy
Designer's Workbench
dV Reality
J3D SpaceCrafter API
OnLive Voice Chat
Vega 3.0
Virtual Home Space Builder 2
Viscape

3D Modeling tool
Social computing client/server
Social computing client
Virtual human
Worldbuilding tool
Worldbuilding tool
3D JAVA API
Audio server for shared worlds
Simulation construction tool
Low-cost Worldbuilding tool
VRML & Superscape browser

Kinetix
Black Sun
Sony
Boston dynamics
Coryphaeus
Division
InWorldVR
OnLive! Technologies
Paradigm Simulation
Paragraph
Superscape

Continued next page .

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VR Entertainment At IAAPA '96

By Louis M. Brill

The IAAPA (International Association of Amusement Parks and Attractions) '96 Convention and Trade Show at New Orleans was the 78th annual presentation of the latest and greatest rides, attractions, and arcades for theme parks and entertainment centers. As it has for the last several years, virtual reality entertainment had a very visible presence at IAAPA.

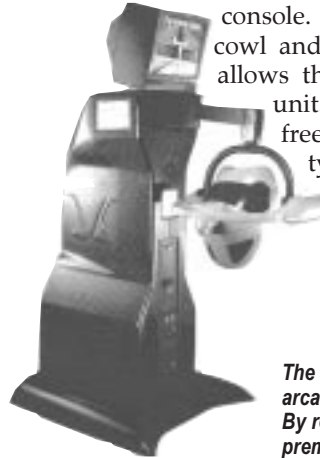
In the unique interface category, the Italian company, CyberFunk, showed the most unique in their *Cyber Buggy* system. *Cyber Buggy* players climb aboard a large air-filled pillow with a meter-long joystick imbedded in the middle. They don an HMD, and hang on to the joystick to play *Kaleidosong Scooter*. It is a delightful experience of flying through cityscapes, including an aerial obstacle course, all the time chasing and capturing musical notes. Navigation is simple, accomplished with body english; players hold the joystick and lean into the direction they wish to travel. A data glove it is not, but it is a very interesting variant on conventional VR navigation.

Virtual Systems (formerly Virtual Images, of Columbus, OH) presented its new VR game station, CYBERPAK, which is a stand-up system with an HMD attached to a unit that looks like a rocket pack. A player dons HMD, grabs a joystick and enters the virtual world of *Alpha Rescue I* to save astronauts on a space station from an invading alien attack.

Virtuality (Irving, TX) was once again the VR hit of IAAPA, with diverse VR gaming presentations, several platform configurations and the introduction of a new game. *PAC MAN VR*, was licensed from NAMCO, the original creators of the cute smiley face with the voracious appetite for energy pills and ghosts. It is a trip down memory lane: PAC MAN's back and he's running loose in cyberspace. When players enter the PAC world they encounter three-dimensional trenches filled with the very same obstacles found in its 2D flat screen version of the 80's. The rules are the same – run like hell and gobble up everything in sight. Although Virtuality only displayed a beta version, it was voted one of the best new products by the 1996 IAAPA awards committee. Virtuality also presented the *Total Recoil* system for those itching to take a crack at

improving their shotgun skills. *Total Recoil* supports two shooting games; *Trap Master* and *Quickshoot Carnival*.

Another interesting VR interface was shown by Immersive Technology (Richardson, TX) as part of their *Kimera* system. It is an arcade game, with an HMD built into a cowl. It looks something like a Darth Vader helmet. The cowl is suspended from a boom that is appended to the top of the console. Players insert their head into the cowl and grab handles on the front, which allows them to steer by moving the entire unit. The cowl moves with 6 degrees of freedom, and the HMD provides the typical clarity of an LCD viewer. The only available game was *Pyramid Pilot* which involves flying up and into a pyramid.



The Kimera system offers the promise of a VR arcade system that does not need an attendant. By reducing the cost of having VR on the premises, this could aid acceptance.

The Vivid Group of Toronto, Canada, demonstrated a new product called *Big Head Racer*, which is gesture-controlled, networked, car racing. Players start by sitting in a booth where their face is photographed. The picture is digitally imposed on the body of a sports car. When the game begins, the player controls her car's track position by the movements of her head – moving left or right moves the car in the same direction. Up to 8 players can race each other. The challenge is classic; keep on the road, try to pass all other cars and win! *Big Head Racer* offers 3 levels of play.

Where is VR entertainment going?

As VR entertainment is adopting to the arcade format with shoot-em-up type games, and an atten-

Continued next page.

CJ Nominees

Continued from previous page.

VRrealm Builder
WIRL
WorldToolKit V6/Direct
WorldView 2.0

VRML authoring Tool
VRML & VREAM browser
Worldbuilding tool
VRML browser

IDS
VREAM
SENSE8
Intervista

Art and Events Category

RiverWorld

Musical Jam Session in virtual world
(SIGGRAPH)

Virtuality, Motorola, Phillips,
House of Blues

Soundscape

Music visualization and interaction
(SIGGRAPH)

Christian Greul, Fakespace Music

Voting address: www.cyberedge.com.

IAAPA '96

Continued from previous page

dant-free, coin-op style of operation, arcade game manufacturers are creating a class of new products that take on somewhat of a VR flavor. I refer specifically to a rash of skiing, snow boarding and Jetski simulators that are beginning to appear – all very interactive and very immersive.

In each case participants stand or sit facing a giant TV screen and hanging on for dear life as they maneuver through their snow or water environment. Is this VR? It may be stretching the limits of the definition – but hey, isn't that what it's all about?

Given the small number of VR companies that makeup the VR entertainment industry there was a respectable showing of companies and their products at IAAPA. However beyond having an IAAPA presence, the big question is, of course, where is the VR entertainment industry going with the games they bring to arcades and entertainment centers? For the most part VR entertainment seems to be emulating arcade games. Its potential as a experiential and exploratory medium has hardly been tapped. While it is understood that the VR entertainment industry is slowly building a customer base of players who already understand and enjoy arcade play, this is by no means a representation of what VR entertainment is all about.

Ideally VR games should present experiences not normally encountered and that are so compelling that participants would seek it out for, at least, a second or third encounter.

Offering Doom look-alikes doesn't really do a lot in providing exciting and interesting VR entertainment. While arcades are one level of VR entertainment, they are not the only kind. One hopes that in time some percentage of these VR companies will break the continuing shoot-em-up mold and strike out as pioneers in offering some new level of a VR attraction. For example, a virtual 'dark ride' (such as the Universal Studios' *Back to the Future* ride), or a highly interactive ride simulator that combines both motion and a physical control of that motion through its ride presentation.

This has already happened at least once. Disney's Aladdin, a VR version of the hit animated feature film, can be seen at Tomorrow Land in Disneyland. Aladdin (a 1994 CEJ VR Product of the Year winner) suggests a new realm of virtual entertainment experience, offering a more sophisticated form of VR presented as an outright attraction or adventure. The big problem here is financial. Disney won't provide exact figures, but we know Aladdin cost a small fortune to create. None of the other VR entertainment companies can afford to create an Aladdin-scale attraction now, but it stands as an inspiration and maybe, somehow, the start of a new level of VR entertainment that involves more than just perfecting your shooting skills.

Contact: IAAPA, 1448 Duke Street, Alexandria, VA 22314 USA, 703 836-4800, FAX: 703 836-4801, www.iaapa.org.



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Meetings Measured

Each year about this time we look back at the conferences we attended last year. While you can't use past performance to gauge future results, we have found that our rankings serve two important purposes.

First and foremost, you can use these rankings to determine if a conference looks like it will be valuable to you. While there are some completely useless meetings, they are rare. However, finding the gatherings where you will obtain the most value is not obvious or easy. So we qualify each conference by the type of meeting, as well as our other measurements. You can quickly see how much of the conference is devoted to VR, how big the exhibit hall is, and other important details that make a conference experience great or so-so.

The second value is to the conference promoters themselves. They want a high ranking, and if they're wooing the VR crowd, our rankings provide a barometer that they can use to compare their meeting with others. We know that this has been effective; meeting have improved or found new ways to better portray their focus in advertising, thanks to our rankings.

So here we go again. Remember, a lower overall ranking may indicate that an are the is unimportant to you is not covered, while a high-ranking meeting may not address your needs well. Also, much as we try, it is impossible to attend every VR conference in the world. We apologize for missing some meetings, but the fact that a meeting is not listed here should not be construed to mean anything except that we had no one there.

Summary by Rank

	Total Points	Type	Total Attendance	VR Exhibits	Exhibits	Length (Days)	Average Cost(US \$)
SIGGRAPH	8.19	N	28,500	280	95	6	1,000
VR World '96	7.60	T	700	30	22	3	1,200
Medicine Meets VR	7.41	I	650	35	16	4	450
Eurographics Workshop on VE	7.16	S	42	0		2	250
I/ITSEC	6.91	I	10,000	72	56	4	300
Earth to Avatars	6.91	I	300	21	21	2	300
IAAPA	6.91	N	23,000	320	11	6	90
Virtual Humans	6.91	S	250	8	7	2	900
VR in Mfg, Research & Education	6.50	S	100	4	4	2	200
3D Design	5.41	N	1,000	2	1	3	525
CeBIT	5.13	N	600,000	6500	14	7	33

Summary by type

Type = T: Trade Show, S: Scientific Meeting, N: Non-VR Specific, I: Special Interest.

	Type	Total Points	Total Attendance	VR Exhibits	Exhibits	Length (Days)	Average Cost(US \$)
Medicine Meets VR	I	7.41	650	35	16	4	450
I/ITSEC	I	6.91	10,000	72	56	4	300
Earth to Avatars	I	6.91	300	21	21	2	300
SIGGRAPH	N	8.19	28,500	280	95	6	1,000
IAAPA	N	6.91	23,000	320	11	6	90
3D Design	N	5.41	1000	2	1	3	525
CeBIT	N	5.13	600,000	6500	14	7	33
Eurographics Workshop on VE	S	7.16	42	0	0	2	250
Virtual Humans	S	6.91	250	8	7	2	900
VR in Mfg, Research & Education	S	6.50	100	4	4	2	200
VR World '96	T	7.60	700	30	22	3	1,20

Continued page 10.

Immersion Corporation

The Force Feedback Company

RESEARCH



The Impulse Engine

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ARCADE



The Impulse Stick

- World's only robust force feedback for rough environments
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Immersion

Fun 2
New Art

POW

"In the force feedback arena, the nod definitely goes to Immersion Corporation."

CyberEdge Journal

HOME

I-Force Technology

- Industry standard for consumer force feedback
- \$149.95
- Feel your video games



"Once you've tried an I-Force joystick with a game, playing without it isn't nearly as fun!"

GAMEPRO Magazine

Immersion Corporation produces a wide range of force feedback products, including high-performance research equipment, robust arcade solutions, and low cost consumer products. Over the past few years, critics have raved about Immersion's force feedback tools which are revolutionizing the way people interact with computers. Visit our web site at www.immerse.com for more information.



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Meetings Measured

Continued from previous page.

Ranking Details

		Weighted		Percent		Presentation		Networking		Exhibit		Organization		Entertainment/			
		Type	Points	VR	Quality	Quality	Opportunities	Materials	Quality	Location	Parties						
Weighting factor:		10	580	10	10	9	7.5	7.5	5	5	4						
3D Design	N	5.41	314.0	1	10	6	60	8	72	8	60	0	0	8	40	8	32
CeBIT	N	5.13	297.5	1	10	7	70	5	45	4	30	7	52.5	7	35	7	35
Earth to Avatars	I	6.91	401.0	10	100	7	70	9	81	2	15	4	30	9	45	8	40
Eurographics Workshop on VE	S	7.16	415.0	9	90	9	90	6	54	8	60	0	0	8	40	9	45
IAAPA	N	6.91	400.5	1	10	7	70	7	63	7	52.5	10	75	9	45	9	45
I/ITSEC	I	6.61	383.5	3	30	7	70	7	63	7	52.5	8	60	8	40	8	40
Medicine Meets VR	I	7.41	430.0	7	70	7	70	7	63	9	67.5	7	52.5	8	40	7	35
SIGGRAPH	N	8.19	475.0	4	40	8	80	10	90	8	60	10	75	9	45	9	45
Virtual Humans	S	6.91	401.0	10	100	8	80	8	72	0	0	6	45	8	40	8	40
VR in Mfg, Research & Education	S	6.50	377.0	10	100	7	70	6	54	5	37.5	3	22.5	6	30	7	35
VR World '96	T	7.60	441.0	8	80	8	80	8	72	8	60	8	60	6	30	7	35

NOTE: Ben Delaney (Publisher and Editor of *CyberEdge Journal*) served on the Program Committee for Medicine Meets VR.

Methodology

Conferences are ranked in eight categories: Percent VR, Presentation Quality, Materials Provided, Networking Opportunities, Exhibit Quality, Organization, Location, and Parties & Entertainment. Each of these categories is weighted, with the Percent VR (how much of the conference is devoted to VR?) weighted the most, and Parties & Entertainment weighted least. Each category is given a score from 0 (none, not applicable), to 10 (100%, as good as it could be). From these

scores, we computed weighted scores, which are summed. These sums are normalized by dividing by the total possible score (580), and multiplying by 10, which provides a 0-10 overall ranking.

Each conference is also assigned a type code: T: Trade Show, S: Scientific Meeting, N: Non-VR Specific, I: Special Interest. Finally, some additional information is provided that will help you better determine the style and size of the meeting.

IEEE Virtual Reality Annual International Symposium

V
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'97



Tutorials and Workshops March 1-2, 1997

General Session March 3-5, 1997

Exhibits March 3-4, 1997

March 1 - March 5, 1997 ▲ Hyatt Regency, Albuquerque, NM

Up to date information and registration forms for VRAIS '97 may be found at:
<http://www.eece.unm.edu/eece/conf/vrais/> or contact Sharon Stansfield:
(505) 844-1396, (505) 844-2051 (fax), sastans@sandia.gov

Exhibit space still available! Contact Henry Sowizral:
(415) 786-6579, (415) 786-7334 (fax), henry.sowizral@eng.sun.com

Latest Book Releases

☆☆☆☆ It has taken architects a long time to hop onto the VR bandwagon. For that matter, it's taken a long time for architects to accept computers at all, accept for billing. Now it seems like the transition is taking place. Last year we saw the Great American Virtual Home, an application developed by Mike Rosen and Associates (Philadelphia, PA, USA), that showcased an unbuilt house and the appliances and decorations in it. A few weeks ago *Designing Digital Space* arrived in our office. *Designing Digital Space* is a book about VR that is intended for architects. It starts with the basics, an explanation of perspective, and goes on until the subject is covered. Author Daniela Bertol has done a good job, and produced a book that fellow architects will find enjoyable and informative.

I learned a lot in this book, though not much about VR. Bertol does a fine job of setting the historical stage for 3D visualization with her detailed discussion of perspective. She cites many examples, including a fascinating story of a painting done in the mid-1400's by Dilippo Brunelleschi. He painted a view of the Cathedral of Florence that was meant to be looked at by peeking through a hole in the painting. The viewer would hold a mirror at arms length, and looking through the hole, see the painting reflected in the mirror. The painting had silver leaf in the areas of the sky, so the reflection of the real sky was seen. When viewed in this fashion, the painting blended into the real surroundings (similar to some paintings by the modern surrealist, Magritte), providing an interesting

illusion. Bertol calls it "renaissance virtual reality". I call it darned clever.

Bertol moves from perspective to trompe l'oeil, where she spends a bit more time than needed. From there she makes a transition to more modern efforts to fool the eye; the stereoscope and Mort Heilig's famous Sensorama. Thence to Sutherland, CAD, and GIS (geographic information systems). It's a quick trip, but probably provides just the right amount of detail for an architect trying to get a grasp on this hot technology.

At times, one gets the impression that Bertol was trying too hard. Her definition of Architecture (capitol "A" implied) is awkward, as she tries to be profound. I wonder how useful it is to think of architecture as "a solid-void dialectic"? But, all in all, she does good job on definitions and concepts.

The book concludes with a group of nine papers by other authors. Each of these addresses a particular subject, such as force feedback, genetic algorithms and evolving spaces, and research projects exploring the uses of virtual spaces. This is useful information, too, and provides other voices and points of view.

Should you buy this book? If you are an architect, or working with architects, emphatically, yes. Few other sources could enable VR professionals to understand the Continued next page.

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Palo Alto, CA

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info@virtex.com (automated response)
sales@virtex.com support@virtex.com
<http://www.virtex.com/~virtex>

Entertainment News

Illusion Inc., a supplier of high-fidelity networked virtual reality systems for the military and entertainment industry, has announced it is about to begin construction on a *Grand Prix Racing Center*. The Racing Center will be part of the \$65 million renovation project currently under way at the Sahara Hotel and Casino in Las Vegas. Scheduled to open in the Fall, The Racing Center will feature twenty-four networked, Grand Prix cars. Each Grand Prix car will include directional sound and will be set on a six-axis motion system. Drivers will be surrounded by 20 feet diameter, wrap-around screens displaying their vehicle's track position and the positions of their competitors. Illusion's proprietary SpeedSports technology will allow eight, sixteen, or all twenty-four vehicles at the Racing Center to participate in the same race.

In addition, the Racing Center will include two, 24-seat 3-D simulator theaters showcasing high-speed, high-resolution films that will feature a variety of action-packed motor sport activities with big screen imagery. Six-seat motion pods will utilize a six-axis platform to produce accurate motion synchronization for a realistic ride.

Illusion's Image Architecture, a large screen blended video display system, will also project scenes from the virtual race track onto an external 8 by 18 foot seamless video screen designed to entertain visitors walking past The Racing Center.

Contact: Illusion Inc., 2660 Townsgate Road, suite 530, Westlake Village CA 91361 USA, 805 371-4530, FAX: 805 371-4533, www.illusion.com.

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Find Your VR Career in the News Stand/Job Mart**

www.cyberedge.com

Book Reviews

Continued from previous page.

architectural sensibility and its background as easily. However, this book is a primer. When you need a deeper understanding of VR (or architecture), many other books will do a better job. Bertol says in her preface, "The grasp of cyberspace, as well as the shaping of dynamic 'virtual' environments, is the next (or present) task awaiting architects". She goes on, "The discussion of these and similar issues provides the reader with food for thought". I concur. Bertol has provided a nice lunch here.

Designing Digital Space, by Daniela Bertol, published by John Wiley & Sons, New York, NY, USA, ISBN 0-471-14662-5, 327 pages, soft cover, illustrated, indexed, us\$39.95.

☆☆☆☆ Since it's introduction in August of last year, VRML 2 has been one of the hottest topics on the Internet and in VR circles. However, development has been held back by the lack of a good secondary reference book on the language. Now there is such a book. Written by three members of the San Diego Supercomputer Center's VRML team, the *VRML 2.0 Sourcebook* will meet the needs of most VRML developers. Though not highly technical, it will provide a very useful backup to the official VRML spec for both serious programmers and beginners.

This book is called a second edition because the same authors did a *VRML Sourcebook* that covered VRML 1. But this book is practically all new, and provides a complete syntactical reference and tutorial for VRML 2 – a totally different ani-

mal than VRML 1. This difference has been both a relief and a challenge to the VRML community.

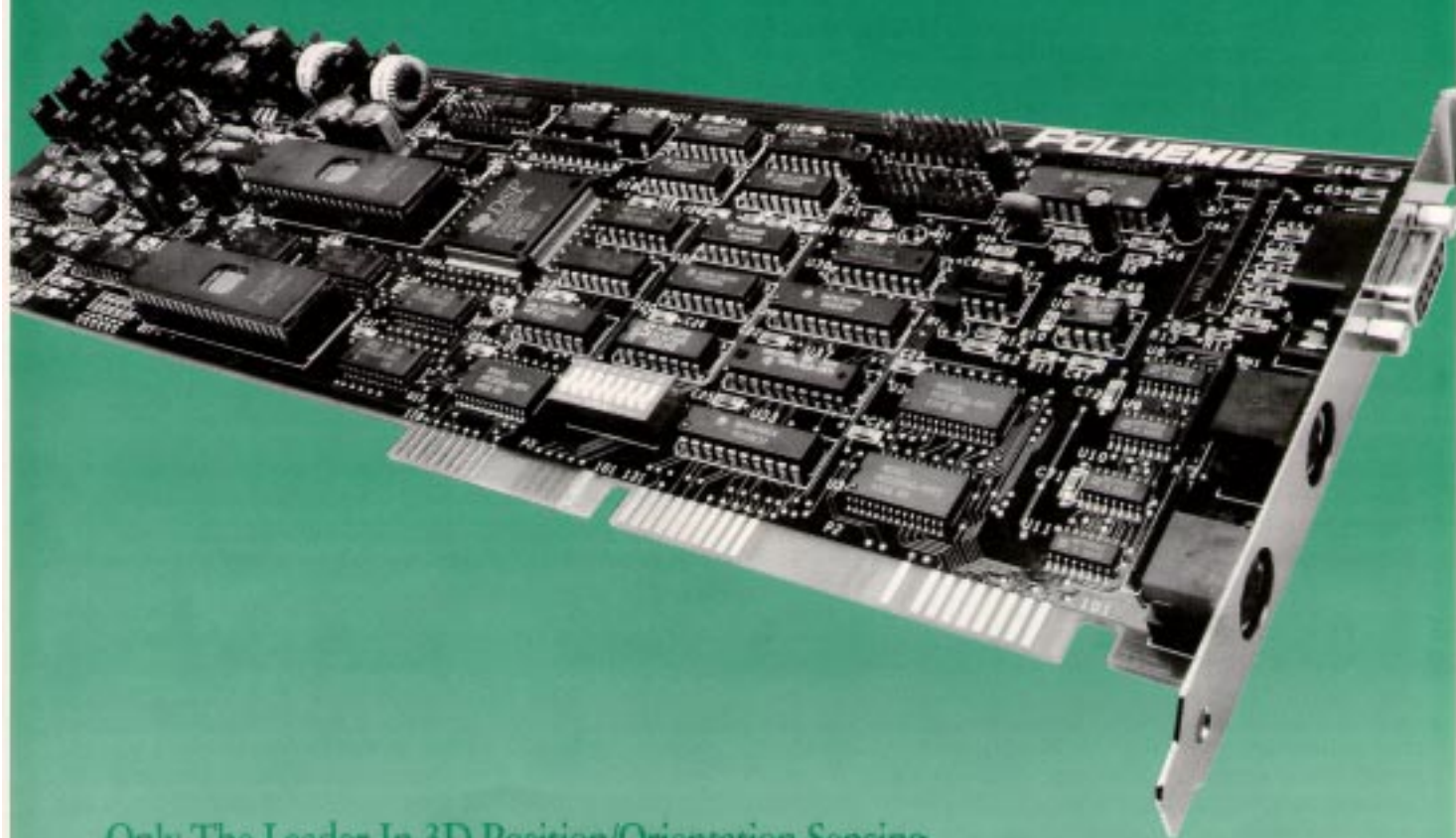
The evolution of VRML took a major turn when the VRML 2.0 spec was released at SIGGRAPH last year. On one hand, there was a general sense of gratitude, because VRML 2 is a more logical, and more versatile spec for moving virtual worlds around. On the other hand, the experienced VRML 1 programmers knew that they had to start over, learning new ways to do things, and converting their existing VRML 1 worlds into VRML 2. This has not always been a trivial process.

This book is organized by task, starting with configuring a browser, through building simple shapes and 3D text, into animation, sensing state changes, and determining the viewpoint of the user. It continues by explaining color and lighting, shading, sound, and scripting. The writing is clear and easy to follow, and the examples make sense. In addition to the excellent text, the accompanying C-ROM has every figure and example in the book, in tri-lingual format (Mac, UNIX, PC), several programming and worldbuilding tools, and samples of objects and textures from commercial vendors.

Even if you are an experienced VRML worldbuilder, you will find this book valuable. Initiates and novices alike will find it a useful reference, and the included software is an added bonus. We highly recommend the *VRML 2 Sourcebook*.

VRML 2 Sourcebook, by Andrea L. Ames, David R. Nadeau, and John L. Moreland. Published by John Wiley and Sons, New York, NY, USA, ISBN: 0-471-16507-7, 654 pages, soft cover, illustrated, indexed, includes CD-ROM, us\$49.95.

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Business Briefs

Seattle-based Virtual i-O, a manufacturer of low-cost HMDs, has named Stan Springel its new President and Chief Executive Officer. As President and CEO, Springel is responsible for the company's strategic direction. Springel brings more than 25 years of management experience to Virtual i-O, including 17 years at General Electric.

The change marks an effort by Virtual i-O to transition the company from a development stage to that of an operating company. Springel replaces company founders Greg Amadon and Linden Rhoads, who served respectively as CEO and President during the company's first three years. Both Rhoads and Amadon remain with the company as board members.

Virtual i-O was founded in May 1993, and shipped its first products in 1995. The company is funded by investors who include Tele-Communications, Inc. (TCI), the largest cable TV operator in the U.S., Logitech International, best known for its line of computer mice, trackballs and scanners, Planar Systems, Inc., a worldwide leader in the development and manufacture of high-performance electroluminescent flat panel and CRT-based display products, and Thomson-CSF Ventures, a wholly-owned subsidiary of Thomson SA Corp., one of the world leaders in professional and consumer electronics. The company's Virtual i-glasses product line is distributed in the US, Canada, Europe and Japan, and is available domestically at major PC and consumer electronics retailers. Virtual i-O is based in Seattle, Washington and employs more than 150 people.

Contact: Virtual i-O, 1000 Lenora Street, suite 600, Seattle, WA 98121 USA, 206 382-7410, FAX: 206 382-8810, www.vio.com.

MÄK Technologies, Inc., has been awarded a patent for a new networking protocol which allows participants in virtual reality environments to exchange data describing physical interactions with each other using only a small amount of network bandwidth.

Called *Newtonian Protocol*, the technology is an extension of the Distributed Interactive Simulation (DIS) protocol, a technique for networking thousands of simulators together. Until now DIS was unable to transmit contact force information between two objects, resulting in low-fidelity simulation of collisions, towing, pushing and carrying.

"To make the Newtonian Protocol a reality we developed a novel transfer function exchange paradigm to reduce the amount of network traffic required to maintain physical contact between two participants," said Darrin Taylor, principal investigator. "With this technology you can implement a large variety of interactions between networked entities. You can even invent new physical laws and implement them."

"This enabling patent will become critically important in the two- to five-year time frame when networked force and tactile feedback becomes popular on the Internet," said Warren Katz, co-founder and Chief Operating Officer of MÄK

Technologies, and lead patent holder. "In the interim we will use the technology for our clients in military simulation, online video games, and collaborative CAD/CAM industries who demand the highest realism."

Contact: MÄK Technologies, Inc. 185 Alewife Brook Pkwy., Cambridge, MA 02138 USA, 617 876-8085, FAX: 617 876-920, info@mak.com, www.mak.com

Since October 1st 1996, the post of AGOCC VR Support Officer has been in place at the Advanced VR Research Centre (AVRRC) at Loughborough University (UK). AGOCC (The Advisory Group on Computer Graphics) is an initiative of the Joint Information System Committee (JISC) of the Higher Education Funding Councils and the Research Councils. This office came as a direct consequence of an AGOCC workshop *The Potential of Virtual Reality for UK Higher Education* and funding received through the JISC Technology Applications Programme. The Support Officer will provide the following support:

- A world wide web site.
- An on-line newsletter
- Telephone and e-mail support
- Organizing workshop events
- Attendance and feedback from appropriate conferences
- Liaison with other research groups and industrial organizations

The Support Officer is Patrick Costello, who will be undertaking the role on a full time basis. His involvement in VR stems from a final year dissertation on the human factors issues of using immersive VR headsets. Following graduation from Loughborough in 1995 he was employed as a Research Assistant on an HSE funded project to determine the possible visual side-effects of head-mounted displays. The results of this research have since been presented at conferences in the UK, Europe and the USA.

Contact: Advanced VR Research Centre, Dept. of Human Sciences, Loughborough University of Technology, Loughborough, Leicester, LE11 3TU, England, 44 1509-223037 x4266, FAX: +44 1509-223940, .j.costello@lboro.ac.uk, <http://sgi-6.lut.ac.uk/~vrsupp>.

Adams Consulting Group, Inc., was recognized January 10, 1997 at the Motorola University Kick-off Meeting for "creative thinking in implementing Virtual Reality Training for Motorola". Adams Consulting Group developed multiple virtual reality training applications for use by Motorola business units nationwide to train associates on how to operate manufacturing equipment. This was the only award Motorola presented to any team that included Motorola employees and an outside vendor.

Traditionally, employees learn how to use equipment in a classroom, on-the-job, or on equipment allocated specifically for training. These methods are not only

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Business Briefs

Continued from previous page.

time-consuming, but costly for the client," said Nina Adams, President, Adams Consulting Group. "Virtual Reality training provides a safe environment for employees to learn without risk to the equipment or themselves. The benefits realized from VR training include increased user confidence, reduction in time to proficiency, and an increase in consistency."

Adams Consulting Group has been developing Virtual Reality programs with Motorola University since 1994. In 1995, Adams Consulting won the VR World Magazine "Industry Award" for developing a VR application which teaches how to start up, run and shut down a manufacturing line.

Contact: Adams Consulting, 3952 Western Avenue, Western Springs, IL 60558-1042 USA, 708 246-0766, FAX: 708-246-0971, ninaa@adams-consult.com, www.adams-consult.com.

Paradigm Simulation, Inc. today announced that it has signed a letter of intent which will enable it to receive \$3 million in new capital. This additional funding will be used to further Paradigm's growth as a leader in visual Paradigm has also appointed Dr. Thomas Cantwell to the position of President and CEO. Dr. Cantwell holds a Ph.D. from MIT and is a director of Discreet Logic and Supreme Industries. "Paradigm is a world leader in real-time 3D graphics and audio applications, and we intend to further develop products and provide content development to our customers, making them leaders in their fields," said Dr. Cantwell.

Paradigm's simulation and training division is a provider of industry-leading graphics and audio rendering products, including Vega and AudioWorks2. Paradigm also offers database and application development, training and customer support.

Contact: Paradigm Simulation, 14900 Landmark Blvd., Dallas, TX 75240 USA, 972-960-2301, FAX: 972-960-2303.

Paul Paray has joined General Reality Company in the position of Vice President of Business Development. Gordon Hackett has joined as Customer Support Manager. As Vice President of Business Development, Mr. Paray manages General Reality's strategic partnerships, enhancing the Company's products and services. He also pursues alliances for new imaging technologies under development by the Company. Mr. Paray reports to Arthur Zwern, President of General Reality. Previously, Mr. Paray owned a high technology law practice in Glen Rock, New Jersey, and was an attorney with Pitney, Hardin, Kipp & Szuch in Morristown, New Jersey, and with Lord Day & Lord, Barrett Smith in New York City.

As Customer Support Manager, Mr. Hackett maintains product quality control, oversees system installation for domestic and international orders, provides training and technical support, and assists in new product development. Mr. Hackett formerly held the position of Event Manager for the CyberEvent Group, New York City, where he produced virtual reality events for notable clients including Hiram Walker & Sons, Blockbuster Video, and People

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Web Watch

ParaGraph International, has announced immediate availability of its award-winning *Virtual Home Space Builder* (VHSB) software for 680X0 and PowerPC Macintosh systems. The VHSB Windows version sold over 125,000 copies in 1996. VHSB for the Mac is available from ParaGraph's web site, for us\$29.95 as a download or \$49.95 on CD ROM.

Worlds built using VHSB can be viewed with any standard VRML 2.0 plugin or ActiveX control. The VRML 2.0 format is compatible with every major OS and computer platform, including Microsoft Windows, Mac OS and UNIX.

As a PowerPC-native application, VHSB takes full advantage of the floating point performance of the Mac's RISC-based architecture for 3D performance. In keeping with ParaGraph's commitment to providing solutions for all Mac users, VHSB 2.0 for the Mac is a 'fat' binary that also runs on 68040 machines with a minimum of 8 MB of memory.

Paragraph has also announced that *Internet3D Space Builder 2.0* (ISB) and *Internet3D FontMagic* (IFM) are now available for Windows 95. ISB is ParaGraph's next-generation VRML 2.0 authoring tool. IFM converts text created with any TrueType font into VRML 2.0 for publishing on the Internet or inclusion in more complex VRML Spaces.

The software packages are among the first to natively support the VRML 2.0 standard. ISB costs us\$89.95 (\$69.95 for downloadable version) and IFM costs \$29.95.

Internet3D Font Magic is the first VRML 2.0 authoring tool for creating 3D interactive text, logos and billboards for Web sites and virtual spaces. Internet3D Font Magic is simple to

use. A user types in text, selects a TrueType font, and may adjust color, bevel, depth and light source. The program outputs lighted 3D text in VRML 2.0 format. This text can be viewed online by any VRML-enabled browser and incorporated into an existing HTML page or VRML world scene.

Contact: ParaGraph International, 1688 Dell Avenue, Campbell, CA 95008 USA, info@paragraph.com, www.paragraph.com.

InWorldVR has developed a fast, portable, JAVA-based solution to the problem of delivering 3D graphics on the Internet. Their *J3D Spacecrafter API*, a toolkit for 3D content developers, lets them develop interactive graphics optimized for the Internet. Perhaps most interesting about J3D, however, is that no plug-in or helper application is required for playback. Any JAVA-compliant browser, such as Netscape Navigator, can display interactive graphics developed in J3D without the needing any extra software.

J3D supports many of the functions available in VRML, without the overhead of an external software requirement. J3D features include:

- Wireframe of flat shaded modes (texture support under development)
- Z-sorted sprites and animation
- 24-bit color
- Geometry modification in real time
- Terrain following
- Collision detection

Continued next page.

Business Briefs

Continued from page 12.

Magazine. Mr. Hackett has also designed virtual reality exercise machines and user interfaces.

Contact: General Reality Company, 124 Race St. San Jose, CA 95126 USA, 408-289-8340, FAX: 408-289-8258, sales@genreality.com, www.genreality.com.

On November 19, 1996 3Dlabs Inc., Ltd. (NASDAQ: TDDDF) made the initial public offering of 2,500,000 shares of common stock at a price of \$11 per share. 3Dlabs is a leading supplier of high-performance, cost-effective graphics semiconductors, software and related technology. The offering was co-managed by Oppenheimer & Co., Inc. and UBS Securities LLC. The company intends to use the net proceeds of the offering primarily for working capital and general corporate purposes.

Contacts: Oppenheimer & Co., Inc., Oppenheimer Tower, World Financial Center, 200 Liberty Street, New York, New York 10281 USA, 212 667-7000. UBS Securities LLC., 299 Park Avenue, New York, New York 10171 USA, 212 821-4000.

Newfire is the new name for Axial Systems, Inc. Axial previewed a very fast VRML browsing technology at SIGGRAPH last year. That technology, along with some new, object-oriented modeling tools were scheduled for release this spring. Now, after a name change, Newfire is ready to release the player, dubbed *Newfire Heat*, in March, and the development tools soon thereafter.

Newfire claims that Heat is 4-8 times faster than competing technology, a claim we believed after a private demo. With the excruciating speed of much VRML content in mind, we welcome any technology that speeds up VRML interaction. Heat works with Netscape Navigator and Microsoft's Internet Explorer.

The development tool is called *Ignition*. Content developers are invited to register immediately for more details on the technology.

Contact: Newfire, 12901 Saratoga Avenue, Suite 4, Saratoga, CA 95070-4162 USA, 408 996-3100, FAX: 408 996-3381, www.newfire.com.

Web Watch

Continued from previous page.

- Multiple lights
- Easily extensible
- Format translation support from Syndesis Corporation

Pre-release beta versions of J3D, as well as demos, are available on InWorld VR's web site. The cost of the Beta Version is us\$50.

Contact: InWorld VR, 10 Liberty Ship Way, #266, Sausalito, CA 94965 USA, 415 331-5004, FAX: 415 331-5010, inworld@inworldvr.com, www.inworldvr.com.

NTT SOFT, a subsidiary of the Nippon Telegraph and Telephone Corp., has ported its InterSpace virtual reality application to Intel/Windows platforms.

The proprietary InterSpace environment enables navigation in three-dimensional worlds while allowing multi-user, real-time facial video and audio communications. When we first reported on this technology (CEJ #28, November/December 1995), NTT needed SPARC servers and ISDN connections to make the system work. Now, they have found ways to make the system work using Pentium Pro servers and standard 28.2k modems and phone lines. NTT SOFT told us that they will soon enhance InterSpace to take advantage of the upcoming Pentium processors with MMX technology. Using a clustered Pentium Pro solution, NTT SOFT expects to support thousands of clients in its distributed environment.

In December 1996, NTT SOFT launched a pilot program called *Virtual Peninsula*, comprising 100 households in Palo Alto, California, equipped with graphic accelerator cards for their Windows 95 or NT personal computers, and linked to the Internet via ISDN or cable modems. The applications being offered in the Virtual Peninsula pilot include distance learning, 3D games and electronic commerce. Entertainment applications include a proprietary new 3D multi-player networked game called "Runners-N-Guides". This was developed by Gravity, a San Francisco-based design and productions studio

In recent tests, NTT SOFT has shown the ability to incorporate audio and video over the Internet at delivery speeds of 28.8 Kbps. These capabilities were formerly only available at ISDN speeds. As a result, InterSpace is now optimized for today's Internet protocols, bandwidth and computer hardware and software capabilities. Virtual Peninsula can support an unlimited number of users and provides streaming video, audio and *InterScripts* for programming simplicity.

The InterSpace application development environment will be available for licensing in the first quarter of this year.

Contact: NTT Soft, 415 688-1100, interspace@ntts.com, www.ntts.com.

Apple Computer, Inc. and Silicon Graphics, Inc. have jointly announced an agreement intended to further the proliferation of VRML browsing on personal computers. They believe that

this agreement will significantly enhance networked, interactive 3D content and applications for the Internet and Intranets.

To further the role of the Macintosh in multimedia and 3D personal computing, Apple plans to bundle Silicon Graphics' *Cosmo Player VRML 2.0* browser with its suite of Internet access software, the Apple *Internet Connection Kit*, and has endorsed *Cosmo Player* as its preferred VRML browser. Silicon Graphics plans to deliver the Mac OS version of *Cosmo Player* early this year. In addition, Silicon Graphics will support Apple's *QuickDraw 3D* as one of the rendering engines for the Windows 95 and NT versions of *Cosmo Player*.

Cosmo Player, which supports Windows 95, Windows NT, Mac OS, and UNIX, works with Netscape Navigator, Microsoft's *Internet Explorer*, and Apple's *Cyberdog*. Windows and UNIX versions of *Cosmo Player* can be downloaded at <http://vrml.sgi.com>.


QuickDraw 3D is Apple's real-time 3D architecture for Mac OS and 32-bit Windows platforms which enables multi-platform deployment of 3D authoring tools, VRML and CAD/CAE. *QuickDraw 3D* may be downloaded from <http://quickdraw3d.apple.com>.

Contacts: Apple, www.apple.com. SGI, www.sgi.com.

At Supercomputing '96 (November 17-21), San Diego Supercomputer Center (SDSC) researchers for the first time demonstrated a new *Immersive Collaborative Environment (ICE)* with a specific application in protein structure analysis. By integrating innovative visualization tech-

Continued next page.

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Taking My Best Guess

by Ben Delaney

Here it is a new year, with the end of a millennium in spitting distance. There is excitement and trepidation in the air.

Excitement and trepidation sums up the VR business as well. Excitement, because we actually see hard years of effort starting to pay off. Trepidation, because as VR becomes more mainstream, the small players, the pioneers who got the ball rolling, are likely to be subsumed. This is the yin and yang of progress.

Progress was what we saw last year, accelerating into 1997. VR is quickly becoming just another tool in the IS manager's belt. Applications like Computer Associate's *CA-Unicenter TNG*, and the modeling of emission control systems done by Nalco Fuel Technologies (see page 1) show that our dreams of ubiquitous VR are coming true.

Looking into the future

The changes we are likely to see this year promise to be more sweeping and more important than everything that has happened in VR to this date. So let me take out my runes, crystal ball, I Ching, goat entrails, and Tarot cards, and make a few predictions of what will be happening in the VR industry in 1997.

The use of VR will increase dramatically. This is a no-brainer. Every week I hear of more VR applications. The top companies in every industry see VR as an important tool for prototyping, training, collaboration, and marketing. There is no reason to expect this trend to change. Moreover, I expect that we will start to see serious data visualization applications this year.

Immersive VR almost disappears. No, this isn't a contradiction. While the general use of VR will increase dramatically, the high prices and relatively low quality of head-mounted

displays will relegate them to specialty applications. For most VR users, low-cost PCs and big monitors will serve adequately as their portals to virtual worlds.

VRML has serious competition. For a while it seemed that VRML was the undeniable wave of the future. But some are denying. The military is sticking with the DIS (Distributed Interactive Simulation) standard, and upgrading it to High Level Architecture (HLA). Superscape and VREAM are both doing brisk business (and hedging their bets); providing proprietary tools and supporting VRML. InWorld VR has a JAVA-based 3D API that is really fast. VRML has no formal method for building multi-user environments, but Division and SENSE8 each give their customers robust techniques for building interactive, multi-user worlds. Recently VRML's co-inventor, Mark Pesce renounced the VRML consortium. The decision is still out on VRML.

The VR game business is no fun. Last year Virtuality saw a decline in sales, as their game systems business hit the wall. They are by far the largest supplier of VR entertainment system, with well over 50% of the market. The smaller players fared no better, with many going out of business, or changing direction. Unless someone figures out what it takes to make VR games irresistible, AND brings down the cost of the equipment, VR entertainment is going to be found only at the big theme parks – where it is typically a loss leader!

Several VR companies get bought. The time is right for some of the pioneer VR companies to be gobbled up for their people and technology. With companies like IBM, Oracle, CA, and Microsoft all trying to build 21st century systems, look for them, and others, to buy what they need. Likely candidates: Superscape, Division, VREAM, MultiGen. Another prospect: privately owned SENSE8. An industry leader, their savvy management will hold out for a great offer.

Continued next page.

Web Watch

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nologies with biological databases and software, SDSC's *Molecular ICE* project hopes to open up new worlds of interaction and cooperation for scientists.

Biologists need to understand how proteins work in order to design drugs that bind to them and change their activity. Key to this understanding is the 3-D structure of the protein, DNA, or other biological macromolecules. Seeing the complex folding patterns and detailed interactions between atoms reveals how and why a protein acts as it does.

MEME, a supporting application to Molecular ICE, was developed by Timothy Bailey, Charles Elkan, and Bill Grundy of UCSD's Computer Science and Engineering department to search for common protein sub-sequences using techniques

ranging from simple text searches to complex pattern matching. Implemented on SDSC's Intel Paragon and CRAY T3D, MEME allows users to conduct computationally intensive protein sequence searches through a Web interface. The system makes supercomputer power available without requiring biologists to delve into the complexities of parallel programming.

ICE software translates the MEME results into an annotated VRML model. Collaborating researchers at remote locations then can explore the structure jointly. Standard VRML browsing gives each viewer a separate copy of the 3-D world, but ICE allows researchers to interact simultaneously with the same VRML molecular "world." When one researcher manipulates the molecule, by zooming, rotating, or panning, remote collaborators see the same movement.

Contact: SDSC, Ann Redelfs, 619-534-5032, redelfs@sdsc.edu, www.sdsc.edu.

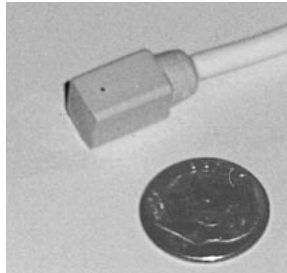
Products You Need To Know About

Virtual Reality Products

At the MMVR Conference, we saw the smallest magnetic tracker receiver we've ever heard of. Ascension's new *miniBIRD* receiver is only 18mm long and 8mm in diameter, in an encapsulated package. Ascension recommends it for probes, instruments, and other medical devices. It may be used both externally and internally. Smaller form factors are available when the sensor is unencapsulated, for inclusion in a probe or instrument.

Like all Ascension trackers, *miniBIRD* employs DC magnetic fields. Signals pass through the human body without attenuation. Mini sensors may be inserted into a body cavity to accurately record location. Accuracy is unaffected by mounting mini sensors on ultrasound scanheads or non-magnetic stainless-steel instruments.

As an example of the use of the *miniBIRD* in obstetrics, *miniBIRD* sensors are utilized to continuously monitor the intricate movements of the fetal head during labor. These measurements can provide early warning of labor abnormalities, and can be used to prevent complications and minimize the need for C-sections. According to Dr. John P. Brennan, who developed the labor monitor in conjunction with Virtual Medical Systems, Inc., "*miniBIRD* sensors enable clinicians to



The miniBIRD, shown here at about actual size, is a really small step in magnetic tracking technology.

visualize the mechanisms of labor in stunning detail. The progress of labor can now be measured with a precision, accuracy, and continuity never before imagined." Dr. Brennan is Assistant Professor of Obstetrics and Gynecology at State University of New York.

The *miniBIRD* makes up to 144 measurements per second with sensor accuracy of 0.07 inch (1.7mm) for translations and 0.5 degree for rotations. Higher accuracy is achievable with medical calibration. Performance is specified for sensors located within 30 inches of the transmitter.

Contact: Ascension Technology, PO Box 527, Burlington, VT 05402 USA, 802 860-6440, FAX: 802 860-6439, ascension@world.std.com, www.ascension-tech.com.

Continued next page.

Best Guess

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VR revenue, grows to more than \$662.30 million in 1997. Another no-brainer. CN Media (the Virtual Reality Investor) estimated revenues to be US\$559.00 million in 1996. CyberEdge Information Services takes their figures and assumes only modest growth; an average of 18% industry-wide. (Several notable companies are privately held, and will not reveal sales figures.) We never believed the multi-billion estimates being tossed around over the past few years, but this is real money. Also, it makes a difference what you count. For example SGI is a 2.8 billion dollar company, but they only attribute 15% of that to the Vis/Sim business. Is VR a billion-dollar industry by 1999? Yes, we think so.

Virtual Reality WorldWide is the best VR conference ever! OK, so this is a tiny bit self serving. But seriously, if you haven't gotten you program yet in the mail, be sure to visit our web site (www.cyberedge.com/VRWW.html) for the most current program updates and information. We have a great program, and our Exhibit Hall is nearly sold out, with all the top companies in attendance. This will be the first grown-up

VR show, with a focus on applications and technology. Be there!

Thanks to everyone

Finally, let me mention of some of the people who have been instrumental in our successes in the past year. First and foremost is our Executive Editor (and my wife), Sherry Epley, who has stood by me through thick and thin.

Our many fine writers have done a great job, especially Francis Hamit, Bernie Roehl, Jeff Abouaf, Mark Pesce, Kevin Williams, Misty West, Tom Sperlich, Ian Kallen, Christine Treguier, Rob Johnston, and Penny Weiss. Thanks to our Supervisor of Operations, Maureen Garrett for a great job.

Special thanks to Bob Gelman, who has been a friend and advisor, Karen Morgan and Bob Wagoner of Aligned Management, Inc., our wonderful partners in the VR WorldWide conference, to Doug Faxon, our retiring Webmaster, and to Kenny Meyer, who over the years has helped me in countless ways.

Without doubt the most important people in VR are the ones I never forget. Thanks to YOU, the people who make the products and technologies, the discoveries and inventions. And thank you for reading CEJ and supporting our efforts. I know we will all have an exciting and interesting 1997. I look forward to seeing you at Virtual Reality WorldWide in Santa Clara!

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Coming Up

❑ **Please Note:** While we make every effort to assure the accuracy of these listings, plans change and errors occur. Contact the conference organizer to confirm places and dates before making firm plans. Please let us know of any changes or misprints.

PAPERS indicates that papers are welcome. Contact the organizers for submission details.

Be sure to check the on-line version of *Coming Up* for weekly updates. It is in the News Stand at *CyberEdge Electric!*

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www.cyberedge.com

FEBRUARY

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Marriott Hotel, Marina del Rey

Los Angeles, CA, USA

Contact: agents-97-info@isi.edu, www.isi.edu/isd/AA97/info.html

❑ **The Engineering Reality of Virtual Reality**

Part of IS&T/SPIE's Symposium on Electronic Imaging

February 8-14 1997

San Jose Convention Center

San Jose, CA, USA

Contact: IS&T/SPIE Electronic Imaging, SPIE, P.O. Box 10, Bellingham, WA 98227-0010 USA, 360 676-3290, FAX: 360 647-1445

❑ **MILIA '97**

Exploring key issues affecting digital media in the world market.

February 9-12, 1997

Palais Des Festivals

Cannes, France

Contact: Reed Midem Organisation, 11 rue du Colonel Pierre Avia, 75015 Paris FRANCE, +33 1 41 90 44 60 FAX: +33 1 41 90 44 70, 100321.1310@compuserve.com, www.reedmidem.milia.com

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VR Products

Continued from previous page.

Also at the *Medicine Meets Virtual Reality (MMVR)* conference, held in San Diego in January, HT Medical showed *T-Vox*, the *Teleos Voxel Visualizer*, which enables real-time volume rendering of color or gray-scale images. Applications of *T-Vox* include interactive 3D visualization of data from:

- Magnetic Resonance (MR) Imaging
- Computed Tomography (CT) Scans
- Ultrasound
- Confocal Microscopy
- Color Photographs, including the National Library of Medicine's Visible Human Data

T-Vox enables users to slice volume data from any angle or explode it along the x, y, or z axis to see both internal and external anatomy. The software comes with volumetric data sets already loaded and also allows users to import data in standard image formats. Users can then manipulate this data using interactive look-up tables for isolating bone, skin, or other tissue. *T-Vox* is completely interactive. Users can manipulate the volume data, directly or through the use of look-up tables, and they can interactively fly through the data.

To perform volume rendering with update speeds up to 30 frames per second, *T-Vox* uses a special technique based on hardware capable of managing volumetric textures. *T-Vox* runs on Silicon Graphics' Indigo² IMPACT and ONYX InfiniteReality computers; an O2 version is in development. The list price for the *TVox* software package is us\$2,400.

Michele Ursino, an HT Medical Senior Scientist and a principle architect in the development of *T-Vox*, said, "the research at HT Medical has resulted in efficient volume visualization algorithms that can run at interactive speeds on low-cost hardware. These algorithms have been implemented within an open software architecture, allowing for infinite flexibility and expandability to meet the specific needs of the research and clinical community."

Contact: HT Medical, 6001 Montrose Road, Rockville, MD 20852 USA, 301 984-3706, FAX: 301 984-2104, info@ht.com, www.ht.com.

A leading producer of immersive display systems, n-Vision, has made two interesting announcements. They have introduced a new, high-resolution, wide field of view HMD, first shown at I/ITSEC. They also have signed a marketing agreement with the Virtuality Group plc.

The new system is labeled *Datavisor-80*. It provides 120° FOV with 1280 x 2024 color resolution in a 1.8Kg package. The *Datavisor-80* provides IPD adjustment, variable overlap, and fixed focus in an innovative optical design. It is compatible with a variety of image generators. The *Datavisor-80* is available now, priced at us\$105,000. As far as we know, this is the only wide FOV HMD now available commercially.

More in the middle of the HMD price scale, n-Vision will market Virtuality's *Visette Pro*, an entry-level head-mounted display. The *Visette Pro* will become part of the n-Vision product line, marketed under the name *DV-4*. Under the agreement, n-Vision will sell and distribute the *DV-4* worldwide and to U.S. Government agencies on the

Continued next page.

Coming Up

Continued from previous page.

□ Imagina

Europe's premier CG/multimedia meeting.

February 19-21, 1997

The Marina

Monte Carlo, Monaco

Contact: INA-Imagina, 4, avenue de l'Europe, 94366 Bry-sur-Marne Cedex, France, +33 1 49 83 26 93, FAX: +33 1 49 83 31 85, lydia@imagina.ina.fr

□ VRML 97

the hot news on the hot technology.

February 24-26, 1997

Hyatt Regency Hotel

Monterey California USA

Contact: Lynn Johnson, Evans & Johnson, P.O. Box 51621, Pacific Grove, CA 93950 USA, 408 655 9924, FAX: 408 372 0846, ljohnson@redshift.com

□ Symposium on Arts and Technology

The Biennial Symposium includes papers, panels, art exhibitions, music, mixed media works, video, dance, and experimental theater.

February 27 - March 2, 1997

Contact: Center for Arts and Technology, Box 5365, Connecticut College, 270 Mohegan Avenue, New London, CT 06320-4196 USA, 860 439-2001, cat@conncoll.edu

MARCH

□ ACM 97 Expo

The next fifty years of computing.

March 1-4, 1997

San Jose Convention Center

San Jose, CA, USA

Contact: Hall-Ericson, Inc., 150 Burlington Avenue, Clarendon Hills, IL, 60514 USA, 708 850-7779, FAX: 708 850-7843, acm97expo@acm.org, www.acm.org

□ Virtual Reality Annual International Symposium (VRAIS)

The US academic VR conference.

March 1-5, 1997,

Hyatt Regency Hotel

Albuquerque, NM, USA

Contact: Larry Hodges, Georgia Institute of Technology, 801 Atlantic Drive, Atlanta, GA 30332-0280 USA, FAX: 404) 894-8787, 894-0673, hodges@cc.gatech.edu, www.eece.unm.edu/eece/conf/vrais/

□ Simulation Interoperability Workshop

Formerly the DIS workshop.

March 3-7, 1997

Holiday Inn International Drive

Orlando, FL, USA

Contact: University of Central Florida, Div. CE, PO Box 160950, Orlando, FL 32816-0950 USA, FAX: 407 823-6374, kgauvin@ucflvm.cc.ucf.edu

□ Computers, Freedom, and Privacy

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March 11-14, 1997

San Francisco Airport Hyatt Regency Hotel

Burlingame, CA, USA

Contact: CFP'97, 2210 Sixth Street, Berkeley, CA 94710 USA, cfp97@cfp.org, www.cfp.org

□ CeBIT

Europe's biggest electronics and computer show.

March 13-19, 1997

Hannover Fairgrounds

Hannover, Germany

Contact: Hannover Fairs USA, 103 Carnegie Center, Princeton, NJ 08540 USA, 609 987-1202, FAX: 609 987-0092

□ Technology and Persons with Disabilities

CSUN's twelfth conference. Science fiction legend, Ray Bradbury, will deliver the keynote address.

March 18-22, 1997

Airport Hilton & Airport Marriott Hotels

Los Angeles, CA, USA

Contact: Center on Disabilities, California State University, Northridge, 18111 Nordhoff Street, Northridge, CA 91330-8340 USA, 818 885-2578 V/TDD/Message, FAX: 818 885-4929, LTM@CSUN.EDU

□ Global Virtual Manufacturing

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March 19-20, 1997

Westin Hotel, Renaissance Center

Detroit, MI, USA

Contact: Detroit VR Center, 7430 Second Avenue, suite 150, Detroit, MI 48202 USA, 313 974-5686, FAX: 313 974-0724, gvm@dvrc.eds.com.

□ Joint Conference of CVRMed and MRCAS

Presentation of the innovative and promising research work in medical computer vision, virtual reality, robotics and computer assisted therapy and surgery.

March 20-22, 1997

Atria World Trade Center

Grenoble, France

Contact: CVRMed & MRCAS Conference, TIMC - IAB, Faculte de medecine de Grenoble, 38 706 La Tronche, Cedex FRANCE, jocelyne.troc-
caz@imag.fr, www-timc.imag.fr/cvrmed-mrcas

□ CHI 97

Looking to the future of computer/human interfaces.

March 22-27, 1997

Atlanta, GA USA

Contact: www.acm.org/sigchi/chi97

□ WESTEC

Manufacturing and metalworking folks talk high-tech shop.

March 24-27, 1997

Los Angeles Convention Center

Los Angeles, CA, USA

Contact: SME, One SME Drive, PO Box 930, Dearborn, MI 48121-0930 USA, 313 271-1500, FAX: 313 271-2861

APRIL

□ Virtual Reality Universe'97

Simply the world's most important conference for VR business and technology. Sponsored by *CyberEdge Journal* April 2-5, 1997

Westin Hotel

Santa Clara, CA, USA

Contacts: AMA, Inc., PO Box 23220, San Diego CA 92193 USA, 619 751-8841, FAX: 619 751-8842

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Contact: Military, Government, and Aerospace Simulation, c/o SMC 97, P.O. Box 17900, San Diego, CA 92177 USA, 619 277-3888
FAX: 619 277-3930, mchinni@pica.army.mil

VR Products

Continued from previous page.

GSA schedule. Price for the DV-4, including InsideTRAK magnetic tracker from Polhemus, is less than \$8,000.

"There is a significant part of the market for whom entry-level displays are the only affordable option," said Kevin Hoisington, n-Vision's Marketing Director. "The DV-4 will help us create a stronger presence in price sensitive VR markets such as architecture, computer-aided design, and entertainment, and position n-Vision for future upgrade opportunities."

Contact: n-Vision, 7680 Old Springhouse road, Madison Building, First Floor, McLean, VA 22102 USA, 703 506-8808, FAX: 703 903-0455, sales@nvis.com, www.nvis.com.

Boston Dynamics Inc. (BDI), based in Cambridge, MA, is delivering DI-Guy software for simulating humans on the virtual battlefield. It is a 3D articulated soldier figure that moves realistically, responds to simple high-level commands, and travels about the environment as directed. DI-Guy moves with various gaits such as walking, crouching, and crawling, and uses weapons in a variety of postures. Transitions from one activity to another are seamless and realistic. DI-Guy is currently being used for individual and team training by the U.S. Army, Navy, and Marines.

DI-Guy is available as a DIS plug-in module and as a linkable object library. The DIS modules are designed to drop into popular DIS environments, such as MAK Technology's Stealth, or NPSNET. Versions are available for IRIS/GL, OpenGL and SGI/Performer. The software includes a run-time motion control engine, motion data, 3D graphics models, textures and display code. DI-Guy models include several uniform and weapon types and each model has several levels of detail. Depending on the platform, dozens of DI-Guy figures can be displayed at one time.

Contact: Boston Dynamics Inc., One Kendall Square, Building 100, Cambridge MA 02139 USA, 617 621-2929, FAX: 617 621-1606, info@bdi.com, www.bdi.com.

3Dfx Interactive and Hercules Computer Technology, Inc. have made a deal to include 3Dfx's *Voodoo Rush*, the next-generation of its Voodoo Graphics 3D technology, as the 3D graphics accelerator for Hercules' recently announced *Stingray 128/3D* Windows accelerator. The *Stingray 128/3D* is the first consumer graphics board to incorporate the new high-performance, low-cost technology from 3Dfx Interactive, which was announced at Comdex in November.

The proprietary Voodoo Rush interface, jointly developed by 3Dfx Interactive and Alliance Semiconductor, allows a seamless interface between the Voodoo Rush chipset and Alliance Semiconductor's ProMotion-AT3D PC multimedia accelerator. This joint technology results in a low-cost, 2D/3D product for the consumer mass market, which Hercules is the first to deliver. In addition, other consumer and coin-op/arcade OEMs have selected 3Dfx's Voodoo Graphics product to bring interactive, arcade 3D technology to their customers.

Voodoo Rush's performance exceeds 45 Mpixels per second and over 1 million texture-mapped triangles per second on a 166Mhz Pentium system. It features, triangle setup, Gouraud shading, bilinear and trilinear filtering, Z-buffering, alpha-blending, level-of-detail MIP mapping, and perspective-correct texture mapping. In addition, Voodoo Rush also supports unique special effects including texture compositing and morphing, sub-pixel correction, texture animation, and per-pixel MIP mapping and atmospheric effects such as transparency, fog, and haze.

The Hercules *Stingray 128/3D* combines three high performance graphics processors on a single board to offer 128-bit 2D graphics plus high performance, arcade quality 3D and outstanding video acceleration. The *Stingray 128/3D* integrates the 128-bit Alliance ProMotion AT3D 20/30 graphics processor with the Voodoo Rush dual 3D graphics controller chipset and 4MB of 40ns single-cycle EDO memory. All major 3D APIs for popular 3D games are supported, including Microsoft Direct3D, 3Dfx Interactive Glide, Argonaut Brender and Criterion Renderware. The Hercules *Stingray 128/30* will be available in Q1 1997 through Hercules' worldwide network of distributors, major computer retailers, and OEMs. Estimated street price will be us\$129 for the 2MB model, \$159 for the 4MB model, and \$299 full configured with the daughtercard.

Contacts: 3Dfx Interactive, 4435 Fortran Drive, San Jose, CA 95134 USA, 408/935-4400, FAX: 408 262-8874, wallen@3dfx.com, www.3dfx.com.

Rapid 3.5, Is Emultek's newest version of their simulation tool. Rapid allows users to create fully functional prototypes and simulations of embedded products and other interactive systems on Windows 95 and NT computers. Rapid is designed so that non-programmers can create complete models that can simulate the look and behavior of practically any system, from a telecomm device to an airplane cockpit. The new version features reusable components, giving users the opportunity to customize and reuse software objects.

The new version of Rapid's simulation tool includes two primary flexible elements: User Defined Objects (UDOs) and User Defined Functions (UDFs). UDOs are complete Rapid applications encapsulated as objects. They serve as reusable building blocks for creating other applications. The ability to create reusable objects from within Rapid increases the productivity and potential of the development process by orders of magnitude.

UDFs are clusters of activities and conditions which are grouped together to serve a specific function. Reusable UDFs can be combined with UDOs to create fully customized working models.

Rapid 3.5 has an open architecture that also allows users to create hard-coded Rapid Extension Objects (RPXs) in conventional programming languages. Using the Object Development Kit, developers can create any object needed for special application needs, unlimited by the Rapid standard library objects. Both UDOs and RPXs are used by Rapid applications as regular Rapid objects, together with Rapid's built-in library of objects. Rapid 3.5's robust 32 bit power provides enhanced performance and speed to desktop **Continued next page.**

VR Products

Continued from previous page.

simulation. Loading and running applications is up to ten times faster than the previous version, allowing simulations of even the most complex systems.

Rapid 3.5 was shipped to distributors in December, and is available on both CD ROM and diskettes. The price is us\$6,000 including an unlimited runtime simulation reviewer. Rapid runs under Windows 3.x, 95 and NT.

Contact: Emultek, Inc., 13100 Worldgate Drive, Suite 180, Herndon, VA 22070 USA, 703 478-0595, FAX: 703 478-0727, www.emultek.com.

Liquid Image Corporation, a developer of HMDs for location-based entertainment systems, is branching out. They have announced a new OEM product. The MRG6 Monocle is a display screen worn near one eye. The MRG6 provides industrial, military and commercial users of portable, wearable computers with a high brightness, low power video display. The VGA image is comparable to a 14" monitor viewed from four feet.

The MRG6 is water resistant and can be provided fully immersible. It features a standard, 8-bit gray scale, with color displays available. The field of view is 40° diagonal in a unit which is 1.4" wide x 2.4" tall x 2.0" deep, with a weight of 4 ounces. Controls include on/off, and brightness. Other options that can be integrated into the MRG6 include speakers, microphones, eye tracking, and cameras.

Another important feature is the MRG6's low power consumption: 0.6 watt nominal, 1.0 watt peak. Said Tony Havelka, President of Liquid Image, "the MRG6 has the lowest power consumption available in the world for a product of this quality. There are competing products, but none can beat the battery life that the MRG6 delivers. We guarantee it!"

Connected to a wearable computer, the MRG6 allows mobility and the use of both hands. Such displays are expected to become standard issue for military personnel, firefighters, and police officers. The system has been field tested for over 1 year by the U.S. Army.

The base model MRG6 is priced at us\$3,495.00 and is ready to ship in OEM quantities.

Contact: Liquid Image Corporation, Dave Collette, 659 Century Street, Winnipeg, MB R3H 0L9, Canada, 204 772-0137, FAX: 204 772-0239, liquid@liquidimage.ca, www.liquidimage.ca/vr.

At I/ITSEC, we saw Fakespace, Inc.'s newest version of their *Immersive WorkBench*, the *DUO-Dynamic Display System*. The Immersive WorkBench is a large, drafting-table-like display system that provides 3D images to CrystalEyes-wearing users. The virtual objects can be manipulated using Fakespace PINCH gloves, an electronic pointing device, or keyboard commands. Head tracking is provided for one user, so that while many people can see the 3D images, only one sees them from the proper point of view.

The Duo doubles the usefulness of Immersive WorkBench by tracking two people's positions, and displaying two correct images. When the system is activated, the display hardware projects two three-dimensional images

of the virtual scene, each in the unique perspective of a separate user and visible only through that user's stereoscopic glasses. Each viewer sees a true-perspective rendering of the 3D image and the two viewers can interact with the simulation as if they were interacting with a real object.

Both of the viewable images in the DUO system are generated from the same simulation data. Fakespace has developed a proprietary technique to display the different images simultaneously, while maintaining synchronization between the separate views. This allows VR programmers to create applications where a single set of data is used to create variants of the same image. In design reviews, for example, a 3D visualization might be seen by one viewer as a finished "product," with full surface texture mapping. The second viewer could observe the same object as a parametric model, and by observing the data underlying the image, see the structural effect of a requested change. In addition, the dual image capability of the system can be extended to support remote collaborative work. The image data can be delivered across a cam- **Continued next page.**

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Putting the "VR" Back in VRML

by Bernie Roehl

The VRML standard is certainly moving along at an impressive rate. There are a growing number of VRML 2.0-compliant browsers, as well as a healthy number of authoring tools and converters. VRML is also well on its way to becoming an ISO standard (ISO/IEC 14772), which will ensure its widespread adoption.

With VRML browsers about to appear on every desktop, now is perhaps a good time to ask some important questions: will the Virtual Reality Modeling Language live up to its name? Is it really suitable for VR applications? If not, what needs to change in order to make that possible? In this article, we're going to try to answer those questions.

Software & I/O

Certainly VRML has many elements in common with the world description languages used by traditional VR software. It offers support for geometry, surface colors, texture maps and 3D sound. It supports object behavior and user interaction, and it's programmable using Java. VRML authoring tools are available which have most if not all of the features found in VR software packages.

VR software companies have apparently seen the writing on the wall. Chicago-based VREAM, one of the oldest and best-known VR software companies, has enthusiastically embraced the VRML standard. In fact their latest product, *VRCreator*, is being positioned as a user-friendly VRML authoring tool. SENSE8 is another well-established VR software firm, and they've added VRML support to their *WorldUp* authoring

environment. Even Superscape has added VRML export capability to their high-level VRT software.

Standardizing on the VRML format has a number of advantages. VR enthusiasts will be able to use authoring tools from firms they're already familiar with to build worlds that can be shared with anyone with Internet access. In fact, different parts of a given world might be built using different authoring tools; the user could walk out of a house built in *VRCreator*, onto a street created with Superscape, and get hit by a car created in *WorldUp*.

VRML browsers perform the same basic set of functions as the "runtime systems" (limited to displaying, but not creating VR content) found in many VR software packages. The important difference, of course, is that VRML runtime systems are, or soon will be, bundled with major Internet browsers such as Netscape *Navigator* and Microsoft's *Internet Explorer*, and will therefore finally bring "desktop VR" to the masses this year.

Anyone who's tried to migrate their VR applications to VRML has discovered that there are still a number of problems. Most VR runtime systems have built-in support for 6 DOF input devices, head mounted displays and other special-purpose hardware. VRML browsers have no such support in place; all navigation and interaction is handled with the lowly mouse, and the only way the virtual world can be seen is by using the computer's monitor as a "window on the world" display.

However, these are solvable problems. VRML's support for "prototypes" and scripting in Java makes it possible for third party developers to create input device nodes, in order to bring the data from the various devices

Continued page 26.

VR Products

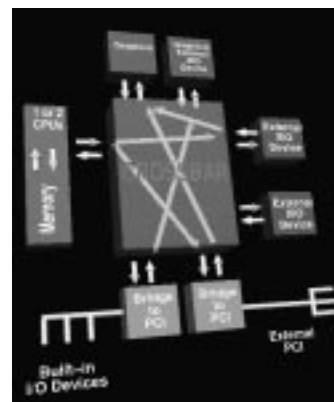
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pus, or to more distant locations using high-bandwidth network transmission.

The DUO display system utilizes the display and image viewing components of the Immersive WorkBench, which include a 100" x 75" viewing table, which adjusts from horizontal to nearly vertical, an RGB projector, a glove interface and stereo shutter glasses. The upgrade from the single user WorkBench requires additional shutter glasses and the proprietary Fakespace image generation and synchronization sub-system. Software to port current 3D-capable applications for use with the system is also provided. The complete single-user Immersive WorkBench system is priced at US\$85,000. Pricing for the DUO upgrade is \$25,000. The system can be driven by any graphics-ready computer capable of generating 3D visualizations with RGB video output.

Contact: Fakespace, 241 Polaris Avenue, Mountain view, CA 94043 USA, 415 688-1940, FAX: 415 688-1949, fakespace@well.com, www.fakespace.com.

SGI has announced the latest in their revamped line of graphics computers, the OCTANE system family. They tell us that the OCTANE family features high-performance graphics, symmetric multiprocessing (SMP) and a 64-bit computing environment. OCTANE graphics scale to deliver a wide variety of performance levels. OCTANE/SI is designed for industry-leading solid modeling performance. Customers can also



add a dedicated texture module to an OCTANE/SI system. OCTANE/SSI doubles the solid modeling performance for customers tackling more

The OCTANE workstation crossbar switch dynamically and directly links any two computer subsystems, giving them a high-speed path without interfering or competing with other system activity.

Image courtesy of Silicon Graphics, Inc.

complex models. OCTANE/MXI, the flagship of the product line, offers the highest levels of realism

Continued page 26.

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VR Products

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available in the family line.

All OCTANE systems come standard with 10Base-T/100Base-TX Ethernet, analog and digital audio I/O, external stereo speakers, and one of three graphics options. The base system includes one 175 MHz R10000 processor, OCTANE/SI Graphics, 64M RAM, 2G system disk, 20-inch monitor. Pricing has not been announced. The OCTANE line is expected to ship this month. OCTANE video options will ship in April.

Contact: Silicon Graphics, 2011 N. Shoreline Blvd., Mountain View, CA 94043 USA, www.sgi.com.

Two new simulation development and training systems were introduced at I/ITSEC by Interface Technologies. Both DIS-compatible systems are based on SGI hardware, and use Virtual Research HMDs and Fakespace PINCH gloves, along with speech recognition and output technology. Both are available now in customized configurations.

ProtoSim is a simulation development platform, and intended to facilitate rapid prototyping and simulation. It is a general-pur-

pose system, with intended applications including medical simulation, architecture, aerospace design, and data visualization.

TactX, is designed for training applications, specifically dismounted infantry in DIS scenarios. It is also suitable for training firefighters, police, HazMat teams, and others performing similar tasks that involve activity and dangerous situations.

Contact: Interface Technologies, 1840 41st Avenue, Suite 102, Capitola, CA 95010 USA, 408 688-3084, FAX: 408 688-3087, itc@appliedve.com, www.AppliedVE.com.

The *Vega Class Recorder* module (Vega-VCR), which provides users with the ability to record and play back simulations, has been released by Paradigm Simulations. Similar to a video cassette recorder in function, Vega-VCR functionality includes record, play, stop, rewind, fast forward, pause and seek. Vega-VCR records and plays back multiple Vega classes, such as observers, objects, players and special effects. "The real benefit of Vega-VCR is that several pre-recorded files can be played simultaneously, and in parallel, while viewing or recording the entire simulation (real-time as well as pre-recorded events)," said Chris Johnson, Vice President of engineering. Vega-VCR is now available and is priced at us\$3,495 U.S.

Continued next page.

Putting the "VR" Back Into VRML

Continued from page 24.

into VRML (using native methods in Java). By using VRML's ROUTE statement, an input device node can have its output sent to a Transform node, in order to move the viewpoint through the environment.

On the Windows 95 platform, all this is easy to implement, because of something called DirectInput. DirectInput is Microsoft's standard interface for 6 DOF devices; it supports translation and rotation around three axes as well as information from a number of buttons. Vendors of specialized input devices simply provide a DirectInput driver for their hardware, so that users can access that device from their existing applications. A similar kind of input capability is also available on the Macintosh.

However, DirectInput does not support multiple channels of simultaneous information. Because of this, more esoteric devices such as datagloves and datasuits (or "motion capture" systems as they're often called now) will be difficult to use with VRML systems. They are worth supporting, but in many cases this may require custom software for each device – so we won't see them in common use until some future version of DirectInput supports multiple data channels.

Special cases – head tracking & stereoscopic rendering

The programming technique described above works fine for most input devices. However, the overhead of all those different software components (script nodes in VRML, Java routines and native methods) contributes to tracking lag. For most

input devices, that isn't much of a problem. However, head tracking is a different story; even a small amount of lag is too much. To properly support the tracking of head mounted displays, it's necessary for the VRML browsers themselves to read the tracker and use it to directly adjust the viewpoint in the virtual world. Both Virtual i-O and Forte have DirectInput drivers for their HMDs, so adding head-tracking support to Windows 95-based browsers should be straightforward.

Supporting HMDs, shutter glasses and other stereoscopic viewing systems will also require changes to the VRML browsers themselves. Each image needs to be drawn twice, once for the left eye and once for the right. Many PC-based VRML browsers are using the Renderware graphics library, which has stereoscopic support built-in. Others are using Direct3D, which is expected to have stereoscopic capabilities in a near-future release.

Of course, the browsers would also have to be configured to take over the entire screen area, with no Netscape frame or control panels. Ideally, they'd also be able to use 320x200 mode, not only to improve performance, but also to match the limited resolution available on consumer HMDs.

What Needs to be Done

None of the above enhancements to VRML browsers are particularly difficult or complex. The challenge lies in convincing browser developers to add the necessary functionality, since they already have a long list of features to implement. However, once this goal has been achieved, VRML will have finally earned the name "Virtual Reality Modeling Language".

VR Products

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Contact: Paradigm Simulation, 14900 Landmark Blvd., Dallas, TX 75240 USA, 972-960-2301, FAX: 972-960-2303, marketing@paradigmsim.com, www.paradigmsim.com.

TriStar has announced a new computer intended for professional graphics users, which would also make a good VR platform. The *StudioStation* base configuration includes dual 200MHz Intel Pentium Pro processors, 128MB of RAM (expandable to 512MB), 500TX GLINT OpenGL 3D accelerator with 16MB of RAM, integrated SCSI ultra wide controller and an A/V-rated 4.3GB hard drive. The StudioStation's base price also includes the ViewSonic PT810 21-inch, high-resolution monitor.

Contact: TRI-STAR, 2424 W. 14th Street, Tempe, AZ, 85281-6900 USA, 602-731-4926, FAX: 602-731-4979, www.tri-cad.com.

Datapath Ltd.'s *RealiMation* toolset that will become a standard part of Science Applications International Corporation's (SAIC) *SIMTools* development environment for real-time 3D simulations. *SIMTools* will use *RealiMation* for cross-platform software graphics rendering.

SIMTools, with *RealiMation*, is compatible with any Windows graphics board or image generator. It supports multiple graphics standards, including OpenGL, Glide, Renderware, Direct3D, and others.

Contacts: SAIC, 703 814-7818, simtools@aol.com. Datapath, Derby, England +44 1332 294441, brett@datapath.co.uk

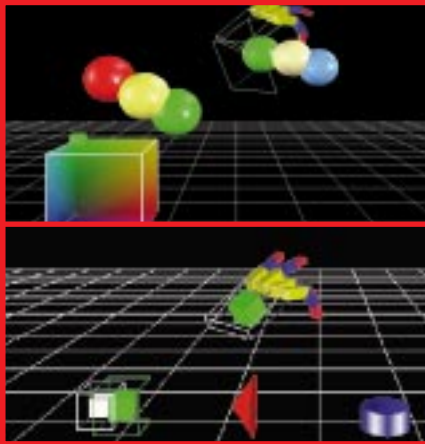
Computer-imaging technology developer Synthonics Technologies Inc. has launched MedScape LLC, a new subsidiary established to design software for creating affordable, photorealistic, three-dimensional (3-D) models and images for dental and medical diagnosis and treatment planning.

MedScape will initially develop software technologies and services for use by orthodontists and reconstructive and aesthetic (plastic) surgeons, who will be able to view and manipulate 3-D re-creations of the dental and facial features of patients on the clinicians' own PCs, or by sending them via the Internet, use them as the basis for collaboration and consultation.

The digital models can be created from any combination of media sources, including X-rays, photos or video frames, without the patient being present. The models are created by Synthonics' patented *Rapid Virtual Reality (RVR)*, 3-D image creation technology. It uses two slightly different 2D images of the same subject to extract 3D data and create a 3D model.

After completion of beta testing, MedScape plans to establish a nationwide network made up of regional service centers and existing medical and dental laboratories.

Contact: MedScape LLC, 31324 Via Colinas, No. 106, Westlake Village, CA 91362 USA, 818 597-2395, synthonics@synthonics.com, www.synthonics.com.



General Reality Company is pleased to announce **GloveGRASP™**, our new C++ SGI developers library for 5th Glove. Featuring context-sensitive and networked gesture recognition, plus hand models and sample source code. **GloveGRASP** is the ideal low-cost solution for intuitive 3D input on SGI!

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