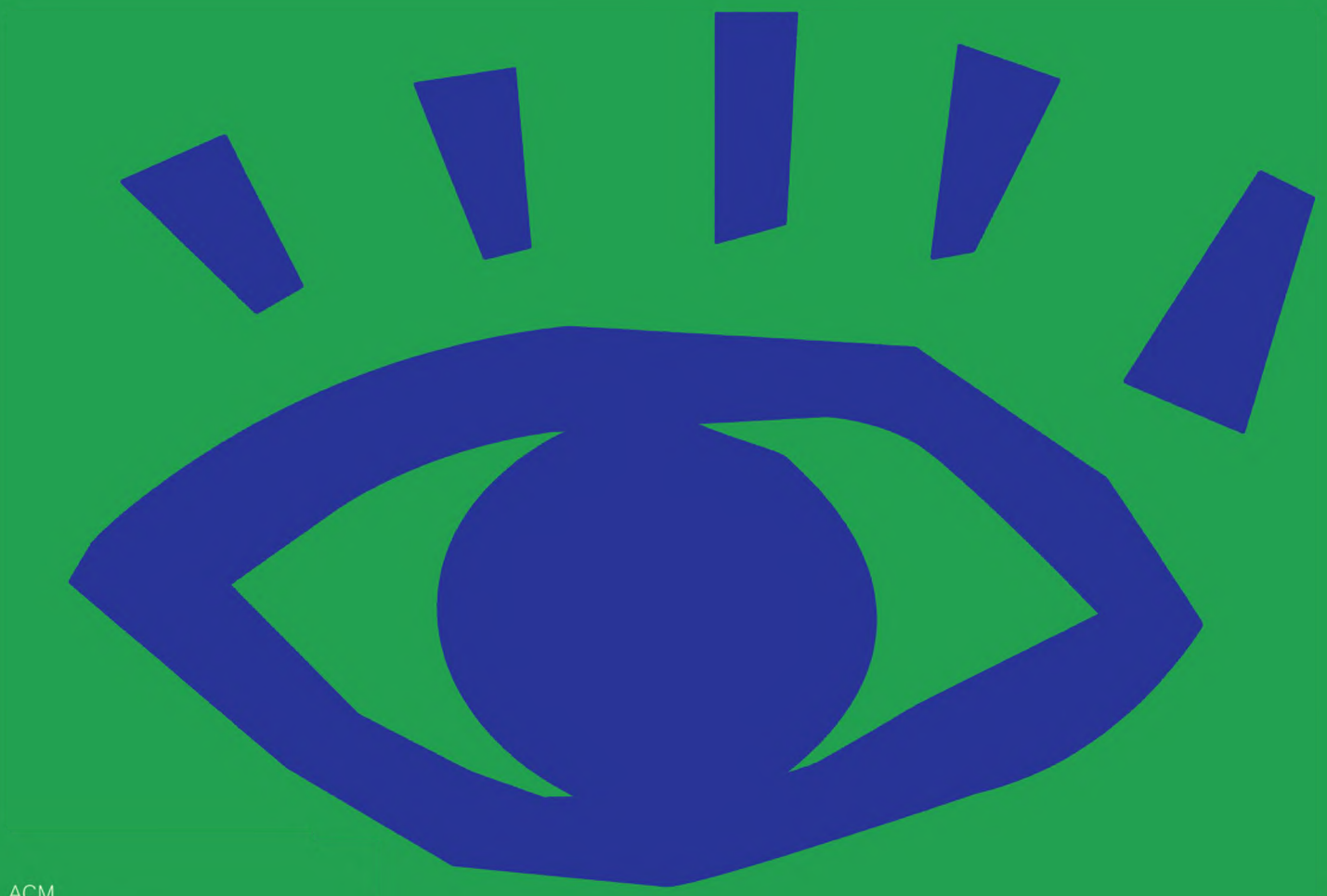
25th International Conference on Computer Graphics and Interactive Techniques
Conference **19-24 July** 1998 Exhibition **21-23 July** 1998
Orlando, Florida USA

program and buyer's guide

SIGGRAPH 98

celebrating 25 years of discovery



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conference at a glance

		SAT 18 JUL	SUN 19 JUL	MON 20 JUL	TUES 21 JUL	WED 22 JUL	THU 23 JUL	FRI 24 JUL
Registration/Merchandise Fulfillment Center SIGGRAPH Store		6 - 8 pm	noon - 7 pm	8 am - 6 pm	8 am - 6 pm	8 am - 6 pm	8 am - 5 pm	8 am - 1 pm
Exhibition/Startup Park	FC CS EP				10 am - 6 pm	10 am - 6 pm	10 am - 5 pm	
Conference Programs								
Art Gallery: Touchware**	FC CS EP		5 - 7 pm	9 am - 6 pm	9 am - 6 pm	9 am - 6 pm	9 am - 6 pm	9 am - 1 pm
Computer Animation Festival Electronic Theater	FC			7 - 9 pm	7 - 9 pm	7 - 9 pm 10 pm - midnight	7 - 9 pm	
Computer Animation Festival Electronic Theater Matinée	CS				2 - 4 pm	2 - 4 pm		
Computer Animation Festival Animation Theaters	FC CS EP		5 - 7 pm	9 am - 6 pm	9 am - 6 pm	9 am - 6 pm	9 am - 6 pm	9 am - 1 pm
Courses	FC		1:30 - 5 pm	8:30 am - 5 pm	8:30 am - 5 pm			
Creative Applications Laboratory*	FC CS		1 - 6 pm	9 am - 6 pm	9 am - 6 pm	9 am - 6 pm	9 am - 6 pm	9 am - 5:30 pm
Digital Pavilions	FC CS EP		5 - 7 pm	9 am - 6 pm	9 am - 6 pm	9 am - 6 pm	9 am - 6 pm	9 am - 1 pm
Educators Program	FC CS						9 am - 6 pm	8:30 am - 4 pm
Enhanced Realities**	FC CS EP		5 - 7 pm	9 am - 6 pm	9 am - 6 pm	9 am - 6 pm	9 am - 6 pm	9 am - 1 pm
Interactive Dance Club	FC CS EP			9 pm - 1 am	9 pm - 1 am	9 pm - 1 am	9 pm - 1 am	
Panels	FC					10:30 am - 6:30 pm	8:30 am - 6 pm	8:30 am - 6 pm
Papers	FC					10:30 am - 6:30 pm	8:30 am - 6 pm	8:30 am - 6 pm
sigKIDS	FC CS EP		5 - 7 pm	9 am - 6 pm	9 am - 6 pm	9 am - 6 pm	9 am - 6 pm	9 am - 1 pm
Sketches	FC CS					10:30 am - 6:30 pm	8:30 am - 6 pm	10:30 am - 6 pm
Special Sessions/Daytime	FC CS					12:45 - 1:45 pm History of the Future		12:45 - 1:45 pm SIGGRAPH Bowl III
Special Sessions/Evening	FC CS EP			5:30 - 6:30 pm Hand-Drawn Spaces	6 - 8 pm Web 3D Round-Up		6:30 - 7:30 pm "Titanic"	

REGISTRATION CATEGORIES FC Full Conference CS Conference Select EP Exhibits Plus

		SAT 18 JUL	SUN 19 JUL	MON 20 JUL	TUES 21 JUL	WED 22 JUL	THU 23 JUL	FRI 24 JUL
Conference Activities								
Career Center	FC CS EP	6 - 8 pm	noon - 7 pm	8 am - 6 pm	8 am - 6 pm	8 am - 6 pm	8 am - 6 pm	8 am - 3 pm
Digital Campfire	FC CS					9:30 am - 5 pm	9:30 am - 5 pm	9:30 am - 5 pm
Film Show Classics	FC CS EP				10 - 11:30 pm		10 - 11:30 pm	
Fundementals Seminar	FC CS EP		2 - 5 pm					
Get Involved	FC CS EP				5 - 6:30 pm			
Guerilla Gallery	FC CS EP		1 - 6 pm	9 am - 6 pm	9 am - 6 pm	9 am - 6 pm	9 am - 6 pm	9 am - 5:30 pm
International Services	FC CS EP	6 - 8 pm	noon - 7 pm	8 am - 6 pm	8 am - 6 pm	8 am - 6 pm	8 am - 6 pm	8 am - 5 pm
Internet Access Centers	FC CS EP		noon - 7 pm	8 am - 6 pm	8 am - 6 pm	8 am - 6 pm	8 am - 6 pm	8 am - 5 pm
Job Fair	FC CS EP					8 am - 6 pm		
Keynote Address/Awards	FC CS EP					8:15 - 9:45 am		
SIGGRAPH Business Meeting	FC CS EP				5:30 - 6:30 pm			
Special Interest Groups & Birds of a Feather	FC CS EP	Throughout the week						
Receptions								
Welcome Reception	FC CS EP		5 - 7 pm					
Course Reception	FC			8 - 11 pm				
25th Conference Recognition Ceremony	FC CS EP					6 - 6:45 pm		
25th Celebration Party	FC CS EP					9 pm - 1 am		
Papers/Panels Reception	FC						8 - 11 pm	

For further information on documentation included with your registration, see page 95.

* When the Creative Applications Laboratory is scheduled for specific technical sessions, it may not be available for use by other attendees.

** Tickets may be required for some installations in Art Gallery: Touchware and Enhanced Realities.

welcome

to SIGGRAPH 98, version 25.0 of the world's greatest showcase of advances in computer graphics and interactive techniques!

Step into the forever-improving future!

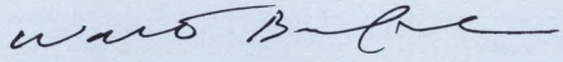
You and your colleagues have created a conference showcasing technology's reach into forms of expression that are more meaningful to the human experience. It's that one week, in one place, where education, excitement, exchange, and fun energize the greeting, meeting, and companionship of 30,000 of your closest friends. This is your classroom, your living room, your front porch, your wonderworld, and corner cafe.

This year, we invite you to participate in and celebrate a small pause, a brief glimpse at the exciting and colorful history that this community creates with every advance, invention, and new dream realized over 25 years of SIGGRAPH conferences.

SIGGRAPH 98 is about people. From the conference identity to the content you have brought to Orlando, your community of scientists, artists, educators, entrepreneurs, and visionaries has fulfilled and expanded the vision we sketched nearly two years ago for SIGGRAPH 98.

It's here, it's yours. Your SIGGRAPH 98 Conference Committee friends thank you for the honor of creating this container for your inspiring achievements.

Enjoy this week of wonderment in Orlando!



Walt Bransford
SIGGRAPH 98 Conference Chair

programs and events

Keynote Address/Awards

Wednesday 22 July 8:15 - 9:45 am Hall E 2

Jim Blinn, Graphics Fellow at Microsoft Research and recipient of the first SIGGRAPH Computer Graphics Achievement Award, surveys the computer graphics scene from his unique perspective as a scientist, engineer, artist, and author. Over the past 25 years, his contributions and achievements have exponentially expanded the horizons of computer graphics.

Immediately before the keynote, SIGGRAPH presents two awards:

- **Michael Cohen,** Microsoft Research, receives the 1998 Computer Graphics Achievement Award for his achievements in radiosity, constraint-based animation, shape design, image-based rendering, and realistic image synthesis.

- **Maxine Brown,** University of Illinois at Chicago, receives the first SIGGRAPH Outstanding Service Award for her many years of leadership on SIGGRAPH organization and conference committees, including chair of SIGGRAPH 92 (Chicago).

25th Conference Celebration

Exhibits and events celebrating the history of SIGGRAPH and computer graphics, and their influence on technology, society, business, applications, education, and aesthetics:

- **Videoconference with panelists at SIGGRAPH 98**, the Smithsonian Institution, and the National Museum of Photography, Film & Television, Pictureville, Bradford, United Kingdom

- **Digital Campfire** – the great stories and legends of computer graphics told by the luminaries themselves

- **25th Conference Recognition Ceremony**

- **Historical displays and exhibits –** Hardware, software, and memorabilia

- **Classic animations and art**

- **A collection of computer graphics seminal writings**

- **25th Celebration Party,** hosted by SIGGRAPH 98, SIGGRAPH Professional Chapters, and friends

Courses

Formal instruction in computer graphics theory, mathematics, and applications presented by experts in every aspect of the discipline in three formats: full-day courses, half-day courses, and two-hour tutorials.

Papers

The world's most distinguished and respected forum for the latest advances in computer graphics. The Papers committee subjects hundreds of submissions to rigorous selection criteria and selects the most significant and provocative work by an international contingent of scientists, engineers, researchers, and application developers, who present their achievements at SIGGRAPH 98.

Panels

This highly interdisciplinary program sparks animated discussions and provides thought-provoking insights from some of the top professionals in the interactive and graphics world. Panels explore the art and science of image and interface, and address the technical, practical, aesthetic, and social challenges that we face as we build the future into the next millennium. All SIGGRAPH 98 Panels will be simultaneously interpreted into Japanese.

SIGGRAPH 98 の全てのパネル討論は、
日本語に同時　通訳されます。

Sketches

Lively presentations of interesting new ideas, unique collaborations, late-breaking results, works in progress, and novel applications of computer graphics and interactive techniques. Sketches are presented in four categories: Technical; Art, Design, and Multimedia; Animation; and Applications.

Educators Program

Computer graphics and interactive techniques in learning environments at all levels, from K-12 through university. For SIGGRAPH 98, the Educators Program has expanded to include papers, panels, a workshop, and the Electronic Schoolhouse – a hands-on area where educators can exchange information on how they use computer graphics.

Conference Programs/Activities

25 Art Gallery: Touchware

A milestone exhibition chronicling 25 years of computer art from early algorithmic drawings and paintings to modeled figures and "pebble drawings" by pioneering computer artists. Artistic insights reveal the simultaneity of touch as a sensory experience and the ephemeral experience of being in touch electronically via the Internet. Artworks include digital paintings, drawings, and photographs; interactive installations; teleperformance projects; ARTSITE Web-based creations (www.siggraph.org/s98/conference/art/artsite.html); and work by some of the earliest pioneers of computer art.

Community Outreach

Room 330 BC

Educators, students, and representatives of the computer graphics industry collaborate to explore how kids and their families can apply new technologies for exploration, fun, and learning.

25 Computer Animation Festival

Animations, performances, and interactions that show computer graphics as product, media, and process. A broad, international selection of this year's most outstanding work is featured in the Animation Theaters as well as in matinée and evening shows of the Electronic Theater. SIGGRAPH 98 also presents two animation events: sigKIDS Theater and, in honor of the 25th conference celebration, Film Show Classics.

Creative Applications Laboratory

The collaborative center of SIGGRAPH 98, where attendees explore the ideas, concepts, and technologies presented in Papers, Panels, Courses, and Sketches. CAL merges art, science, and engineering to create the "Wow!" of SIGGRAPH 98.

Digital Pavilions

Better living through networks and computer graphics: a premier, planet-wide showcase of networked computer applications that demonstrate future (quickly becoming present) ways to communicate, collaborate, and interact.

Enhanced Realities

1998's international showcase of innovations that facilitate human/idea/machine interaction. Where computer graphics combine with emerging technologies to create intelligent graphics that can learn, play, assist, and instruct. Where inspired design and technical breakthroughs point the way to a surprising future.

Fundamentals Seminar

Room 224 CDGH

Sunday 19 July 2 - 5 pm

An essential, accessible introduction to computer graphics jargon, concepts, techniques, and technologies. The perfect orientation for novices on the fast track.

Presenters

- Mike Bailey, University of California at San Diego/San Diego Supercomputer Center
- Wayne Carlson, The Ohio State University
- G. Scott Owen, Georgia State University

Interactive Dance Club

In this turn-of-the-century club, audience members become performers. Participants influence the music, images, video, and lighting via interactive zones that are linked together to create an overall experience. The place in the evening to hang out and watch, or jump in and play!

25 Receptions

Food, refreshment, fun, friends, and colleagues convene for informal evening interchange. Three receptions (the 25th Conference Recognition Ceremony, the 25th Celebration Party, and the Welcome Reception) are open to all SIGGRAPH 98 attendees. The Course Reception and Papers/Panels Reception are included with Full Conference registration.

- **Welcome Reception**
  Hall C, Rooms 314, 315 B
  Sunday 19 July 5 - 7 pm
- **Course Reception**
  Renaissance Orlando Resort Pool
  Monday 20 July 8 - 11 pm
- **Papers/Panels Reception**
  Orlando Science Center
  Thursday 23 July 8 - 11 pm
- **25th Conference Recognition Ceremony**
  Hall C Lobby
  Wednesday 22 July 6 - 6:45 pm
- **25th Celebration Party**
  Wide World of Sports Complex at Walt Disney World
  Wednesday 22 July 9 pm - 1 am

Session Breakout Lounge

Hall F Lobby

After each technical session, join presenters and authors for continued discussion in a comfortable, informal lounge setting.

SIGGRAPH TV

Live events, recorded programming, and video coverage of SIGGRAPH 98 will be broadcast throughout the Orange County Convention Center and beyond.

sigKIDS

sigKIDS Art and sigKIDS Interactive feature exhibits that highlight computer graphics applications and work for and by children. These interactive exhibits are available for attendees of all ages to explore and experience.

Special Interest Groups & Birds of a Feather

Special Interest Groups (SIGs) are for attendees who think and work in similar technologies and environments. Birds of a Feather (BOFs), Room 204 C, are impromptu gatherings organized at the conference by anyone who posts a notice on the BOFs sign-up board at SIGGRAPH 98 (Hall C Lobby, OCCC).

T-Shirt Contest

Room 312

The annual, underground T-Shirt Contest will be juried at noon on Thursday, 23 July at SIGGRAPH 98. Bring your unique, CG-designed t-shirt with a description of the process used to create it. For information, contact:

Joe Lohmar
lohmar@siggraph.org

Wednesday is vintage t-shirt day! Pull out those old SIGGRAPH t-shirts and wear them with pride.

Special Sessions

Hand-Drawn Spaces

Monday 20 July 5:30 - 6:30 pm
Hall E 2

"Hand-Drawn Spaces" is a virtual performance in which dancers move across three projection screens and the spaces in between. The figures are modeled and rendered as three-dimensional sketches and animated by the intricate choreography of Merce Cunningham. The composition was created with motion fragments that were motion captured, key-frame reduced, footstep-extracted and then assembled into long-format sequences with motion-flow editing. In this Special Session, presenters discuss their individual contributions to this work and address the prospects of and for virtual dance.

Chair
Paul Kaiser
Riverbed
(Concept and Visual Design)

Presenters
Merce Cunningham
Cunningham Dance Foundation
(Choreography)

Paul Kaiser, Shelley Eshkar, Michael Girard, and **Susan Amkraut**, Unreal Pictures (Motion Editing and Composition Software)

Shelley Eshkar
Riverbed
(Concept and Visual Design)

Ron Kuivila
(Sound Design)

Web 3D Round-Up: Tomorrow's Visions of Web-Based Virtual Reality

Tuesday 21 July 6 - 8 pm
Valencia Room D

The Web is round! Forget about html flatland. Come see the latest 3D offerings for the World Wide Web. Due to popular demand, SIGGRAPH 98 invited the SIGGRAPH 97 VRML Special Interest Group to expand their program to include all applications of 3D for the World Wide Web in their own Special Session.

This lively, fast-paced demo session is a guaranteed fun time for all.

Organizer
Don Brutzman
Naval Postgraduate School

Master of Ceremonies
Timothy Childs
WhoWhere, Inc.

History of the Future: The Past, Present, and Future of Computer Graphics

Wednesday 22 July 12:45 - 1:45 pm
Hall E 2

Computer graphics and interactive techniques, once the esoteric purview of computer scientists in the ivory towers of academia and military research, have now permeated virtually every aspect of our culture. From high-tech film effects to the World Wide Web, from architecture to artificial intelligence, from computerized games to computerized brain surgery, computer graphics can be seen in all facets of modern life.

The 25th SIGGRAPH conference provides an opportunity to pause and reflect. Where were we going 25 years ago and before? Where did we end up? Were the predictions we made over the past 25 years accurate? What went wrong? What went right? What surprised everyone?

Join us for this insightful, humorous, and lively look at the past, present, past future, present past, and present future of computer graphics and interactive techniques.

Moderator
Celia Pearce
Celia Pearce & Friends
SIGGRAPH 98 Panels Chair

Speakers
Rebecca Allen
University of California at Los Angeles

Don Greenberg
Cornell University/Hewlett Packard

Alan Kay
Walt Disney Imagineering

Turner Whitted
Microsoft Research

Survival Stories from "Titanic"

Thursday 23 July 6:30 - 7:30 pm
Hall E 2

The chills. The thrills. The spills. Tales of human courage under daunting odds. Epic disasters in the face of looming deadlines. No, not the movie – the effects production.

Survival Stories from "Titanic" provides an intimate, in-the-trenches look at what it took to coordinate a massive multi-company project of this scale, and the management and people skills required. At SIGGRAPH 97, attendees got a sneak preview of some of the awesome special effects in "Titanic." This year, get an insider's view of the trials and tribulations of creating this Academy Award-winning epic disaster movie.

Moderator
Camille Celluci
Independent Visual Effects Producer

Speakers
Rob Legato
Judith Crow
Digital Domain

Ken Jones
Composite Image Systems

Casey Cannon
Banned from the Ranch

Jamie Dixon
Hammerhead Productions, Inc.

Cheryl Budgett
Blue Sky | VIFX

SIGGRAPH Bowl III

Friday 24 July 12:45 - 1:45 pm
Hall E 2

A quiz show that tests the knowledge of these Official Bowling Teams on a variety of computer graphics topics and trivia:

- **Team Seattle: The Raining Champions**
  David Salesin
  Andrew Glassner
  Michael Cohen
- **Team NYC: What are you looking at?**
  Scott Lang
  Ken Perlin
  Carl Machover
- **Team Utah: Utah Teaputz**
  Peter Shirley
  Peter-Pike Sloan
  Robert McDermott
- **Team Brown: Hooray for the Red, White and Brown**
  David "Spoke" Laidlaw
  Nancy "Spork" Pollard
  John "Spike" Hughes
- **Team Grappa: The Twice-Fermented Team**
  Ken Musgrave
  Dave Fracchia
  one Wyvill to be named later
- **Team Caltech: Catch the Wavelet**
  Peter Schröder
  Al Barr
  David Breen
- **Team CMU: Straight from Mister Roger's Neighborhood**
  Paul Heckbert
  Steve Seitz
  Michael Garland
- **Team ILM: Let the Wookiee Win**
  Joshua Pines
  Dan Goldman
  Florian Kainz
  Subs: Rod G. Bogart, Doug Smythe

tracks

SIGGRAPH 98 programs and events focus on six broad technical themes. In this publication, symbols identify which Courses, Papers, Panels, Sketches, and Educators Program sessions are associated with these thematic tracks. Other programs also include track-related content.

Animation & Special Effects

Producing and using computer graphics techniques for animation, special effects, and other entertainment applications.

Courses

34 3D Computer Animation Workshop

39 The Art of Disney's "Mulan"

40 Compositing in the Digital Film Industry: Case Studies in Film Production

Papers

NeuroAnimator: Fast Neural Network Emulation and Control of Physics-Based Models

Subdivision Surfaces for Character Animation

Large Steps in Cloth Simulation

Texture Mapping for Cel Animation

Interaction

Design, implementation, and application of advanced, intuitive human-computer communication.

Courses

1 Physical Interaction: The Nuts and Bolts of Using Touch Interfaces with Computer Graphics Applications

35 Interactive Visualization and Web-Based Exploration in the Physical and Natural Sciences

Papers

mediaBlocks: Physical Containers, Transports, and Controls for Online Media

Modeling

Creation and manipulation of representations for graphical objects.

Courses

13 Physically Based Modeling

16 Procedural Implicit Techniques for Modeling and Texturing

21 3D Geometry Compression

31 Cloth and Clothing in Computer Graphics

36 Subdivision for Modeling and Animation

Papers

Subdivision Surfaces for Character Animation

Multiresolution Surfaces (all papers)

Realistic Modeling and Rendering of Plant Ecosystems

Surfaces (all papers)

Rendering

Creation of realistic images from models, by computing the interaction of light with surfaces.

Courses

5 A Basic Guide to Global Illumination

11 Advanced RenderMan: Beyond the Companion

15 Image-Based Modeling and Rendering

33 Rendering with Radiance: A Practical Tool for Global Illumination

Papers

Image-Based Modeling & Rendering (all papers)

Image-Based Rendering (all papers)

Rendering (all papers)

Virtual Reality

Creation of and immersive interaction with virtual environments.

Courses

14 Applied Virtual Reality

38 Immersive Environments: Research, Applications, and Magic

Papers

Constellation: A Wide-Range Wireless Motion-Tracking System for Augmented Reality and Virtual Set Applications

Synthetic Actors

Creating, acquiring, programming, and controlling realistic, real-time human behavior.

Courses

10 Hardcore AI for Computer Games and Animation

22 Artificial Life for Graphics, Animation, Multimedia, and Virtual Reality

28 Virtual Humans: Behaviors and Physics, Acting and Reacting

Papers

Retargeting Motion to New Characters

Making Faces

An Anthropometric Face Model Using Variational Techniques

Modeling Realistic Facial Expressions From Photographs

Panels	Sketches	Educators Program
Dis-Illusion of Life: Becoming a Digital Character Animator Feature FX: Money Pit or Gold Mine?	*Technical Sketches* • Fast Multi-Layer Fog • Adventures in Moving Session *Applications Sketches* • Previsualization for Starship Troopers, Managing Complexity in Motion *Animation Sketches* • All	The Language of Cinema and Traditional Animation in the 3D Computer Animation Classroom
Computer Vision in 3D Interactivity The Sorcerer's Apprentice: Invoking Ubiquitous Computing for Computer Graphics Out of the Box: Toys Break the Screen Barrier Interfaces for Humans: Natural Interaction, Tangible Data, and Beyond...	*Technical Sketches* • Star Cursors in Content Space: Abstractions of People and Places • Plane-Shape Perception Using Point-Contact Type Force Feedback *Art, Design, and Multimedia Sketches* • Electronic Remapping: Body Augmentation in the Electronic Age • Interactive Poem	Moving Mountains: Using Interactive Graphics to Teach Geography The Physics 2000 Project: Interactive Physics on the World Wide Web Web-Based Teaching of Computer Graphics: Concepts and Realization of an Interactive Online Course
Is Robust Geometry Possible?	*Technical Sketches* • Another Fine Mesh Session • Artificial Evolution of Implicit Surfaces • Editing 3D Objects Without 3D Geometry Natural Causes Session *Applications Sketches* • DView • Studying Sculpture with a Digital Model: Understanding Michelangelo's Pietà of the Cathedral	
Ray Tracing and Radiosity: Ready For Production?	*Technical Sketches* • The Light Brigade Session • A Model for Anisotropic Reflections in OpenGL • Quadratic Interpolation for Near-Phong Quality Shading *Applications Sketches* • Techniques Session	
Virtual Reality as Healing Art Are You Here? Presence in Virtual Reality: What Is It All About and Why Care? Look Ma! Four Hands! New Models for Interacting with 3D Worlds Human Factors in Virtual World Design: Psychological and Sociological Considerations Special Session: 3D Web Roundup	*Technical Sketches* • Optimizing Stereo Video Formats for Projection Based Virtual Reality • Reality++ Session *Applications Sketches* • Time Travels in Virtual Landscapes • Smithsonian Without Walls • Training and Simulation Session • Emerging Technologies Session	Virtual Reality in Education: Irish and American Students on the Virtual Frontier
Characters on the Internet: The Next Generation Behavioral Modeling and Animation: Past, Present, and Future	*Applications Sketches* • Virtual Stage: An Interactive 3D Karaoke System *Art, Design, and Multimedia Sketches* • It/I: Theatre with an Automatic Reactive Computer Graphics Character	

creative applications laboratory

The collaborative center of SIGGRAPH 98, where attendees explore the ideas, concepts, and technologies presented in Papers, Panels, Courses, Sketches, Art Gallery: Touchware, and the Computer Animation Festival. CAL merges art, science, and engineering to create the "Wow!" of SIGGRAPH 98.

Location

Room 230

Days

Sunday 19 July
Monday 20 July
Tuesday 21 July
Wednesday 22 July
Thursday 23 July
Friday 24 July

Hours

1 - 6 pm
9 am - 6 pm
9 am - 6 pm
9 am - 6 pm
9 am - 6 pm
9 am - 5:30 pm

Guerilla Gallery

Room 205

Guerilla Gallery is an exciting digital studio where art can be created and printed using the latest technologies. It fosters unique collaborations among scientists, artists, and educators.

Come interact with experienced digital artists and animators. Look for impromptu presentations and educational sessions about creating digital art. Sign up for hands-on access to advanced and unique computer graphics equipment and digital printers.

Chair

Garry M. Paxinos
Metro Link Incorporated

Creative Applications Lab Committee

Stuart Anderson
Metro Link Incorporated

Gudrun Enger
Silicon Graphics, Inc.

Ross Gilson
Florida Atlantic University

Cynthia Jakeway
IFAC

Patricia Johnson
Computer Imaging Resources

Rob Lembree
Silicon Graphics, Inc.

Emmy Louvaris

Francis McAfee
Florida Atlantic University

Chris Tome
3D Design

Jordanna Williams
Visible Means, Co.

Rob Williams
Visible Means, Co.

CAL

Art Gallery: Touchware

VRML-Based Interactive Art
Chuck Csuri

Computer Animation Festival

Kazematsuri
Yasuo Ohba

Papers

Efficiently Using Graphics Hardware in Volume Rendering Applications

A Beam Tracing Approach to Acoustic Modeling for Interactive Virtual Environments

Non-Distorted Texture Mapping For Sheared Triangulated Meshes

The Office of the Future: A Unified Approach to Image-Based Modeling and Spatially Immersive Displays

A Distributed 3D Graphics Library

Panels

Listen Up! Real-Time Auditory Interfaces for the Real World

Courses

1 Physical Interaction: The Nuts and Bolts of Using Touch Interfaces with Computer Graphics Applications

7 A Visual Introduction to OpenGL Programming

17 Advanced Graphics Programming Techniques Using OpenGL

19 Beyond Bottlenecks and Roadblocks: Internetworked 3D Computer Graphics

20 Real-Time Graphics for Visual Simulation: Advanced Techniques from the Top Down

28 Virtual Humans: Behaviors and Physics, Acting and Reacting

34 3D Computer Animation Workshop

35 Interactive Visualization and Web Exploration in the Physical and Natural Sciences

Sketches

Interactive Poem

Designing with Words: a Model for a Design Language in a MOO

courses

Formal instruction in computer graphics theory, mathematics, and applications presented by experts in every aspect of the discipline in three formats: full-day courses, half-day courses, and two-hour tutorials. SIGGRAPH 98 Courses are not organized in three discrete levels of difficulty. Instead, the Courses Committee offers two other types of information:

- **A course level indicator below each course title presents a more refined indication of course level, as derived from the course reviewers.**
- **For each course, a description, prerequisites, and a summary of topics covered have been carefully crafted to help you decide which courses are most appropriate for your background and interests.**

Attendees who select the Full Conference registration option receive access to all SIGGRAPH 98 Courses and the Course Notes CD-ROM. Printed course notes can be purchased at SIGGRAPH 98.

Location

See pages 12 - 34

Days	Hours
Half Day am	
Monday 20 July	8:30 am - noon
Tuesday 21 July	8:30 am - noon
Half Day pm	
Sunday 19 July	1:30 - 5 pm
Monday 20 July	1:30 - 5 pm
Tuesday 21 July	1:30 - 5 pm
Full Day	
Monday 20 July	8:30 am - 5 pm
Tuesday 21 July	8:30 am - 5 pm
Tutorial	
Sunday 19 July	3 - 5 pm
Monday 20 July	10 am - noon
Tuesday 21 July	10 am - noon

Courses Chair
Harry F. Smith
University of North Carolina at Wilmington

Administrative Assistant
Emma Kay Thornton
University of North Carolina at Wilmington

Committee

Barb Helfer
The Ohio State University

Alyce Kaprow
The New Studio

Anselmo Lastra
University of North Carolina at Chapel Hill

Steve May
The Ohio State University

Nan Schaller
Rochester Institute of Technology

Arnulfo Zepeda
Microsoft Corporation

DHCP

Network access is available from tables near the front of some course rooms. Attendees with laptop computers equipped for 10BaseT Ethernet can access SIGGRAPH 98's GraphicsNet internal network and the Internet via DHCP (Dynamic Host Configuration Protocol), which dynamically "hands out" and later reclaims IP addresses. This network facility is a limited experiment. For a few courses, a few ports in a small number of course rooms are available on a first-come, first-served basis.

Sunday 19 July

interaction CAL

1 Physical Interaction: The Nuts and Bolts of Using Touch Interfaces with Computer Graphics Applications

Sunday **Half Day PM**

Beginning — Intermediate — Advanced

An introduction to haptic hardware and current software techniques with an emphasis on applications. The course begins with an introduction to haptics and the basic psychophysics of human touch, followed by the evolution of haptic devices. It includes an overview of haptic software techniques, examples of practical microscopy, and how volumetric representations and applications are used in medicine and modeling. It concludes with a summary of the future of haptic technology and a hands-on demonstration.

Prerequisites

Participants should have a working knowledge of computer graphics, virtual environments, and visualization techniques. Familiarity with volume rendering methods is useful.

Topics Covered

Haptics history, haptic devices, psycho-physics, basic mechanics, physical modeling, geometric rendering techniques, volumetric rendering techniques, haptic modeling and painting, and haptics APIs.

Organizer

Ricardo Avila
General Electric Corporate R&D Center

Lecturers

Ricardo Avila
General Electric Corporate R&D Center

Matt Coill
Microsoft Corporation

Thomas Massie
SensAble Technologies

Kenneth Salisbury
Massachusetts Institute of Technology

Russell Taylor
University of North Carolina at Chapel Hill

Room 224 ABEF

Schedule

1:30	**Introduction** Salisbury
2:15	**Haptic rendering** Massie
2:45	**Entertainment software and applications I** Coill
3	**Break**
3:15	**Entertainment software and applications II** Coill
3:30	**Visualization applications** Taylor
4	**Volume haptics** Avila
4:30	**Future of haptics** Salisbury
4:40	**Live demonstration** All

2 Exploring Gigabyte Data Sets in Real Time: Algorithms, Data Management and Time-Critical Design

Sunday **Half Day PM**

Beginning — Intermediate — Advanced

Modern data sets arising from computational physics are extremely large and involve complex, difficult-to-exhibit phenomena. "Real-time" interfaces have proven useful for analysis of these data sets, but "real-time" performance has been difficult to achieve with such large amounts of data. This course discusses the issues that arise in real-time interactive visualization of very large (>100 gigabytes) data sets and presents solution strategies that emphasize feature detection and time-critical design that impacts architectures, interfaces, algorithms, and data management.

Prerequisites

Familiarity with the basics of scientific visualization and three-dimensional computer graphics.

Topics Covered

Architectures and algorithms for near-real-time interactive visualization, including fast access to data on disk, extraction of interesting features, and time-critical visualization techniques.

Organizer

Steve Bryson
NASA Ames Research Center

Lecturers

Steve Bryson
NASA Ames Research Center

Michael Cox
MRJ Technology Solutions/NASA Ames Research Center

Bob Haimes
Massachusetts Institute of Technology

Room 414 CD

Schedule

1:30	**Introduction** Bryson
1:45	**Architectures, algorithms, and interfaces** Bryson
2:15	**Feature detection I** Haimes
3	**Break**
3:15	**Feature detection II** Haimes
3:30	**Data management** Cox
4:30	**Time-critical design** Haimes

3 Parallel and Distributed Photo-Realistic Rendering

Sunday **Half Day PM**

Beginning **Intermediate** **Advanced**

Parallel processing offers an approach that significantly reduces computation time and exploits combined memory resources. Complex environments must be distributed over the processors' local memories, so careful attention must be paid to the correct management of data and tasks, to ensure an efficient and scalable solution. This course addresses techniques for decreasing the volume of cached data, aiding memory management, and optimizing communication. It includes task scheduling and memory management techniques for three photo-realistic graphics algorithms: ray tracing, radiosity, and particle tracing. Their different parallel implementation approaches are compared and contrasted.

Prerequisites

Knowledge of ray tracing, radiosity, particle tracing, geometric simplification, levels of detail, impostors, and related topics. Experience with parallel processing is useful, but it is not assumed.

Topics Covered

Task migration, coherence, load balancing, and communication issues, as well as data decomposition, data redistribution, and various caching mechanisms. Their application to ray tracing, radiosity, and particle tracing is compared and contrasted.

Organizer
Alan Chalmers
University of Bristol

Lecturers
Alan Chalmers
Erik Reinhard
University of Bristol

Room 311 ABCD

Schedule

1:30 **Introduction**
Chalmers

1:45 **Task scheduling**
Chalmers

2:15 **Data management**
Reinhard

2:35 **Caching technique**
Reinhard

3 **Break**

3:15 **Parallel ray tracing**
Reinhard

3:45 **Parallel radiosity**
Chalmers

4:15 **Parallel particle tracing**
Chalmers

4:45 **Discussion**
Both

4 Advanced Geometric Techniques for Ray Casting Volumes

Sunday **Half Day PM**

Beginning **Intermediate** **Advanced**

Hardware-assisted volume rendering techniques for solving common practical problems in geo-science, medical, and scientific applications. The course introduces a framework that unifies treatment of volumes and geometry by employing a highly flexible tetrahedral decomposition of volumetric shapes. It then presents effective techniques for handling such commonly occurring tasks as: deforming volumes, defining arbitrarily shaped regions of interest, clipping to non-planar surfaces, rendering multiple volumes, hardware-assisted shading, unstructured grids, and large data set roaming.

Prerequisites

Familiarity with fundamentals of 3D computer graphics, basic volume visualization techniques (ray casting), basic programming skills, and working knowledge of OpenGL with an emphasis on texture mapping.

Topics Covered

Advanced volume rendering techniques using hardware acceleration accessible through OpenGL, disassociation of volume appearance and geometry, tetrahedral primitives, polygonization, bricking, mixing volumetric and polygonal shapes, multiple volumes, shading, deformations, clipping, unstructured grids, and performance tips.

Organizer
Robert Grzeszczuk
Silicon Graphics, Inc.

Lecturers
Robert Grzeszczuk
Silicon Graphics, Inc.

Chris Henn
Silicon Graphics, SA

Roni Yagel
Biomedicom

Room 240 CD

Schedule

1:30 **Fundamentals of volume rendering**
Yagel

2:15 **Basic geometric techniques I**
Grzeszczuk

3 **Break**

3:15 **Basic geometric techniques II**
Grzeszczuk

3:45 **Advanced techniques and applications**
Henn

4:45 **Volume imaging API**
Grzeszczuk

Sunday 19 July

rendering

5 A Basic Guide to Global Illumination

Sunday Half Day PM

Beginning Intermediate Advanced

The goal of global illumination methods is to simulate the path of light in an environment through the image plane in order to compute realistic images. Not all applications require the accuracy attainable with global illumination methods, and not all global illumination methods are good for all possible lighting effects. In this course, comparison of physical experiments provides insight into the basic methods. The target audience includes: people who are new to graphics, who teach and work in other areas of graphics, and who might want to understand how these methods differ from other rendering techniques.

Prerequisites

Beginning experience with graphics, including representation of geometry by polygons specified as lists of vertices. Familiarity with physics and math at a level provided by first-year college courses in physics and calculus is also assumed.

Topics Covered

The course presents a model of image formation in which RGB values in an image are determined by a global illumination method. It also presents the physical equations that govern global illumination, how these equations relate to image RGB values, and ray tracing and radiosity as they relate to these equations.

Organizer
Holly Rushmeier
IBM T.J. Watson Research Center

Lecturers
David Banks
Mississippi State University

Holly Rushmeier
IBM T.J. Watson Research Center

Peter Shirley
University of Utah

DHCP

see page 11 for information

Hall F 1-2

Schedule

1:30 **Motivation and definitions**
Banks, Rushmeier

2:15 **Ray tracing**
Banks

3 **Break**

3:15 **Radiosity**
Shirley

4 **Current trends**
Rushmeier

4:45 **Questions and answers**
All

6 From Fourier Analysis to Wavelets

Sunday Half Day PM

Beginning Intermediate Advanced

Fourier analysis and wavelet theory, the fundamental mathematical framework for the description of functions in the time and frequency domains, are the key elements for effective analysis of function properties, as well as for efficient implementation of computational methods. For this reason, it is very important in many application areas to find function descriptions that are localized both in time and frequency. In this course, attendees learn the mathematical concepts behind Fourier analysis and wavelets. These concepts are significant for researchers and developers alike, because they are involved in so many of the problems in computer graphics and image processing.

Prerequisites

Knowledge of linear algebra and calculus. Some familiarity with analysis of real and complex functions is desirable. The course also assumes basic knowledge of signal and image processing.

Topics Covered

The main tools for function analysis in the frequency domain (the Fourier and Windowed Fourier Transforms), fundamental aspects of multiresolution analysis and its importance to the construction of wavelets, the main principles of computation with wavelets and their implementation, and various extensions of the basic wavelet transform.

Organizers and Lecturers
Jonas Gomes
Luiz Velho
Instituto de Matemática Pura e Aplicada

Room 312

Schedule

1:30 **Fundamentals of Fourier analysis**
Gomes

2:15 **From time-frequency localization to wavelets**
Gomes

3 **Break**

3:15 **Filter banks and wavelets**
Velho

4 **Wavelet design**
Velho

courses

CAL

7 A Visual Introduction to OpenGL Programming

Sunday **Half Day PM**

Beginning — Intermediate — Advanced

An introduction to writing interactive graphics programs using the OpenGL API. Instead of snippets of code and static, captured images, this course features interactive tools to visualize and experiment with computer graphics concepts, such as transformations, lighting, and texture mapping. Detailed explanations focus on controlling the position and movement of the camera, the light sources, and objects in a scene. The effects of changing the order of modeling transformations (and their associated matrices) are discussed and visually demonstrated.

Prerequisites

Ability to program in a structured programming language such as C, C++, or Java and familiarity with mathematical concepts such as matrix multiplication, trigonometry, cross products, and dot products. Knowledge of transformations, lighting, and texturing is helpful. This course assumes no prior knowledge of OpenGL programming. It may be too elementary for those who are experienced with OpenGL.

Topics Covered

The syntax and structure of the OpenGL API for writing programs that render 2D and 3D, transformed, lit, shaded, textured geometric objects with hidden surfaces removed. Underlying mathematical principles for a graphics rendering library are also discussed.

Organizer
Mason Woo
World Wide Woo

Lecturers
Dave Shreiner
Silicon Graphics, Inc.

Mason Woo
World Wide Woo

Room 330 DEFG

Schedule

1:30 **Welcome and OpenGL introduction**
Woo

1:50 **Elementary rendering**
Shreiner

2:20 **Matrix transformations**
Woo

3 **Break**

3:15 **Lighting models**
Shreiner

3:45 **Texturing**
Shreiner

4:15 **Overview of other topics**
Woo

4:50 **Summary, questions and answers**
Both

8 Theory and Practice of "Tour Into the Picture"

Sunday **Tutorial 3-5 pm**

Beginning — Intermediate — Advanced

In-depth exposition of a new image-based rendering technique, "Tour Into the Picture" (TIP), which was originally presented at SIGGRAPH 97. This technique gives a unique and powerful GUI for making "visually 3D" animation from a single 2D picture or photograph. The course gives practical and detailed guidance on how to use TIP, along with many animations and real-time demonstrations. The course also focuses on theoretical aspects of TIP, including features and applications not discussed in the original paper.

Prerequisites

Basic knowledge of 3D computer graphics. Working knowledge of rendering, modeling, and animation may be helpful. Programming experience using a 3D library is useful but not required.

Topics Covered

Basic and practical techniques used in image-based rendering approaches, such as texture/projection mapping and image warping, and a more general and theoretical approach to designing a GUI for image-based rendering.

Organizer
Ken-ichi Anjyo
Hitachi, Ltd.

Lecturers
Ken-ichi Anjyo
Youichi Horry
Hitachi, Ltd.

Room 240 AB

Schedule

3 **Introduction**

What is "Tour Into the Picture" (TIP), motivation, scope, and related works in image-based modeling and rendering
Anjyo

3:15 **Making animation from a single image, real-time demonstration on the PC, animation examples, applications**
Horry

4:10 **Toward cognitive reality, mathematics and algorithms in TIP, from photoreality to cognitive reality, a new framework for realistic rendering, characterization and extension of TIP**
Anjyo

4:50 **Concluding remarks and future directions, questions and answers**
Both

9 Fundamentals of Video Compression Techniques

Sunday **Tutorial 3-5 pm**

Beginning **Intermediate** **Advanced**

A picture may be worth 1,000 words, but it takes far more than 1,000 words to display a high-resolution image. When motion video is considered, the storage requirements become gigantic. Fortunately, techniques exist to lessen this data requirement without affecting the resulting image quality too badly. This course investigates and compares various compression techniques in still and motion video. It explores the underlying techniques that form the foundation of today's compression algorithms, with an emphasis on examining the trade-offs between quantity and quality for different techniques.

Prerequisites

A basic understanding of bit-mapped graphics is helpful. Attendees should understand the concept of the pixel as an RGB triplet, the image as a rectangular array of pixels, and the video clip as a sequence of images. No serious math skill is required. Because this course makes significant use of side-by-side slides that show subtle differences, good eyesight is helpful.

Topics Covered

The basics of digital color science, subsampling, quantization, rounding, error diffusion, delta coding, color spaces, spatial correlation, prediction, discrete cosine transforms, Huffman coding, macroblocks, and decompression.

Organizer and Lecturer
Andy Daniel
Alliance Semiconductor

Room 414 AB

Schedule

3 **Welcome and course overview**
Daniel

3:05 **Why is compression needed? Possible? Acceptable?**
Daniel

3:20 **Digital color and human perception**
Daniel

3:40 **Underlying techniques demystified**
Daniel

4:15 **Decompression techniques**
Daniel

4:30 **JPEG/MPEG**
Daniel

synthetic actors

10 Hardcore AI for Computer Games and Animation

Sunday **Tutorial 3-5 pm**

Beginning **Intermediate** **Advanced**

Using ideas and techniques from cognitive robotics that are completely new to the computer graphics community, this tutorial imparts a basic understanding of the key issues associated with building intelligent characters for computer games and animation. In particular, within the concrete and intuitive framework of the situation calculus, it provides an in-depth survey of solutions to important knowledge-representation problems that arise in computer games and animation. It then proceeds to more advanced topics such as incorporating sensing, planning, and reactive behaviors. The tutorial concludes with a detailed look at new work on problems in cinematography, computer games, and behavioral animation.

Prerequisites

This tutorial is self-contained, but a degree of mathematical maturity is assumed. Attendees should not feel intimidated by standard notation from mathematical logic. Knowledge of programming, computer games, computer animation, or AI is a big advantage.

Topics Covered

The situation calculus, logic programming, possible worlds semantics, using interval arithmetic to handle uncertainty, nondeterministic specification of programs, and logical approaches to control.

Organizer and Lecturer
John Funge
Intel Corporation

Room 311 EFGH

Schedule

3 **Motivation**
Funge

3:10 **Background**
Funge

3:20 **Cognitive modeling**
Funge

3:45 **Sensing**
Funge

4 **High-level control**
Funge

4:20 **Applications**
Funge

4:50 **Summary**
Funge

Monday 20 July

rendering

11 Advanced RenderMan: Beyond the Companion

Monday **Full Day**

Beginning **Intermediate** **Advanced**

Much of RenderMan's power is due to its flexibility and extensibility, which gives users the ability to customize the system to fit situations not envisioned by the original implementors. This course goes beyond the basics presented in The RenderMan Companion and teaches advanced tricks and techniques that are being used (or should be) in late-1990's special effects production. It examines examples of successful animations that made extensive use of RenderMan's features, particularly its Shading Language.

Prerequisites

Thorough knowledge of 3D image synthesis and computer graphics illumination models, and previous experience with the RenderMan Shading Language are required. Students should be facile in C. The course is not for those with weak stomachs for examining code.

Topics Covered

Modern methods of generating geometric data and handling geometric complexity, advanced Shading Language techniques, and antialiasing of shaders. Case studies include discussions of volumetric rendering, realistic lighting, and issues of integration with other CGI tools.

Organizers

Tony Apodaca
Larry Gritz
Pixar

Lecturers

Tony Apodaca
Ronen Barzel
Larry Gritz
Pixar

Antoine Durr
Blue Sky | VIFX

Clint Hanson
Sony Pictures Imageworks

Scott Johnson
Fleeting Image Animation

Room 240 AB

Schedule

8:30 **Introduction**
Apodaca

8:45 **Modern scene description paradigms**
Apodaca

10 **Break**

10:15 **Advanced shader writing techniques**
Gritz

noon **Lunch**

1:30 **Advanced techniques for CG lighting**
Barzel

2:15 **RenderMan as an element in the produc tion pipeline**
Durr

3 **Break**

3:15 **Volume rendering effects in "Contact"**
Hanson

4 **Non-photorealistic rendering**
Johnson

4:45 **Pointed questions and answers**
All

12 Introduction to Computer Graphics

Monday **Full Day**

Beginning **Intermediate** **Advanced**

The SIGGRAPH conference is an exciting event, but it is often an intimidating experience for first-time attendees. There are so many new terms, new concepts, and new products to try to understand. This course is designed to ease new-comers into the SIGGRAPH conference experience by presenting the fundamental ideas and vocabulary at a level that can be readily understood. Far from dry facts, this course also portrays the fun and excitement that led most of us here in the first place. Attendees leave the course well-prepared to understand, appreciate, enjoy, and learn from the rest of the SIGGRAPH conference events. It includes live demos, the source code of which will be placed on the Course Notes CD-ROM and made available on the Web.

Prerequisites

A basic understanding of computers and algebra. All other required knowledge is provided in carefully planned presentations.

Topics Covered

An understanding of computer graphics from data to photons; the fundamentals of geometry, interaction, hardware, modeling, rendering, and animation; and virtual reality and graphics for the World Wide Web.

Organizer

Mike Bailey
University of California at San Diego/San Diego Supercomputer Center

Lecturers

Mike Bailey
University of California at San Diego/San Diego Supercomputer Center

Andrew Glassner
Microsoft Research

Olin Lathrop
Cognivision, Inc.

Patricia Wenner
Bucknell University

Room 330 DEFG

Schedule

8:30 **Welcome**
Bailey

8:45 **Geometry for computer graphics**
Bailey

9:15 **Input devices**
Bailey

9:30 **Graphics display hardware**
Lathrop

10 **Break**

10:30 **Visible surface determination**
Wenner

11 **Modeling**
Glassner

noon **Lunch**

1:30 **Rendering**
Glassner

2:15 **Animation**
Glassner

3 **Break**

3:15 **Graphics on the World Wide Web**
Wenner

3:45 **Virtual reality**
Lathrop

4:15 **Graphics in entertainment**
Wenner

4:45 **Finding additional information**
Wenner

Monday 20 July

modeling

13 Physically Based Modeling

Monday **Full Day**

Beginning **Intermediate** **Advanced**

Physically based modeling has become an important new approach to computer animation and computer graphics modeling. This course is of particular interest to those who wish to implement physically based modeling techniques and/or to read and critically appraise technical papers in the area. Bolstered by extensive course notes, the student with good basic implementation skills should be able to implement the techniques presented, not by rote, but confidently and with understanding. Course presentations favor visual, spatial explanations (including numerous examples on video) over formal symbol manipulation wherever feasible.

Prerequisites

Attendees are assumed to have a working familiarity with mainstream computer graphics modeling and animation. In addition to the usual graphics math skills, such as matrix-vector manipulations, attendees should have had a basic calculus course. Those with more extensive math backgrounds will also benefit, though an expert might find it slow going at times.

Topics Covered

Modeling the dynamics of particle systems and rigid bodies, basic numerical methods for differential equations, simulation of deformable surfaces, collision detection, modeling springs, energy functions, hard constraints, and collision and contact between objects.

Organizers and Lecturers

David Baraff
Andrew Witkin
Carnegie Mellon University

Room 311 ABCD

Schedule

8:30 **Introduction**
Baraff, Witkin

8:45 **Differential equation basics**
Witkin

9:30 **Particle dynamics I**
Witkin

10 **Break**

10:15 **Particle dynamics II**
Witkin

10:30 **Rigid body dynamics**
Baraff

11:15 **Implicit methods and cloth simulation**
Baraff, Witkin

noon **Lunch**

1:30 **Constrained dynamics**
Witkin

2:30 **Collision detection**
Baraff

3 **Break**

3:15 **Collision and contact dynamics**
Baraff

4 **Tips, tricks, and hacks**
Baraff, Witkin

virtual reality

14 Applied Virtual Reality

Monday **Full Day**

Beginning **Intermediate** **Advanced**

This course presents various rationales justifying the need for Virtual Reality (VR), and outlines what VR can offer beyond traditional computer solutions. It answers questions such as: Why do we need VR? What does VR have to offer that I can't already develop with existing 3D interactive computer graphics techniques? It does not focus on exploring available VR hardware and software. Rather, it examines the features of VR technology and relates them to specific applications. It also concentrates on identifying how VR can be applied to today's scientific and engineering challenges.

Prerequisites

Working knowledge of basic computer graphics. Some knowledge of real-time programming concepts, distributed computing, and networking is useful but not required.

Topics Covered

Rendering techniques, geometric modeling, texturing, graphics interface design, graphics hardware architectures, and software toolkits.

Organizer

Carolina Cruz-Neira
Iowa State University

Lecturers

Allen Bierbaum
Carolina Cruz-Neira
Christopher Just
Judy Vance
Iowa State University

Rudolph Darken
Naval Postgraduate School

Mary Lynne Dittmar
Boeing Information, Space, and Defense Systems

Richard Gillilan
Cornell University

Oliver Riedel
Fraunhofer Institute for Industrial Engineering

Room 224 CDGH

Schedule

8:30 **Introduction**

8:45 **Overview of Virtual Reality**
Cruz-Neira

9:15 **Software tools for application development**
Bierbaum, Just

10 **Break**

10:15 **Altering human vision: psychophysiological issues in virtual reality and implications for the human exploration of space**
Dittmar

11:15 **Using immersive projection environments for engineering tasks**
Riedel

noon **Lunch**

1:30 **Navigation in virtual environments**
Darken

2:15 **Making virtual reality useful**
Cruz-Neira

3 **Break**

3:15 **Scientific applications of virtual reality**
Gillilan

4 **Current applications of virtual reality to engineering problems**
Vance

rendering

15 Image-Based Modeling and Rendering

Monday **Full Day**

Beginning **Intermediate** **Advanced**

This course explains and demonstrates a variety of methods for turning photographs into models and then back into renderings, including movie maps, panoramas, image warping, photogrammetry, light fields, and 3D scanning. It also reviews relevant topics in computer vision to show how these methods relate to image-based rendering techniques and how to apply the techniques to animation and 3D navigation.

Prerequisites

Solid understanding of the standard 3D graphics pipeline, including perspective projection, depth-buffering, visibility, lighting, and texture mapping is recommended. Knowledge of basic image processing, especially image resampling, and familiarity with the basic mechanisms of global illumination is helpful.

Topics Covered

Methods of deriving geometric information from photographs, including stereo, structure from motion, interactive techniques, and structured light; image-based data structures and rendering methods that use images and/or geometry for novel view generation.

Organizers

Paul Debevec
University of California, Berkeley

Steven Gortler
Harvard University

Lecturers

Chris Bregler
Paul Debevec
University of California, Berkeley

Steven Gortler
Harvard University

Leonard McMillan
Massachusetts Institute of Technology

Richard Szeliski
Microsoft Corporation

Hall E 2

Schedule

8:30 **Introduction and overview**
Debevec

9 **Projective image warping**
Gortler

10 **Break**

10:15 **Warping images with depth**
McMillan

11:20 **Recovering geometry I**
Szeliski

noon **Lunch**

1:30 **Recovering geometry II**
Debevec

2 **Lightfield representations**
Gortler

3 **Break**

3:15 **Applications of IBMR in art and cinema**
Debevec

3:45 **Applications of IBMR in human animation**
Bregler

4:35 **Questions and dialog**
All

modeling

16 Procedural Implicit Techniques for Modeling and Texturing

Monday **Full Day**

Beginning **Intermediate** **Advanced**

How to use implicit surfaces to model hands, blend bark, blow smoke, comb fur, trim shrubs and paint dogs. This course covers advanced topics in polygonization, particle systems, constraints, texture mapping, geometric texturing, solid texturing, volumetric modeling, L-systems, procedural modeling, and surface topology.

Prerequisites

Familiarity with standard computer graphics modeling and rendering techniques is assumed. Prior understanding of the blobby/soft/metaball model, particle systems, penalty method constraints, and procedural texturing techniques is helpful.

Topics Covered

Polygonization of implicit surfaces, particle system modeling and implicit functions, texturing, topology, and grammar-based and volume modeling with procedural techniques and implicit functions.

Organizers

David S. Ebert
University of Maryland Baltimore County

John Hart
Washington State University

Lecturers

Jules Bloomenthal
Unchained Geometry

David Ebert
University of Maryland Baltimore County

Kurt Fleischer
Pixar

John Hart
Washington State University

Paul Heckbert
Carnegie Mellon University

Hans Køhling Pedersen
Massachusetts Institute of Technology

Przemyslaw Prusinkiewicz
University of Calgary

Hall F 3-5

Schedule

8:30 **Introduction**
Ebert, Hart

9 **Polygonization and modeling**
Bloomenthal

10 **Break**

10:15 **Procedural modeling with volumetric implicit functions**
Ebert

11:15 **Synthetic topiary**
Prusinkiewicz

noon **Lunch**

1:30 **Particle system modeling**
Heckbert

2:30 **Topology**
Hart

3 **Break**

3:15 **Geometric texturing**
Fleischer

4:15 **Decorating implicit surfaces**
Pedersen

Monday 20 July

CAL

17 Advanced Graphics Programming Techniques Using OpenGL

Monday **Full Day**

Beginning **Intermediate** **Advanced**

Practical solutions to domain-specific graphics application problems. Emphasis is on techniques for interactive graphics running on mainstream graphics hardware. Topics are drawn from the major graphics application areas, including CAD, visual simulation/gaming, image processing, scientific visualization, and special effects. Attendees strengthen their understanding of the theory of core computer graphics concepts and the techniques that increase image realism, create special effects, and solve domain-specific rendering problems. They also learn how to identify and evaluate multiple approaches to solving rendering problems, analyze code examples that generate high-quality graphics images, and gain greater insight into the capabilities of OpenGL.

Prerequisites

Some OpenGL programming experience and good working knowledge of computer graphics concepts, particularly lighting and texture mapping. Background in graphics applications that use advanced rendering techniques, image processing, or volume rendering is desirable.

Topics Covered

How to apply theoretical knowledge and programming skills to solve domain-specific computer graphics problems.

Organizer
Tom McReynolds
Silicon Graphics, Inc.

Lecturers
David Blythe
Brad Grantham
Tom McReynolds
Silicon Graphics, Inc.

Scott Nelson
Sun Microsystems, Inc.

Room 414 AB

Schedule

8:30 **Introduction**
McReynolds

8:35 **Visual simulation**
McReynolds

9:20 **Object realism**
Blythe

10 **Break**

10:15 **Interobject realism**
McReynolds

11 **Image processing**
Grantham

noon **Lunch**

1:30 **CAD**
Nelson

2:15 **Scientific visualization**
Blythe

3 **Break**

3:15 **Graphics special effects**
Grantham

4 **Simulating natural phenomena**
McReynolds

5 **Summary, questions and answers**
All

18 Introduction to VRML97

Monday **Full Day**

Beginning **Intermediate** **Advanced**

VRML (the Virtual Reality Modeling Language) technology has broad applicability, including Web-based entertainment, distributed visualization, 3D user interfaces to remote Web resources, 3D collaborative environments, interactive simulations for education, virtual museums, and virtual retail spaces. VRML is a key multi-platform technology shaping the future of the Web. Participants learn how to use VRML to author their own 3D virtual worlds on the World Wide Web. They learn the syntax of VRML, typical usage patterns, how to avoid common mistakes, animation and scene design techniques, and tricks for increasing performance and realism.

Prerequisites

Basic understanding of computers and algebra, and a beginning-level understanding of 3D graphics concepts, such as that provided in Introduction to Computer Graphics (Course 12). Familiarity with computer programming is helpful, but not required.

Topics Covered

Syntax for building shape geometry and controlling shape coloration, texturing, shading, grouping, and animation; specification of preferred viewpoints, lighting, sounds, backgrounds, and fog; animation programming with Java and JavaScript; optimization techniques.

Organizer
David Nadeau
San Diego Supercomputer Center

Lecturers
Michael Heck
Template Graphics Software, Inc.

John Moreland
David Nadeau
San Diego Supercomputer Center

DHCP

see page 11 for information

Hall F 1-2

Schedule

8:30 **Introduction, shapes, primitive geometry, transforms, appearance, groups, naming**
Nadeau

10 **Break**

10:15 **Animating transforms, sensing viewer actions, points, lines, faces, color control, shading control**
Moreland

noon **Lunch**

1:30 **Texture mapping, lighting, backgrounds, sound, fog, viewpoints, navigation, viewer sensing, level of detail**
Heck

3 **Break**

3:15 **JavaScript scripts, Java scripts, browser control, prototypes, extensions, conclusions**
Nadeau

CAL

19 Beyond Bottlenecks and Roadblocks: Internetworked 3D Computer Graphics

Monday **Full Day**

Beginning — Intermediate — Advanced

An overview of network infrastructure issues relating to interactive 3D graphics. Relevant networking capabilities are demonstrated in real time. Topics include: how Multicast Backbone (Mbone) functions support real-time video and audio; collaborative work tools that functionally incorporate computer graphics across the Internet; and the relationship of OpenGL, VRML, Java, and HTML to Internet, streaming, and distributed interactive simulation protocols. This knowledge helps 3D graphics developers and users in building and integrating interactive applications that use the Internet effectively.

Prerequisites

Experience with graphics at the level of Introduction to Computer Graphics (Course 12) and general knowledge of how to apply 3D graphics to Web-page design.

Topics Covered

Introductory material relating to networking issues for computer graphics professionals. Internetworked 3D computer graphics case studies are presented in real time.

Organizer
Theresa Marie Rhyne
Lockheed Martin/U.S. EPA Visualization Center

Lecturers
Bob Barton
Fraunhofer Center for Research in Computer Graphics

Don Brutzman
Naval Postgraduate School

Mike Macedonia
USA Simulation, Training, and Instrumentation Command

Theresa Marie Rhyne
Lockheed Martin/U.S. EPA Visualization Center

DHCP

see page 11 for information

Room 312

Schedule

8:30 **Introduction, course organization, remarks**
All

8:35 **Overview of 3D interactive graphics using the Internet**
Rhyne

9:25 **MBone and virtual environments demonstration**
Rhyne, All

10 **Break**

10:15 **Internetworked graphics: capabilities, shortfalls, frontiers**
Brutzman

11:15 **DIS-Java-VRML demonstrations**
Brutzman, All

noon **Lunch**

1:30 **A practical viewpoint on IETF efforts: telecollaboration and multicast applications**
Barton

2:15 **Collaborative virtual reality demonstration**
Barton, All

3 **Break**

3:15 **Human-computer interaction issues and a taxonomy of distributed networked graphics**
Macedonia

4:10 **Networked simulator demonstration**
Macedonia, All

4:50 **Wrap-up and discussion**
All

CAL

20 Real-Time Graphics for Visual Simulation: Advanced Techniques from the Top Down

Monday **Full Day**

Beginning — Intermediate — Advanced

Algorithms originally developed for flight simulators running on multi-million-dollar systems have evolved into useful methods for real-time interactive applications on much less expensive computers. The processing power and graphics capabilities of PCs, game systems, and high-end graphics systems are all steadily increasing. This course explores those interactive visual simulation algorithms and tricks that still require high-end hardware. It also details sophisticated techniques for handling large complex scenes in real time.

Prerequisites

An understanding of 3D graphics primitives, model and viewing trans-formations, and types of frame-buffer storage. Awareness of multiprocessing issues is helpful but not required.

Topics Covered

Database construction techniques, very large multiresolution textures, dynamically generated or morphed terrain, very large data sets of widespread geographic areas, paging of geometry and texture, frame-buffer storage, blending utilities, and nonlinear image distortion correction.

Organizer
Elizabeth Smith
Paradigm Simulation, Inc.

Lecturers
Graham Beasley
Sharon Rose Clay
Silicon Graphics, Inc.

Dan Brockway
Stephen Gersuk
Elizabeth Smith
Paradigm Simulation, Inc.

J. Bruce Howie
Lockheed Martin Information Systems

Ronald Moore
Evans & Sutherland Computer Corporation

Room 414 CD

Schedule

8:30 **Introduction and overview**
Smith

8:45 **History and requirements of Vis Sim**
Beasley

9 **Intro to computer image generation architecture**
Beasley

9:10 **Evans and Sutherland architectures for real-time display of large areas and big textures**
Moore

9:35 **Other ways to handle geometry and textures for large geographic areas in real-time**
Howie

10 **Break**

10:15 **Silicon Graphics architectures for real-time display of large areas and big textures**
Clay

10:40 **Run-time optimization techniques for Vis Sim applications**
Clay

11 **Requirements and importance of multispectral applications**
Beasley

11:10 **Real-time generation of multispectral images**
Gersuk

11:30 **Database designs**
Brockway, Howie, Moore

noon Lunch

1:30 **Large area texture and terrain - above it all**
Brockway

2 **Integrated feature modeling - stuck in the dirt**
Moore

3 **Break**

3:15 **Performance manage ment: going both ways**
Howie

3:40 **Special displays (Domes, CAVEs, Calligraphics...)**
Gersuk

4:10 **Creative uses of bit planes**
Gersuk, Smith

4:30 **Summary and predictions**
All

Monday 20 July

modeling

21 3D Geometry Compression

Monday **Full Day**

Beginning **Intermediate** **Advanced**

In this course, the storage costs of current 3D shape representations are analyzed, and several recent schemes for lossy and loss-less geometry compression are described. In addition to compression schemes for triangle meshes, which require as low as one byte of storage per triangle, more aggressive surface fitting schemes and multiresolution, progressive-refinement approaches are discussed. Along with surface simplification or decimation methods, these approaches can be regarded as lossy compression schemes.

Prerequisites

Attendees should have some familiarity with the basic concepts of meshes, and the standard representations of polygonal models.

Topics Covered

Recent schemes for lossy and loss-less compression of triangle and polygonal meshes, including surface fitting, multi-resolution, and progressive approaches.

Organizers

Gabriel Taubin
IBM T.J. Watson Research Center

Jarek Rossignac
Georgia Institute of Technology

Lecturers

Michael Deering
Sun Microsystems, Inc.

Hugues Hoppe
Microsoft Research

Jarek Rossignac
Georgia Institute of Technology

Peter Schröder
California Institute of Technology

Hans-Peter Seidel
University of Erlangen

Gabriel Taubin
IBM T.J. Watson Research Center

Room 224 ABEF

Schedule

8:30	**Welcome** Rossignac
8:45	**Overview of representation schemes and trade-offs** Rossignac
9:45	**Topological surgery, standards** Taubin
10	**Break**
10:15	**Progressive forest split, smoothing** Taubin
11	**Executable compressed geometry** Deering
noon	**Lunch**
1:30	**Compression opportunities using progressive meshes** Hoppe
2:30	**Subdivision surfaces** Schröder
3	**Break**
3:15	**Progressive transmission, interactive editing** Schröder
3:45	**Curve and surface fitting, B-splines** Seidel
4:45	**Conclusion** Taubin

synthetic actors

22 Artificial Life for Graphics, Animation, Multimedia, and Virtual Reality

Monday **Full Day**

Beginning **Intermediate** **Advanced**

This course investigates the increasingly important role that concepts from the emerging field of artificial life are playing in image synthesis, modeling, animation, multimedia, and virtual reality. Attendees are introduced to techniques for modeling and animating objects that are alive. They also explore techniques based on phenomena fundamental to biological organisms, such as evolution, growth, behavior, and biomechanics.

Prerequisites

A basic knowledge of geometric and physics-based modeling for animation and virtual reality. A general awareness of fundamental concepts such as Darwinian evolution, perception, behavior, and reinforcement learning is assumed.

Topics Covered

Modeling and animation of plants, animals, and humans; behavioral animation; communication and interaction with synthetic characters in virtual worlds; and artificial evolution for graphics and animation.

Organizer

Demetri Terzopoulos
University of Toronto/Intel Corporation

Lecturers

Bruce Blumberg
Massachusetts Institute of Technology

Przemyslaw Prusinkiewicz
University of Calgary

Craig Reynolds
DreamWorks SKG

Karl Sims
Genetic Arts

Demetri Terzopoulos
University of Toronto/Intel Corporation

Daniel Thalmann
Swiss Federal Institute of Technology

Room 311 EFGH

Schedule

8:30	**Introduction** Terzopoulos
8:45	**Artificial plants** Prusinkiewicz
9:45	**Artificial evolution for graphics and animation I** Sims
10	**Break**
10:15	**Artificial evolution for graphics and animation II** Sims
11	**Behavior animation** Reynolds
noon	**Lunch**
1:30	**Artificial animals** Terzopoulos
2:30	**Artificial humans in virtual worlds I** Thalmann
3	**Break**
3:15	**Artificial humans in virtual worlds II** Thalmann
3:45	**Interactive synthetic characters** Blumberg
4:45	**Questions and answers** All

23 3D Visualization in Medicine

Monday **Full Day**

Beginning — Intermediate — Advanced

The growing health-care industry is providing new opportunities for applied research in computer graphics. This course concentrates on areas of the visualization pipeline not traditionally covered: acquisition and medical evaluation. It presents not only how to approach 3D visualization in medicine, but also, through case studies, the motivations and limitations of such methods. Participants interested in getting started in this area learn about the sources of volume medical data. Clinicians present their views of visualization and what their requirements are for effective and safe applications of computer graphics in medicine.

Prerequisites

Basic knowledge of 3D computer graphics and an understanding of the basic principles of image processing. Some familiarity with medical terminology or experience working on a clinical project is useful but not necessary.

Topics Covered

The sources and characteristics of 3D clinical data (X-ray CT, MRI, SPECT, etc.), advanced displays (virtual worlds) in medicine, and interactive graphics for surgery.

Organizer

Terry Yoo
University of Mississippi Medical Center

Lecturers

Henry Fuchs
University of North Carolina at Chapel Hill

Ron Kikinis
Harvard Medical School

Bill Lorensen
General Electric Corporate R&D Center

Andrei State
University of North Carolina at Chapel Hill

Michael Vannier
University of Iowa

Terry Yoo
University of Mississippi Medical Center

Room 340 AB

Schedule

8:30	**Welcome** Yoo
8:45	**Computer-assisted neurosurgery** Kikinis
9:15	**Segmentation (including deformable models)** Kikinis
9:45	**Medical image acquisition (X-ray CT)** Yoo
10	**Break**
10:15	**Medical image acquisition (MRI)** Yoo
10:30	**Volume rendering techniques** Yoo
11	**Marching through the visible human** Lorensen
11:30	**Surface rendering techniques** Lorensen
noon	**Lunch**
1:30	**Visualization and modeling for socket fit** Vannier
2	**CT and MRI for clinical applications** Vannier
2:30	**Issues in medical imaging** Kikinis
3	**Break**
3:15	**Augmented reality in medicine** Fuchs
3:45	**Tracking and display technologies for medicine** State
4:15	**Workstations** Vannier
4:45	**Open floor, issues and answers** All

24 Advances in Volume Visualization

Monday **Half Day PM**

Beginning — Intermediate — Advanced

This course is devoted to advanced and more recent topics in volume visualization and should be viewed as a successor to an introductory course in volume visualization. The course covers the technology and several major advanced applications and techniques, and the challenges confronting the field of volume visualization.

Prerequisites

Course material is moderately difficult, due to the level of detail in the algorithms and methodologies. Basic knowledge of hidden-surface methods, rendering models, volume rendering of regular grids, and computer organization is recommended.

Topics Covered

Specific presentations on advanced topics in volume visualization research and practice. These include algorithms, architectures and application in volume graphics, volumetric global illumination, regular and irregular grid rendering, special-purpose architectures for volume visualization, and advanced applications of volume visualization.

Organizer

Arie Kaufman
State University of New York at Stony Brook

Lecturers

Arie Kaufman
State University of New York at Stony Brook

Bill Lorensen
General Electric Corporate R&D Center

Hanspeter Pfister
Mitsubishi Electric Research Lab

Claudio Silva
IBM T.J. Watson Research Center

Lisa Sobierajski
General Electric Imaging and Visualization Lab

Room 340 CD

Schedule

1:30	**Introduction** Kaufman
1:40	**Volume synthesis** Kaufman
2:20	**Volumetric global illumination** Sobierajski
3	**Break**
3:15	**Architectures for volume rendering** Pfister
3:50	**Irregular grid rendering** Silva
4:25	**Advanced applications** Lorensen

25 Color Image Coding

Monday — Half Day AM

Beginning — Intermediate — Advanced

Computers have been used to generate synthetic images since the first SIGGRAPH conference, and to generate color images for nearly that long. But only recently has it been practical to create and reproduce digital images with predictable, accurate color. This course introduces the science behind image digitization and color reproduction in computer graphics and video. A key aspect of obtaining accurate color is understanding the objective meaning of RGB codes: interpretation of a particular RGB code by one system may not match interpretation of the same RGB code by a different system. This course describes how color information is coded into RGB and details transformations among various color coding systems.

Prerequisites

Attendees should be comfortable with mathematics and have experience in designing or implementing hardware or software that processes color images. Alternatively, attendees should be very experienced in manipulating digital imagery.

Topics Covered

The coding of color image data has a different set of constraints than color specification. This course describes how linear-light intensity representations are transformed into the nonlinear RGB system, and then into the Y'CBCR representations used in studio video, DVC, JPEG, and MPEG. It also reviews the Y'UV and Y'IQ systems.

Organizer and Lecturer
Charles Poynton

Room 240 CD

Schedule

8:30 **Perception and visual acuity**
Poynton

9 **Luminance, lightness, and luma**
Poynton

9:45 **Raster images in computing; gamma**
Poynton

10 **Break**

10:15 **Color science for video**
Poynton

11 **Principle of constant luminance**
Poynton

11:30 **Luma and color differences**
Poynton

26 Color Management: Theory and Implementation

Monday — Half Day PM

Beginning — Intermediate — Advanced

Color management system technology enables device-independent color, which is an admirable goal for business graphics. However, image professionals do not seek device-independent color! This course explains the theory of color management, emphasizing its roots in human visual perception. It details implementation and use of color management systems, describes the ICC standard for color device profiles, and shows how a device profile is produced.

Prerequisites

Experience in designing or using software that processes color images, technical background in creating and manipulating digital imagery, detailed knowledge of image coding.

Topics Covered

Deliberate, subtle alterations to mathematical "correctness" are applied when a video or film image is originated, in order to maximize the subjective quality of the picture. This course outlines these alterations and suggests how they can be exploited. It demonstrates that profile construction is a blend of science and craft, of mathematics and perception.

Organizer
Charles Poynton

Moderator
Jan De Clippeleer
Agfa-Gevaert NV

Lecturers
Michael Bourgoin
Adobe Systems

Edward Giorgianni
Eastman Kodak

Room 240 CD

Schedule

1:30 **Welcome**
De Clippeleer

1:40 **Principles and theory**
Giorgianni

3 **Break**

3:15 **Color management with ICC**
Bourgoin

4:30 **Questions and answers**
De Clippeleer

Tuesday 21 July

27 Introduction to Audio Compression and Representation

Monday — **Tutorial 10 am-noon**

Beginning — Intermediate — Advanced

This course begins with an introduction to waveform sampling and transmission and storage issues, followed by an introduction to psychoacoustics that covers the unique acuities and limits of the human auditory system. Waveform compression, model-based speech compression, and psychoacoustically based frequency domain compression algorithms are covered. MIDI and other music representation schemes are introduced, in the context of existing music storage and manipulation systems as well as potential future compression schemes. Emphasis is on the tradeoffs of quality, compressed data size, and flexible data manipulation. C code examples are made available for various compression algorithms.

Prerequisites

Familiarity with the concepts of sampling and aliasing. Specific knowledge of Fourier or wavelet transforms is not required, but familiarity with the time and frequency domain representations of data is helpful.

Topics Covered

Statistically based compression of audio waveform data is basically useless, and loss-less compression of audio is generally impossible above the very lowest compression ratios. Incorporation of psychoacoustic principles in a perceptually loss-less system makes higher compression ratios possible. Sound examples are played to demonstrate the tradeoffs of different algorithms and compression ratios.

Organizer and Lecturer
Perry Cook
Princeton University

Room 340 CD

Schedule

10 **Overview of compression in general**
Cook

10:05 **Waveform sampling, storage, and transmission**
Cook

10:15 **Psychoacoustics and limits of auditory perception**
Cook

10:35 **Sound and music representation**
Cook

10:55 **Survey of audio compression algorithms: a-law/u-law, ADPCM, MPEG-2, AC2/3, etc. The future: parametric multi-model compression?**
Cook

11:25 **Details of selected audio compression algorithms**
Cook

11:45 **Wrap-up and bibliographic references**
Cook

synthetic actors CAL

28 Virtual Humans: Behaviors and Physics, Acting and Reacting

Tuesday — **Full Day**

Beginning — Intermediate — Advanced

This course describes the state of the art in interactive, real-time, and networked human motion synthesis and actor behaviors. It demonstrates real-time human animation generated by techniques such as inverse kinematics, dynamics, and video motion capture, and by higher-level approaches such as dynamics and video motion capture, behaviorally scripted agents, personality profiles, and interpersonal and environmental reactivity. Various applications illustrate real-time synthetic humans in virtual prototyping, team tasks, synthetic actors, human-like avatars, language-based interfaces, and dance, tennis, and video motion capture.

Prerequisites

Experience in programming with algorithms or VRML is useful but not essential.

Topics Covered

Some mathematics background is useful in understanding the more advanced control techniques, but all are amply illustrated with working systems.

Organizer
Norman Badler
University of Pennsylvania

Lecturers
Norman Badler
Dimitris Metaxas
University of Pennsylvania

Armin Bruderlin
Sony Pictures Imageworks

Athomas Goldberg
Ken Perlin
New York University

Nadia Magnenat Thalmann
University of Geneva

Room 240 AB

Schedule

8:30 **Welcome**
Badler

8:40 **Virtual human capabilities**
Badler

9:45 **Interactive and procedural motion control I**
Bruderlin

10 **Break**

10:15 **Interactive and procedural motion control II**
Bruderlin

11 **Interacting with virtual actors I**
Goldberg, Perlin

noon **Lunch**

1:30 **Interacting with virtual actors II**
Goldberg, Perlin

1:45 **Networked environments for virtual humans**
Magnenat Thalmann

3 **Break**

3:15 **Physics-based models and motions**
Metaxas

4:30 **Panel**
All

29 Developing High-Performance Graphics Applications for the PC Platform

Tuesday — Full Day

Beginning — Intermediate — Advanced

This course explores techniques for optimizing locality of reference, efficient processing of graphics calls through the software/hardware pipeline, efficient use of graphics hardware resources, and software techniques to maximize graphics performance. It reviews interactions among CPU, accelerator, API, software driver, cache, memory, and bus. Cross-platform PC issues are discussed, including commonality among feature sets, scalability, and choice of graphics API's.

Prerequisites

Experience in graphics programming. Understanding of basic computer architecture (memory hierarchy, concurrent execution, etc.) is helpful. This course is explicitly oriented toward the programmer.

Topics Covered

The essentials of the graphics software and hardware architecture for the PC platform and the programming techniques required to write the highest-performance graphics applications possible.

Organizers

Michael Cox
MRJ Technology Solutions/NASA Ames Research Center

David Sprague

Lecturers

John Danskin
Dynamic Pictures

Rich Ehlers
Evans & Sutherland Computer Corporation

Brian Hook
id Software

Bill Lorensen
General Electric Corporate R&D Center

Gary Tarolli
3Dfx Interactive

Room 414 AB

Schedule

8:30 **Introduction**
Cox

8:40 **PC graphics history**
Danskin/Tarolli

9:30 **Consumer PC: Introduction to optimization I**
Tarolli

10 **Break**

10:15 **Introduction to optimization II**
Tarolli

10:45 **Consumer PC: 3D applications**
Hook

noon **Lunch**

1:30 **Workstation PC: Architecture and acceleration**
Ehlers

2:45 **Workstation PC: Scientific visualization I**
Lorensen

3 **Break**

3:15 **Workstation PC: Scientific visualization II**
Lorensen

4:15 **Workstation PC: Introduction to optimization**
Danskin

30 Art for Computer Graphicists

Tuesday — Full Day

Beginning — Intermediate — Advanced

Creating effective and memorable images is an important part of communication. Computer graphics can help in that process. But the principles that underlie creation of great visuals don't change when applied to the computer. Composition, color theory, layout, and social and historical context are just some of the ideas that an artist brings to a piece to create clear, powerful messages. Many people who create computer graphics today have emphasized technical topics over artistic ones in their education and have missed these visual principles. This course discusses the context and basics of design, and reviews important, practical techniques and tools for creating visuals that speak to a viewer with clarity, precision, and emotion.

Prerequisites

An open mind and a willingness to explore.

Topics Covered

Art history, color theory, design, and the current state of art and design across cultures. Attendees receive reprints of essays and articles, and pointers to other media for further learning.

Organizer

Andrew Glassner
Microsoft Research

Lecturers

Jeff Callender
Q LTD

Andrew Glassner
Microsoft Research

Mat Gleason
Coagula Art Journal

Barbara Kerwin
College of the Canyons

Jim Mahoney
Microsoft Virtual Worlds Research Group

Room 311 ABCD

Schedule

8:30 **Welcome**
Glassner

8:45 **Art history**
Kerwin

10 **Break**

10:15 **Contemporary American design**
Callender

11:45 **Questions and answers, discussion**
All

noon **Lunch**

1:30 **Color theory**
Mahoney

2:30 **Logo design I**
Glassner

3 **Break**

3:15 **Logo design II**
Glassner

3:45 **A global survey of contemporary art**
Gleason

4:45 **Questions and answers, discussion**
All

modeling

31 Cloth and Clothing in Computer Graphics

Tuesday **Full Day**

Beginning **Intermediate** **Advanced**

This course lays the groundwork for understanding cloth and its uses in computer graphics from scientific, artistic, computational and experiential perspectives. After tutorials on modeling and simulating cloth, and on the use of cloth for artistic effect in staging and costuming, it continues with an overview of research on virtual clothing, and on the modeling of woven and knit fabrics. It concludes with a panel involving the presenters and attendees.

Prerequisites

The equivalent of courses in 3D computer graphics, calculus, linear algebra, and differential equations. Some artistic background or knowledge of the process of producing computer animation is also helpful.

Topics Covered

Background information on finite element and interacting particle simulation methodologies, as well as techniques needed for solving stiff or constrained physical systems. Also, concepts from set and costume design will be elaborated.

Organizer

Donald House
Texas A&M University

Lecturers

David Baraff
Andrew Witkin
Carnegie Mellon University

Bernhard Eberhardt
Wolfgang Strasser
University of Tübingen

Jeffrey Eischen
North Carolina State University

Donald House
Texas A&M University

Michael Kass
Pixar

Marla Schweppe
Rochester Institute of Technology

Nadia Magnenat Thalmann
University of Geneva

Umakanth Thumrugoti
Walt Disney Feature Animation

Room 240 CD

Schedule

8:30 **Introduction**
House

8:45 **Representation of woven fabrics**
House

9:45 **Aesthetic considerations I**
Schweppe

10 **Break**

10:15 **Aesthetic considerations II**
Schweppe

11 **Clothing virtual actors**
Magnenat Thalmann

noon **Lunch**

1:30 **Technical issues, approaches and challenges**
Eischen

2:30 **Representation of knit fabrics I**
Eberhardt, Strasser

3 **Break**

3:15 **Representation of knit fabrics II**
Eberhardt, Strasser

3:45 **Faster cloth dynamics**
Baraff, Witkin

4:05 **Clothing in Pixar's "Geri's Game"**
Kass

4:25 **Clothing in Disney's "Fantasia 2000"**
Thumrugoti

32 Applications of Visual Perception in Computer Graphics

Tuesday **Full Day**

Beginning **Intermediate** **Advanced**

Introduction to visual perception and its application in computer graphics. This course surveys key findings in the mechanisms and characteristics of human visual perception and cognition, and focuses on the use of these results in specific applications in computer graphics, including scientific and information visualization, virtual environments and VRML, and realistic image synthesis. The audience: a wide range of graphics researchers and practitioners who want to create images that can be effectively interpreted by the human visual system.

Prerequisites

Some experience in graphics and/or visualization. Familiarity with standard visualization techniques, and the basic mechanisms of image synthesis such as modeling, shading, and rendering is helpful. Prior knowledge or background in perceptual psychology is not required.

Topics Covered

Fundamental findings on how we perceive light, color, pattern, motion, texture, shape; application of these results in a variety of areas in computer graphics.

Organizer

Victoria Interrante
Institute for Computer Applications in Science and Engineering

Lecturers

James Ferwerda
Cornell University

Rich Gossweiler
Xerox PARC

Christopher Healey
University of California, Berkeley

Victoria Interrante
Institute for Computer Applications in Science and Engineering

Penny Rheingans
University of Mississippi

DHCP

see page 11 for information

Hall F 1-2

Schedule

8:30 **Introduction**
Gossweiler

8:35 **Fundamentals of spatial vision**
Ferwerda

10 **Break**

10:15 **Color perception and applications**
Rheingans

11 **Motion perception and applications**
Rheingans

11:30 **Cognitive issues in visual perception**
Interrante

noon **Lunch**

1:30 **Low-level human vision and its impact on information display**
Healey

2:30 **Perceiving 3D shape and depth**
Interrante

3 **Break**

3:15 **Representing 3D shape and depth**
Interrante

3:45 **Perception and real-time 3D graphics applications**
Gossweiler

Tuesday 21 July

rendering

33 Rendering with Radiance: A Practical Tool for Global Illumination

Tuesday **Full Day**

Beginning **Intermediate** **Advanced**

Essential information for artists, designers, and researchers interested in creating realistic images with the Radiance System. It has been used for virtual sculpture, theatrical backdrop rendering, and validating a computer vision system for the space shuttle. It is also used as a testbed for advanced global illumination land-rendering algorithms. Four experts demonstrate their work and provide tips for using the software to solve practical problems. Examples are taken from lighting analysis, theater lighting, and daylighting design. The author of Radiance describes the underlying principles that make this ray-tracing software unique.

Prerequisites

Participants should recognize the importance of global illumination and have basic knowledge or interest in lighting visualization. A general awareness of rendering concepts, such as ray-tracing, radiosity, procedural textures, image filtering, and tone-mapping is also beneficial.

Topics Covered

Light source modeling, daylight simulation, results analysis, validation, and ray-tracing techniques for global illumination.

Organizer
Gregory Ward Larson
Silicon Graphics, Inc.

Lecturers
Charles Ehrlich
Lawrence Berkeley National Laboratory

Gregory Ward Larson
Silicon Graphics, Inc.

John Mardaljevic
De Montfort University

Robert Shakespeare
Indiana University

Room 414 CD

Schedule

8:30 **Introduction**
Larson

8:55 **Tutorial example**
Shakespeare

9:40 **Daylighting applications I**
Mardaljevic

10 **Break**

10:15 **Daylighting applications II**
Mardaljevic

10:35 **Lighting design considerations**
Ehrlich

11:20 **Illumination of large structures**
Shakespeare

noon **Lunch**

1:30 **Theater lighting**
Shakespeare

2:15 **Calculation methods employed in radiance**
Larson

3 **Break**

3:15 **Advanced daylighting calculations**
Mardaljevic

3:45 **Validation studies**
Larson, Mardaljevic

4 **Future program developments**
Erlich, Larson

4:15 **Working through an example design problem**
All

4:45 **Open questions and answers session**
All

animation & FX CAL

34 3D Computer Animation Workshop

Tuesday **Full Day**

Beginning **Intermediate** **Advanced**

This course is presented in two formats: in a normal course room, and in the CAL. The first 100 attendees who arrive and agree to participate all day will be selected for the CAL. Attendees in the course room who are unable to participate in the CAL presentation on Tuesday can do the course exercises in the CAL Wednesday - Friday.

Introduction to high-end 3D computer animation capabilities. The course is divided into several segments, each consisting of a lecture on specific principles of 3D animation, a demonstration of how those principles are implemented with the software being used, and an extended exercise in which participants who are in the CAL work on a short animation that illustrates those principles.

Prerequisites

No prior experience with 3D computer animation is required, but participants should be familiar with basic keyboard, mouse, and menu interfaces.

Topics Covered

Beginning with simple modeling, rendering, and keyframing, participants progress through more complex techniques: texture mapping, path animation, and inverse kinematics. Participants learn the underlying principles shared by all 3D computer animation software packages and how these principles are implemented on one of today's major software packages.

Organizer and Lecturer
Michael O'Rourke
Pratt Institute

Assistants
Abbey Klotz
Helen Koo
Yukito Kurita
Khalida Lockheed
Gevel Marrero
William Sayer
Lina Yamaguchi
Eunmi Yang
Pratt Institute

Room 224 CDGH

Schedule

8:30 **Lecture: coordinate systems, geometric primitives, transformations, keyframing, wireframe preview, parameter curve editing**
Demonstration
CAL Exercise
O'Rourke

10 **Break**

10:15 **Lecture: the camera, lighting, characteristics of surfaces, texture mapping, rendering and shading, final frame considerations, flipbooks**
Demonstration
CAL Exercise
O'Rourke

noon **Lunch**

1:30 **Lecture: polygonal modeling, patch modeling, surface editing, keyshape animation, object path animation, camera path animation, bump and transparency maps**
Demonstration
CAL Exercise
O'Rourke

3 **Break**

3:15 **Lecture: hierarchies, inverse kinematics, rotational limits, rigid and flexible surfaces, constraints**
Demonstration
CAL Exercise
O'Rourke

interaction CAL

35 Interactive Visualization and Web-Based Exploration in the Physical and Natural Sciences

Tuesday **Full Day**

Beginning — Intermediate — Advanced

The convergence of visualization methods with the World Wide Web and the relationship between real-time interactivity and exploration of scientific information. Highly illustrative atmospheric, oceanographic, and geographic examples are demonstrated in real time. Also highlighted: application of visualization tools and interactive techniques to examination and interpretation of scientific data sets, developing effective visualization paradigms for high-speed networking, database management, heterogenous computing platforms, user interface design, collaborative computing, science education, and implementation of animation techniques.

Prerequisites

Experience with scientific visualization systems and terminology, and an understanding of computer graphics programming.

Topics Covered

Real-time, hands-on case study demonstrations of the convergence of visualization methods with World Wide Web tools.

Organizer

Theresa Marie Rhyne
Lockheed Martin/U.S. EPA Visualization Center

Lecturers

Mike Botts
University of Alabama at Huntsville

Bill Hibbard
University of Wisconsin at Madison

Theresa Marie Rhyne
Lockheed Martin/U.S. EPA Visualization Center

Lloyd Treinish
IBM T.J. Watson Research Center

DHCP

see page 11 for information

Room 312 ABC

Schedule

8:30 **Introduction, course organization, remarks**
Rhyne

8:35 **Scientific data models for interactive and distributed visualization**
Hibbard

9:25 **Case study #1: Collaborative geographic visualization**
Rhyne

10 **Break**

10:15 **Applications of data management to the design of effective interactive and Web-based visualizations**
Treinish

11:10 **Case study #2: Tools for interactive exploration and visualization of dynamic spatial data**
Botts

noon **Lunch**

1:30 **Collaborative computing and integrated decision support tools for scientific visualization**
Rhyne

2:15 **Case study #3: correlative visualization techniques for disparate data**
Treinish

3 **Break**

3:15 **Methods for interactive visualization and comparative analysis of large, multisource data sets**
Botts

4:05 **Case study #4: interactively visualizing and steering computations**
Hibbard

4:50 **Wrap-up and discussion**
All

modeling

36 Subdivision for Modeling and Animation

Tuesday **Full Day**

Beginning — Intermediate — Advanced

Subdivision is an algorithmic technique to generate smooth surfaces as a sequence of successively refined polyhedral meshes. Using subdivision, complex geometry can be manipulated and rendered very efficiently, making it a highly suitable tool for interactive animation and modeling systems. This course covers the basic ideas of subdivision and a variety of subdivision schemes.

Prerequisites

Facility with basic linear algebra and introductory calculus. Prior exposure to parametric representations of curves and surfaces, associated algorithms, and general computer graphics implementation is highly recommended.

Topics Covered

A number of different subdivision methods for surfaces and a variety of subdivision-based algorithms for modeling and animation, including adaptive evaluation, level-of-detail rendering, and manipulation.

Organizers

Peter Schröder
California Institute of Technology

Denis Zorin
Stanford University

Lecturers

Edwin Catmull
Tony DeRose
Pixar

David Forsey
Radical Entertainment Ltd.

Leif Kobbelt
University of Erlangen

Michael Lounsbery
Alias | Wavefront

Jörg Peters
Purdue University

Peter Schröder
California Institute of Technology

Denis Zorin
Stanford University

Room 330 DEFG

Schedule

8:30 **Opening**
Schröder

8:45 **Historical tour**
Catmull

9 **Basic ideas**
Schröder, Zorin

10 **Break**

10:15 **Construction and analysi**
Peters, Zorin

noon **Lunch**

1:30 **Interactive multiresoltion mesh editing**
Zorin

2 **Subdivision surfaces and wavelets**
Lounsbery

2:40 **A variational approach to subdivision I**
Kobbelt

3 **Break**

3:15 **A variational approach to subdivision II**
Kobbelt

3:40 **Exploiting subdivision in modeling and animation**
Forsey

4:20 **Subdivision surfaces in the making of "Geri's Game"**
DeRose

37 Introduction to Programming in Java 3D

Tuesday **Full Day**

Beginning — Intermediate — Advanced

Java 3D, a new cross-platform API for developing 3D graphics applications in Java, is designed to enable quick development of complex 3D applications, and at the same time enable fast and efficient implementations on a variety of platforms, from PCs to workstations. Using Java 3D, software developers can build cross-platform applications that build 3D scenes programmatically, or via loading 3D content from VRML, OBJ, and/or other external files. The Java 3D API includes a rich feature set for building shapes, composing behaviors, interacting with the user, and controlling rendering details. In this course, participants learn the concepts behind Java 3D, the Java 3D class hierarchy, typical usage patterns, how to avoid common mistakes, animation and scene design techniques, and tricks for increasing performance and realism.

Prerequisites

Intermediate-level knowledge of Java programming and a beginning understanding of 3D graphics concepts. No advanced math background is required.

Topics Covered

Java 3D classes and methods for building 3D graphics applications, and low-level control of 3D rendering and viewing with head-mounted displays.

Organizer
Henry Sowizral
Sun Microsystems, Inc.

Lecturers
Mike Bailey
University of California at San Diego/San Diego Supercomputer Center

Michael Deering
Henry Sowizral
Sun Microsystems, Inc.

David Nadeau
San Diego Supercomputer Center

Hall F 3-5

Schedule

8:30 **Introduction, overview, shapes, appearance**
Sowizral

10 **Break**

10:15 **Groups, transforms, texture mapping, viewing**
Bailey

noon **Lunch**

1:30 **Behaviors, interpolators, input, picking**
Deering

3 **Break**

3:15 **Lighting, backgrounds, fog, sound**
Nadeau

virtual reality

38 Immersive Environments: Research, Applications, and Magic

Tuesday **Full Day**

Beginning — Intermediate — Advanced

A multidisciplinary approach to how to make a wide range of immersive technologies useful. The challenge can best be met by importing knowledge and insights from disparate fields. Designers need to respect the biases and constraints of the human perceptual system. Similarly, application authors need to learn the principles of interactive design. This course is taught by perceptual scientists, designers, and authors who share an interest both in exploiting the advantages of immersive displays and in comparing immersive and desktop displays to improve desktop media.

Prerequisites

Attendees should have basic knowledge of using computer graphics for modeling and constructing environments. No prior knowledge of visual perception is assumed.

Topics Covered

Design and implementation of immersive systems, basic perceptual psychology, and why immersive systems "work." Basics of interactive-technique design in immersive media, basics of interactive storytelling, and how to present information in immersive environments.

Organizer
Maryjane Wraga
University of Virginia

Lecturers
Steve Bryson
Mary Kaiser
NASA Ames Research Center

Jack Loomis
University of California, Santa Barbara

Mark Mine
Jesse Schell
Walt Disney Imagineering

Randy Pausch
Carnegie Mellon University

Dennis Proffitt
University of Virginia

Room 311 EFGH

Schedule

8:30 **Introduction**
Wraga

8:40 **Design rules for immersive environments**
Pausch

10 **Break**

10:15 **Comparing immersive and desktop displays**
Proffitt

11:10 **Experiences in creating VR entertainment**
Schell

noon **Lunch**

1:30 **Building virtual worlds**
Mine

2:15 **Perceptual properties of immersive environments: differentiating necessary, sufficient, and nice**
Kaiser

3 **Break**

3:15 **How human factors considerations drove the design and implementation of the virtual wind tunnel**
Bryson

4:10 **Using virtual environments for basic research on visually based perception and cognition**
Loomis

animation & FX

39 The Art of Disney's "Mulan"

Tuesday **Half Day AM**

Beginning | Intermediate | Advanced

A glimpse into the artistic thought process for the use of CGI in Walt Disney Feature Animation's "Mulan." This course focuses on the unique considerations of integrating 3D computer graphics with traditional 2D animation, as presented by artistic leads and hands-on CGI artists. It does not dwell on the specific techniques for each element, but focuses instead on the artistic decisions that were made and the technical approaches that were devised to achieve the final result on screen.

Prerequisites

Basic knowledge of 3D computer graphics. The course is appropriate for anyone interested in feature animation, including artists, animators, modelers, and technical directors.

Topics Covered

The production pipeline at Walt Disney Feature Animation, shaders, modeling, and animation.

Organizer
Eric Guaglione
Walt Disney Feature Animation

Lecturers
Marty Altman
Kathy Barshatzky
Rob Bekuhrs
Barry Cook
Eric Guaglione
Mary Ann Pigora
Tony Plett
Ric Sluiter
Walt Disney Feature Animation

Hall E 2

Schedule

8:30 **Introduction, screen clips**
Guaglione

9 **Story, visual development, production design**
Cook, Sluiter

9:30 **Diversity of elements**
Pigora

10 **Break**

10:15 **Visual integration**
Barshatzky, Plett

10:40 **Animation for a graphic style**
Bekuhrs

11:10 **Software: the means to an end**
Altman

11:30 **Realization, screen clips**
Guaglione

11:45 **Questions and answers**
All

animation & FX

40 Compositing in the Digital Film Industry: Case Studies in Film Production

Tuesday **Half Day PM**

Beginning | Intermediate | Advanced

Digital compositing is now a mature tool in today's production pipelines. Through presentations of real-world case studies by top digital artists, attendees see approaches to solving some of the more difficult problems encountered in recent films and gain valuable understanding of the complex techniques possible with current compositing systems.

Prerequisites

Familiarity with 2D imaging and compositing is highly recommended. This course is designed for people who want deeper knowledge of the use of compositing tools in today's film production environments.

Topics Covered

The complexities involved in the compositing process; production of top film project scenes, from the initial hand-off of elements to delivery of the final finished scene; how digital artists deal with difficult or tricky scenes; and an introduction to cutting-edge compositing tools and their extensive range of functionality.

Organizer
Jacki Morie
Blue Sky | VIFX

Moderator
Richard Hollander
Blue Sky | VIFX

Lecturers
Pam Darley
Neil Okamoto
Todd Scopio
Walt Disney Feature Animation

Jonathan Egstad
Digital Domain

Pablo Helman
Industrial Light & Magic

Richard Hollander
Mary Leitz
Sean McPherson
Blue Sky | VIFX

Aviv Yaron
Tom Wood
Cinesite Digital Studios

Hall E 2

Schedule

1:30 **Introduction**
Hollander

1:35 **Cinesite Case Study: compositing UnPreMultiplied CG; "Event Horizon;" current film work; questions and answers**
Wood, Yaron

2:05 **Disney Case Study: intro and history of CAPS; compositing issues in animation; "Mulan;" questions and answers**
Darley, Okamoto, Scopio

2:45 **Blue Sky | VIFX Case Study I: descriptions of tasks; challenges of stereoscopic 4K compositing**
Hollander, Leitz

3 **Break**

3:15 **Blue Sky | VIFX Case Study II: tracking and green screen nightmares; questions and answers**
McPherson

3:35 **ILM Case Study: Sabre in ILM production environment; camera match moving and other 2D challenges; questions and answers**
Helman

4:15 **Digital Domain Case Study: challenges with "Titanic" shot TT18; design philosophies behind "Nuke;" questions and answers**
Egstad

4:45 **Wrap up and final questions**
Hollander

41 How to Survive as a Computer Graphics Entrepreneur

Tuesday **Half Day AM**

Beginning — Intermediate — Advanced

Financial independence, individual glory, and taking charge of one's own destiny are common dreams in computer graphics. This course is designed specifically for those individual computer graphics artists, developers, and enthusiasts who might be thinking of starting and operating their own computer graphics business, and asking themselves "Can I survive as a computer graphics entrepreneur?" A small group of entrepreneurs who have launched their own ventures, faced the onslaught of banks, customers, computer vendors and governments, and lived to tell the tale describe their own experiences, then open up the session to questions from budding entrepreneurs.

Prerequisites

Aspirations to own a business. Familiarity with what is marketable in computer graphics and how it is priced is very helpful.

Topics Covered

The risks and demands of starting and operating one's own business, and a plentiful supply of proven survival techniques.

Organizer

Mark Leon
Forward Edge Technologies

Lecturers

Nancy Collier
Odyssey Productions

David Hamby
The Lightspan Partnership

Mark Leon
Forward Edge Technologies

Room 224 ABEF

Schedule

8:30 **General overview**
Leon

9:10 **Case study: computer graphics software developer**
Collier

10:00 **Break**

10:15 **Case study: computer graphics animator**
Hamby

11:25 **Open discussion, questions and answers**
All

42 Parallel Graphics and Visualization Technology

Tuesday **Half Day PM**

Beginning — Intermediate — Advanced

Issues and challenges of incorporating parallelism into hardware and software rendering systems:

- *The development of parallel graphics technology and trends in high-performance graphics, notably PC graphics accelerators.*
- *State-of-the-art graphics hardware architectures and the parallelism in the software that uses them.*
- *Design of fully parallelized rendering systems, with emphasis on supporting parallel application codes and modern graphics libraries.*
- *Software rendering on massively parallel supercomputers.*

Prerequisites

A basic understanding of computer graphics and computer systems, and a strong interest in graphics hardware architectures, graphics software systems, and parallel rendering algorithms.

Topics Covered

Concepts and designs of parallel graphics pipelines and software architectures, texture systems, parallel graphics interfaces, parallel graphics libraries, frame buffers, load balancing, and parallel image compositing.

Organizer

Kwan-Liu Ma
Institute for Computer Applications in Science and Engineering

Lecturers

Frank Crow
Interval Research Corporation

Mark Grossman
Silicon Graphics, Inc.

Kwan-Liu Ma
Institute for Computer Applications in Science and Engineering

Gordon Stoll
Stanford University

Room 340 AB

Schedule

1:30 **Opening remarks**
Ma

1:35 **Commodity parallel rendering**
Crow

2:25 **Massively parallel rendering**
Ma

3 **Break**

3:15 **The InfiniteReality graphics system**
Grossman

4:10 **Building (and using) fully parallel rendering systems**
Stoll

4:55 **Questions and answers, closing remarks**
All

43 Digital Video: Algorithms and Interfaces

Tuesday **Half Day AM**

Beginning — Intermediate — Advanced

Digital video technology is no longer restricted to broadcast studios. It is available to practitioners of computer graphics, and it is converging – or colliding! – with mainstream computing. This course details the algorithms and interfaces used for high-quality digital video. It describes the sampling, quantization, and filtering that take place in high-quality digital video; the algorithms used for chroma subsampling, spatial resampling, deinterlacing, frame rate conversion, and other processes necessary to exchange digital video among broadcast, consumer, and computer graphics domains, and the digital video interfaces used in the broadcast studio.

Prerequisites

Some familiarity with digital video, no fear of mathematics, and detailed knowledge of image coding, perhaps gained by attending Color Image Coding (Course 25).

Topics Covered

The algorithms of sample rate conversion (in video, called interpolation) and spatial resampling.

Organizer
Charles Poynton

Lecturers
Victor Duvanenko
Truevision

Charles Poynton

Kevin Stec
Panasonic AVC American Labs

Room 340 AB

Schedule

8:30 **Basic principles**
Poynton

8:50 **Interlace and progressive scanning; motion portrayal**
Poynton

9:10 **Filtering and sampling**
Poynton

10 **Break**

10:15 **Spatial resampling**
Stec

10:45 **Composite NTSC and PAL**
Poynton

11 **Studio interfaces; Rec. 601**
Poynton

11:30 **Desktop video and nonlinear editing demo**
Duvanenko

44 Digital Video: Motion JPEG, MPEG-2, DVC, and DVD

Tuesday **Half Day PM**

Beginning — Intermediate — Advanced

To record video, computer graphics professionals have long been faced with a dilemma: consumer-grade analog recording (with inferior picture quality), studio digital video equipment (which is very expensive), or software-based decompression on workstations or desktop computers (with the poor performance). Solutions to these dilemmas are at hand: Digital Video Cassette (DVC) and Digital Versatile Disc (DVD). DVC brings high-quality digital recording to computer graphics professionals. DVD offers high-performance and low-cost distribution of video. This course explains the Motion JPEG technology at the heart of DVC, and the MPEG-2 standard that is the basis of DVD coding.

Prerequisites

Detailed knowledge of image coding, as from Color Image Coding (Course 25) and familiarity with video technology as from Digital Video: Algorithms and Interfaces (Course 43).

Topics Covered

The quality that can be expected from MPEG at particular bit rates, cause and prevention of compression artifacts, quality considerations in MPEG encoding and decoding, how the implementation options of MPEG-2 address diverse applications, and the relationships among the JPEG, MPEG-1, H.261, and MPEG-2 standards.

Organizer
Charles Poynton

Lecturers
Michael Isnardi
Sarnoff Corporation

Charles Poynton

Room 224 ABEF

Schedule

1:30 **JPEG and Motion-JPEG**
Poynton

1:50 **Videotape and DVC**
Poynton

2:10 **Introduction to HDTV and ATSC**
Poynton

2:20 **MPEG-2 video I**
Isnardi

3 **Break**

3:15 **MPEG-2 video II**
Isnardi

4 **ATSC, FCC, and DTV**
Isnardi

4:20 **DVD**
Poynton

4:30 **Questions and answers**
Poynton

45 Authoring Compelling and Efficient VRML97 Worlds

Tuesday **Half Day PM**

Beginning — Intermediate — Advanced

The knowledge required to make intelligent decisions about creating VRML97 content that runs efficiently on modern VRML97 browsers. The presenters explain the tradeoffs that authors need to make, present, and analyze real-world examples culled from their own development and those of their customers. Topics include measuring and predicting runtime performance, texture and sound techniques to minimize download without sacrificing performance or looks, using navigation aids to take the burden of 3D navigation off the user, and how VRML97 browsers optimize their rendering.

Prerequisites

An understanding of the fundamentals of the VRML node structure and recognition of the purpose if not the exact syntax of most VRML nodes.

Topics Covered

In-depth knowledge of the runtime tradeoffs that authoring decisions imply, what features of VRML97 to avoid due to ambiguities, and a new way to think about project workflow that will increase the likelihood of achieving performance goals.

Organizer
David Story
Cosmo Software

Lecturers
Delle Maxwell
Computer Graphic Designer

David Story
Cosmo Software

Room 340 CD

Schedule

1:30 **Introduction**
Story

1:40 **Low-polygon count modeling**
Maxwell

2:00 **Performance optimization**
Story

2:30 **Efficient appearance application**
Maxwell

2:50 **Inexpensive sound**
Story

3:00 **Break**

3:15 **Navigation**
Story

3:40 **Efficient animation**
Maxwell

4:00 **Reaction and interaction**
Story

4:45 **Conclusion**
Story

46 Computer Graphics Beyond the Third Dimension

Tuesday **Tutorial 10 am-noon**

Beginning — Intermediate — Advanced

This advanced tutorial provides an intuitive connection between many standard 3D geometric concepts used in computer graphics and their higher-dimensional counterparts. It begins by answering frequently asked geometric questions whose resolution, though obvious in hindsight, may be obscure to those who have never ventured beyond the third dimension. It then develops methods for describing, transforming, interacting with, and displaying geometry in arbitrary dimensions. Several examples are directly relevant to ordinary 3D graphics, including the treatment of quaternion frames as 4D geometric objects and application of generalized lighting models to 3D volumetric density data reinterpreted as 4D elevation maps.

Prerequisites

Sophisticated understanding of analytic geometry and linear algebra, and familiarity with conventional mathematical methods of 3D computer graphics used in geometric transformations, polygon rendering, ray-tracing, and illumination models. Some knowledge of volume rendering is helpful.

Topics Covered

Basic methods of high-dimensional geometry as intuitive generalizations of 3D graphics techniques. Application of projection, normal determination, and generalized lighting to examples such as visualization of quaternions and 3D scalar fields.

Organizer and Lecturer
Andrew Hanson
Indiana University

Room 340 CD

Schedule

10:00 **Formulas and techniques of N-dimensional geometry, proximity calculations, barycentric coordinates, and treating N-dimensional data points as geometry**
Hanson

10:45 **Rotations in N-dimensions and natural interfaces for N-dimensional orientation control**
Hanson

11:00 **Moving 3D frames as 4D quaternion differential equations, the Frenet and Bishop frame equations, visualizing quaternion frames as 4D geometric objects**
Hanson

11:30 **Viewing 3D scalar fields as 4D elevation maps, display, virtual lighting, and interaction with D>=4 objects in 3D virtual reality environments**
Hanson

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papers/panels

SIGGRAPH 98 Papers: The premier international forum for the latest and most significant findings in computer graphics and interactive techniques. Papers are submitted for review by a committee of world-renowned experts in computer graphics. Each accepted paper is presented by the author(s) at SIGGRAPH 98 and printed in the field's premier archive, the SIGGRAPH Conference Proceedings.

SIGGRAPH 98 Panels: A highly interdisciplinary program that sparks animated discussions and provides thought-provoking insights from some of the top professionals in the interactive and graphics world. Panels explore the art and science of image and interface, and address the technical, practical, aesthetic, and social challenges that we face as we build the future into the next millennium. All SIGGRAPH 98 Panels will be simultaneously interpreted into Japanese.

SIGGRAPH 98 の全てのパネル討論は、日本語に同時　通訳されます。

After their presentations, authors and panelists move on to practical demonstrations in the Creative Applications Lab and informal discussions in the Session Breakout Lounge (Hall F Lobby).

Location

See pages 37 - 43

Papers Chair
Michael F. Cohen
Microsoft Research

Days	**Hours**
Wedneday 22 July	10:30 am - 6:30 pm
Thursday 23 July	8:30 am - 6 pm
Friday 24 July	8:30 am - 6 pm

Panels Chair
Celia Pearce
Celia Pearce & Friends

Papers Committee

Kurt Akeley
Silicon Graphics, Inc.

David Baraff
Carnegie Mellon University

Ronen Barzel
Pixar

Gary Bishop
University of North Carolina at Chapel Hill

Kelly Booth
The University of British Columbia

Rob Cook
Numinous Technologies

Frank Crow
Interval Research

Julie Dorsey
Massacusetts Institute of Technology

Irfan Essa
Georgia Institute of Technology

Steve Feiner
Columbia University

Thomas Funkhouser
Princeton University

Hugues Hoppe
Microsoft Research

John Hughes
Brown University

Chris Johnson
University of Utah

David Kirk
NVidia

Greg Larson
Silicon Graphics, Inc.

Marc Levoy
Stanford University

Jitendra Malik
University of California at Berkeley

Joe Marks
Mitsubishi Electric Research Lab

Demitri Metaxas
University of Pennsylvania

Alyn Rockwood
Power Take-Off Software, Inc.

David Salesin
University of Washington

Tom Sederberg
Brigham Young University

Hans-Peter Seidel
Universität Erlangen, CG Group

Francois Sillion
iMAGIS-GRAVIR/IMAG

Alvy Ray Smith
Microsoft Corporation

John Snyder
Microsoft Research

Demetri Terzopoulos
University of Toronto/Intel Corporation

Jane Wilhelms
University of California at Santa Cruz

Panels Committee

Administrative Assistant
Tom Burkhart

Sara Diamond
The Banff Centre for the Arts

Clark Dodsworth
Osage Associates

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Sandia National Laboratories

Barbara Mones-Hattal
Industrial Light & Magic

Pauline T'so
Rhythm and Hues

Turner Whitted
Microsoft Corporation

David Zeltzer
Sarnoff Corporation

keynote address/awards

Wednesday 22 July 8:15 - 9:45 am
Hall E 2

Jim Blinn, Graphics Fellow at Microsoft Research and recipient of the first SIGGRAPH Computer Graphics Achievement Award, surveys the computer graphics scene from his unique perspective as a scientist, engineer, artist, and author. Over the past 25 years, his contributions and achievements have exponentially expanded the horizons of computer graphics.

Immediately before the keynote, SIGGRAPH presents two awards:

- **Michael Cohen,** Microsoft Research, receives the 1998 Computer Graphics Achievement Award for his achievements in radiosity, constraint-based animation, shape design, image-based rendering, and realistic image synthesis.

- **Maxine Brown,** University of Illinois at Chicago, receives the first SIGGRAPH Outstanding Service Award for her many years of leadership on SIGGRAPH organization and conference committees, including chair of SIGGRAPH 92 (Chicago).

Wednesday 22 July 10:30 am - 12:15 pm

Papers

Animation & Simulation

Hall E 2

Chair
Ronen Barzel Pixar

animation & FX

NeuroAnimator: Fast Neural Network Emulation and Control of Physics-Based Models

Radek Grzeszczuk, Demetri Terzopoulos
University of Toronto/Intel Corporation
Geoffrey Hinton Intel Corporation

CAL

A Beam Tracing Approach to Acoustic Modeling for Interactive Virtual Environments

Thomas Funkhouser Princeton University
Ingrid Carlbom, Gary Elko, Gopal Pingali, Mohan Sondhi, Jim West
Bell Laboratories

synthetic actors

Retargeting Motion to New Characters

Michael Gleicher Autodesk, Inc.

animation & FX

Large Steps in Cloth Simulation

David Baraff, Andrew Witkin Carnegie Mellon University

Panel

Visualization: The Hard Problems

Room F 3-5

For straightforward mapping to time-varying 3D geometry (weather simulation, for example), quite a few visualization tools and techniques are available. But for problems with high dimensionality, abstract quantities or relationships, or diverse kinds of information, visualization solutions remain elusive. These and other visualization issues are addressed by a panel representing a variety of pertinent disciplines: computer graphics, human factors, cognitive science, and the graphic arts. Panelists also present visualization solutions designed to solve these kinds of visualization problems.

Moderator
David Zeltzer Sarnoff Corporation

Panelists
Ann M. Bisantz State University of New York at Buffalo
Krzysztof Lenk Dynamic Diagrams
Jock D. Mackinlay Xerox PARC
Randall W. Simons Sandia National Laboratories

Papers

Facial Modeling & Animation

Hall E 2

Chair
Irfan Essa Georgia Institute of Technology

synthetic actors

Making Faces

Brian Guenter, Cindy Grimm, Henrique Malvar
Microsoft Research
Daniel Wood University of Washington

synthetic actors

An Anthropometric Face Model Using Variational Techniques

Douglas DeCarlo, Dimitris Metaxas, Matthew Stone
University of Pennsylvania

synthetic actors

Modeling Realistic Facial Expressions From Photographs

Frederic Pighin, Jamie Hecker, David H. Salesin University of Washington
Dani Lischinski The Hebrew University
Richard Szeliski Microsoft Research

animation & FX *modeling*

Subdivision Surfaces for Character Animation

Tony DeRose, Michael Kass, Tien Truong
Pixar Animation Studios

Panel

virtual reality CAL

Look Ma! Four Hands! New Models for Interacting with 3D Worlds

Room F 3 - 5

What is so hard about 3D interaction? What exactly is being done to improve the bandwidth of man-machine interface in 3D environments? The World Wide Web makes practical -- indeed necessary -- the development of code that will run everywhere. Thus real-time 3D environments are now more accessible than ever. This panel looks at practical solutions to the challenge of interfacing with these new 3D worlds, both in terms of hardware devices, and in terms of universal 3D file formats such as VRML 2.0 and JAVA 3D.

Moderator
Julian E. Gomez LEGO A/S, SPU-Darwin

Panelists
Dan Mapes LEGO A/S, SPU-Darwin
Henry Sowizral Sun Microsystems, Inc.
Andries van Dam Brown University
Dan Venolia Cosmo Software

Panel

Listen Up! Real-Time Auditory Interfaces for the Real World CAL

Room F 1 - 2

Auditory display pushes human/computer interface boundaries by delivering multi-dimensional information in an efficient and intuitive way. This panel covers some of the most interesting current tools, methodologies, and applications from leading research institutions and industrial labs, including audio-augmented reality, sound design, physical modeling systems, cross-modal sensory affordances, and audio in immersive environments.

Moderators
Elizabeth Mynatt
Maribeth Back Xerox PARC

Panelists
Perry R. Cook Princeton University
Robin Bargar
University of Illinois at Urbana-Champaign/National Center for Supercomputing Applications
Peter B. L. Meijer Philips Research Laboratories

Papers

modeling

Multiresolution Surfaces

Hall E 2

Chair
Thomas Funkhouser Princeton University

MAPS: Multiresolution Adaptive Parameterization of Surfaces
Aaron W. F. Lee, David Dobkin
Princeton University
Wim Sweldens, Lawrence Cowsar
Bell Laboratories
Peter Schröder California Institute of Technology

Interactive Multi-Resolution Modeling on Arbitrary Meshes
Leif Kobbelt, Swen Campagna, Jens Vorsatz, Hans-Peter Seidel University of Erlangen-Nurnberg

Appearance-Preserving Simplification
Jonathan Cohen, Marc Olano, Dinesh Manocha University of North Carolina at Chapel Hill

Progressive Forest Split Compression
Gabriel Taubin, Andre Gueziec, William Horn, Francis Lazarus IBM T.J. Watson Research Center

Real-Time Compression of Triangle Mesh Connectivity
Stefan Gumhold, Wolfgang Strasser
University of Tübingen

Panel

interaction

Out of the Box: Toys Break the Screen Barrier

Room F 3 - 5

Transmedia applications blur the line between physical play in the real world and virtual play in the digital world. Are these applications precursors to eventual integration of the computer into more aspects of daily life? As they distribute the play experience over different media, are they still considered "applications," or have they become "toys" in which the computer is now only part of the total experience? This panel of professionals who have begun to tackle these issues analyzes the theory and practice behind transmedia, and gives live demonstrations of transmedia products.

Moderator
Steve Schklair Quantum Arts

Panelists
Christian Greuel LEGO A/S, SPU-Darwin
Michael Patrick Johnson
Massachusetts Institute of Technology
Andy Rifkin Mattel Media
Erik Strommen Microsoft Corporation
Steve Sutyak Hasbro Interactive

Panel

animation & FX

Feature FX: Money Pit or Gold Mine?

Room F 1 - 2

The effects industry was reborn in the late 1970s with the production of Star Wars. Since then, it has grown from one small company producing effects for George Lucas and his friends to a crowded and highly competitive business of approximately 20 companies competing for almost half a billion effects dollars in 1997. What are some of the growing pains that the big effects operations have experienced in the 80s and 90s, and how are they preparing for a healthy future?

Moderator
Patricia Rose Duignan Rhythm & Hues

Panelists
Scott Ross Digital Domain
Jim Morris Industrial Light & Magic
Carl Rosendahl Pacific Data Images
Richard Hollander Blue Sky | VIFX
Phil Tippett Tippett Studio
Ray Feeney RFX

Thursday 23 July 8:30 - 10:15 am

Papers

Hardware Acceleration

Hall E 2

Chair
David Kirk NVidia

The Design of a Parallel Graphics Interface

Homan Igehy, Gordon Stoll, Pat Hanrahan
Stanford University

The Clipmap: A Virtual Mipmap

Christopher C. Tanner, Christopher Migdal, Michael T. Jones Silicon Graphics, Inc.

A Shading Language on Graphics Hardware: The PixelFlow Shading System

Marc Olano, Anselmo Lastra
University of North Carolina at Chapel Hill

CAL

Efficiently Using Graphics Hardware in Volume Rendering Applications

Rudiger Westermann, Thomas Ertl
University of Erlangen-Nurnberg

Panel

animation & FX

Dis-Illusion of Life: Becoming a Digital Character Animator

Room F 3 - 5

Where are the new animators, and why are recruiters having such a hard time finding them? Now that mature digital tools are available to character animators, and as those tools become more sophisticated every year, this field is coming into its own. The market is ripe for talented digital character animators, but they are few and far between. Educators, animators, and industry trainers present widely divergent views, insights, and suggestions for animators, those who train animators, and anyone looking for employment in character animation.

Organizer
Barbara Mones-Hattal Industrial Light & Magic

Moderator
Jacquelyn Ford Morie Blue Sky | VIFX

Panelists
Endla Burrows Industrial Light & Magic
Peter Docter Pixar Animation Studios
Daniel Jeannette Industrial Light & Magic
Ken Perlin New York University
James Sayers Sheridan College

Panel

virtual reality

Human Factors in Virtual World Design: Psychological and Sociological Considerations

Room F 1 - 2

This panel discusses strategies for graphical virtual world design in light of sociological and psychological human factors. The primary focus is on methods of successfully designing virtual worlds intended as social or community platforms, with special consideration of factors that may interfere with user commitment and social interaction.

Moderator
Elizabeth Reid Steere
Royal Melbourne Institute of Technology

Panelists
Lynn Cherny AT&T Research Labs
Mary Czerwinski Microsoft Research
Beth Kolko University of Texas at Arlington
Tammy Knipp Florida Atlantic University

Thursday 23 July 10:30 am - 12:15 pm

Papers

rendering

Image-Based Modeling & Rendering

Hall E 2

Chair
Julie Dorsey
Massachusetts Institute of Technology

CAL

The Office of the Future: A Unified Approach to Image-Based Modeling and Spatially Immersive Displays

Ramesh Raskar, Greg Welch, Matt Cutts, Adam Lake, Lev Stesin, Henry Fuchs
University of North Carolina at Chapel Hill

Rendering Synthetic Objects Into Real Scenes: Bridging Traditional and Image-Based Graphics With Global Illumination and High Dynamic Range Photography

Paul Debevec University of California at Berkeley

Multiple-Center-of-Projection Images

Paul Rademacher, Gary Bishop
University of North Carolina at Chapel Hill

Recovering Photometric Properties of Architectural Scenes from Photographs

Yizhou Yu, Jitendra Malik
University of California at Berkeley

Panel

virtual reality

Virtual Reality as Healing Art

Room F 3 - 5

How can we use virtual reality to heal ourselves – body, mind and soul? Could it be that virtual healing is the "killer app" of VR not because it kills, but because it heals? In its deepest promise and most profound practice, VR as both healing modality and visionary art form is a transformative technology with extraordinary power to make and keep us well. From classic vision to cutting-edge research, with real-world examples and real-time performance from the true pioneers of cyberspace healing, this panel looks at cyberspace as a healing place, avatar as anima, virtual reality as healing art.

Moderator
Galen R. Brandt
The Pacific Sands

Panelists
Rita K. Addison Virtual Reality Artist/Consultant.
Hugh S. Lusted BioControl Systems, Inc.
Tom Riess H.M.D. Therapeutics
Myron W. Krueger Artificial Reality Corporation
Richard Satava Yale University/NASA
Dorothy Strickland
Stetson University/Virtual Reality Aids
Hunter G. Hoffman University of Washington

Videoconference

An International Videoconference: Computer Graphics Pioneers Assess Computer Graphics

Room 240 AB

Pioneers discuss computer graphics' most significant contributions over the last 25 years, its greatest challenges, and the outlook for computer graphics between now and 2023.

Organizers
Carl Machover Machover Associates Corporation
David Arnold University of East Anglia

Panel Chair: Orlando
Carl Machover Machover Associates Corporation
Panelists
Judith R. Brown University of Iowa
David Arnold University of East Anglia

Panel Chair: Smithsonian Institution, Washington, D.C.
John C. Gebhardt InterCAP Graphic Systems
Panelists
Robert E. Thurber Intergraph Corporation
Charles O. Heller Charles Heller Associates

Panel Chair: National Museum of Photography, Film & Television, Bradford, United Kingdom
Phil Willis University of Bath
Panelists
Richard Guedj
Institut National des Telecommunications
Klaus Kansy
German National Research Center for Information Technology

Thursday 23 July 2:15 - 4 pm

Papers

rendering

Image-Based Rendering

Hall E 2

Chair
Marc Levoy Stanford University

Visibility Sorting and Compositing for Image-Based Rendering

John Snyder, Jed Lengyel Microsoft Research

Layered Depth Images

Jonathan W. Shade University of Washington
Steven J. Gortler Harvard University
Li-wei He Stanford University
Richard Szeliski Microsoft Research

Multiple Viewpoint Rendering

Michael Halle Brigham and Women's Hospital

Progressive Radiance Evaluation Using Directional Coherence Maps

Baining Guo Intel Corporation

Panel

interaction

Interfaces for Humans: Natural Interaction, Tangible Data and Beyond...

Room F 3-5

Huge advances in interface modalities are evident and imminent. This panel demonstrates and explores the most interesting, promising, and clever of these modalities, and their integration into exciting multi-modal systems. The panelists are seasoned pioneers whose views range from incremental to radical. Their work is elegantly inspiring and sometimes exquisitely unconventional.

Moderator
Michael Harris
NCR Human Interface Technology Center

Panelists
Michael J. Sinclair Georgia Institute of Technology
William T. Freeman
Mitsubishi Electric Research Laboratory
Bill Buxton Alias | Wavefront
Hiroshi Ishii
Massachusetts Institute of Technology
Mark Lucente IBM T. J. Watson Research Center

Panel

virtual reality

Are You Here? Presence in Virtual Reality: What Is It All About and Why Care?

Room F 1-2

Virtual reality is supposed to provide a strong illusion of being and acting in a simulated "other place." Is this realisable? What is required to enable someone to be "present" in a virtual scenario? To what extent can this degree of presence be measured, if it exists at all? How does it relate to performance? Does any of this matter anyway to application builders or users? A multidisciplinary panel addresses these and related issues.

Moderator
Mel Slater University College London

Panelists
Nat Durlach Massachusetts Institute of Technology
Lawrence J. Hettinger Logicon Technical Services
Randy Pausch Carnegie Mellon University
Dennis R. Proffitt University of Virginia

Thursday 23 July 4:15 - 6 pm

Papers

Plants, Palettes, Perception

Hall E 2

Chair
Kelly Booth The University of British Columbia

modeling

Realistic Modeling and Rendering of Plant Ecosystems

Oliver Deussen The University of Magdeburg
Pat Hanrahan, Matt Pharr Stanford University
Bernd Lintermann
The ZKM Center for Art and Media Karlsruhe
Radomir Mech, Przemyslaw Prusinkiewicz
The University of Calgary

Reproducing Color Images Using Custom Inks

Eric J. Stollnitz, David H. Salesin
University of Washington
Victor Ostromoukhov
Ecole Polytechnique Fédérale de Lausanne

A Multiscale Model of Adaptation and Spatial Vision for Realistic Imaging

Sumanta N. Pattanaik, James A. Ferwerda, Donald P. Greenberg Cornell University
Mark D. Fairchild
Rochester Institute of Technology

A Perceptually Based Adaptive Sampling Algorithm

Mark R. Bolin, Gary W. Meyer
University of Oregon

Panel

interaction

The Sorcerer's Apprentice: Invoking Ubiquitous Computing for Computer Graphics

Room F 3-5

Industry leaders summarize their interests and research/application areas, with a focus on how ubiquitous computing may change practice and research in computer graphics. Panelists also address what ubiquitous computing will need from computer graphics.

Moderator
W. Bradford Paley
Digital Image Design Incorporated

Panelists
Mark Weiser Xerox PARC
Hiroshi Ishii Massachusetts Institute of Technology
Bill Buxton Alias | Wavefront
Steven Feiner Columbia University
Steven Shafer Microsoft Research
S. Joy Mountford Interval Research

Panel

synthetic actors

Behavioral Modeling and Animation: Past, Present, and Future

Room F 1-2

Only 10 years after it was introduced as an advanced technique for animating graphical characters, behavorial animation is now the foundation of sophisticated systems developed by recipients of technical, scientific, and engineering Academy Awards. This panel discusses the fundamentals of behavioral modeling and animation arising from our knowledge of living systems. It summarizes the state of the art from multiple perspectives, including production animation, the interactive games industry, and research. Is this the dawn of a new age of behavioral animation?

Organizers/Moderators
Demetri Terzopoulos
University of Toronto/Intel Corporation
Xiaoyuan Tu Intel Corporation

Panelists
Kiran Joshi Walt Disney Feature Animation
Craig Reynolds DreamWorks Feature Animation
Toby Simpson CyberLife Technolgy Ltd.
Ken Perlin New York University

Friday 24 July 8:30 - 10:15 am

Papers

rendering

Rendering

Hall E 2

Chair
Greg Larson Silicon Graphics, Inc.

Efficient Simulation of Light Transport in Scenes With Participating Media Using Photon Maps

Henrik Wann Jensen, Per H. Christensen Mental Images

Fast Calculation of Soft Shadow Textures Using Convolution

Cyril Soler, Francois Sillion iMAGIS - GRAVIR/IMAG

Interactive Reflections on Curved Objects

Eyal Ofek, Ari Rappoport The Hebrew University

CAL

Non-Distorted Texture Mapping for Sheared Triangulated Meshes

Bruno Levy, Jean-Laurent Mallet GOCAD

Panel

Location-Based Entertainment: The Next Generation

Room F 3-5

Location-based entertainment has moved from speculation to reality. Following in the tracks of Virtual Worlds Entertainment (formerly BattleTech Center) and Dave & Buster's, GameWorks and DisneyQuest are now open to the public. This panel discusses the factors that go into creating an LBE attraction, based on the industry leaders' real-world experiences.

Moderator
Randy Pausch Carnegie Mellon University

Panelists
Trevor Bryant Sony Development
Joe Garlington Walt Disney Imagineering
Jon Snoddy GameWorks
Jordan Weisman FASA Interactive

Friday 24 July 10:30 am - 12:15 pm

papers/panels

Papers

3D Interaction

Hall E 2

Chair
John Hughes Brown University

Techniques for Handling Video in Virtual Environments

Gianpaolo U. Carraro, John T. Edmark, J. Robert Ensor Bell Laboratories

CAL

A Distributed 3D Graphics Library

Blair MacIntyre, Steven Feiner
Columbia University

virtual reality

Constellation: A Wide-Range Wireless Motion-Tracking System for Augmented Reality and Virtual Set Applications

Eric Foxlin, Mike Harrington, George Pfeiffer
InterSense, Inc.

interaction

mediaBlocks: Physical Containers, Transports, and Controls for Online Media

Brygg Ullmer, Hiroshi Ishii
Massachusetts Institute of Technology

Panel

Sublime and Impossible Bodies

Room F 3-5

Bodies and their metaphors loom large when we configure the potential of digital media and cyberspace! Bodies extended, connected, sublime, erased, implanted, deformed, defaced, empowered, degendered, buffooned, and desired. This panel debates utopian and dystopian futures with a wild and sexy combination of engineers, artists, animators, out-of-the-box experts, scientists, and medical researchers.

Moderator
Sara Diamond The Banff Centre for the Arts

Panelists
Steve Kurtz Critical Arts Ensemble
Arlindo Machado University of São Paulo
Douglas MacLeod
Western University Research Network
Ahasiw Maskegon-Iskwew
SOIL Digital Production Media Site
Joshua Portway
The Royal College of Art in London
Jane Prophet Slade School of Art
Catherine Richards University of Ottawa

Panel

modeling

Is Robust Geometry Possible?

Room F 1-2

Since computers first calculated 2D and 3D geometry for design, modeling, animation, and visualization, implementors and users have been plagued by problems ranging from simple visual discrepancies (such as "cracks" between polygons) to strange program behavior, including outright crashes. Why is it so hard to correctly create and implement computer programs involving geometry, and what can be done to make geometric programs work correctly? This panel of industrial and academic experts expect lively discussion and strong challenges from the audience regarding the nature of the problem, the limits of existing methodologies, and radical proposals for new solutions.

Organizer
Kevin Weiler Autodesk, Inc.

Panelists
Tom Duff Pixar Animation Studios
Steve Fortune Bell Laboratories
Chris Hoffmann Purdue University
Tom Peters University of Connecticut

Friday 24 July 2:15 - 4 pm

Papers

modeling

Surfaces

Hall E 2

Chair
Dimitris Metaxas University of Pennsylvania

Non-Uniform Recursive Subdivision Surfaces
Thomas W. Sederberg Brigham Young University
Jianmin Zheng Brigham Young University/Zhejiang University
Malcolm Sabin Cambridge University
David Sewell Sewell Development

Fast Evaluation of Catmull-Clark Subdivision Surfaces at Arbitrary Parameter Values
Jos Stam Alias | Wavefront

Wires: A Geometric Deformation Technique
Karan Singh Alias | Wavefront
Eugene Fiume Silicon Graphics, Inc.

A New Voronoi-Based Surface Reconstruction Algorithm
Nina Amenta University of Texas at Austin
Marshall Bern Xerox PARC
Manolis Kamvysselis Massachusetts Institute of Technology

Panel

interaction

Computer Vision in 3D Interactivity

Room F 3-5

Now that microprocessor clock rates exceed 300MHz, SIMD integer instructions are commonplace, and shared memory multiprocessing is available for under $3,000, integration of computer vision with 3D graphics is more practical than ever before. Tracking the user's head, hands, body, and gestures could eliminate encumbering sensors. Another approach uses computer vision techniques to understand 3D structure and camera parameters in multi-view, image-based scenes and re-renders them as the user directs. Yet another uses animated characters that are aware of users and other characters. What will be the most compelling integration of computer vision with 3D graphics?

Moderator
Mark Holler Intel Corporation

Panelists
Ingrid Carlbom Lucent Technologies
Steven Feiner Columbia University
George Robertson Microsoft Research
Demetri Terzopoulos University of Toronto/Intel Corporation

Panel

rendering

Ray Tracing and Radiosity: Ready For Production?

Room F 1-2

Ray tracing and radiosity are known as rendering techniques that produce the most realistic images possible in computer graphics. But to what extent are they being used for commercial production? What are the benefits and problems for companies who have tried to use them? This panel answers these questions with presentations and discussions by digital artists and companies that have actually implemented these rendering methods in their film and commercial work, and dissenting views from those working at the alternatives.

Organizer
Jacquelyn Ford Morie Blue Sky | VIFX

Moderator
Richard Hollander Blue Sky | VIFX

Panelists
Chris Wedge Blue Sky | VIFX
Grant Boucher Planet X
Gonzalo Garramuno Digital Domain
Bob Powell Rhythm & Hues

Friday 24 July 4:15 - 6 pm

Papers

Art, Illustration, Expression

Hall E 2

Chair
Alvy Ray Smith Microsoft Corporation

Computer-Generated Floral Ornamental Design
Douglas Zongker, Michael Wong, David H. Salesin
University of Washington

animation & FX

Texture Mapping for Cel Animation
Wagner Toledo Correa, Robert J. Jensen, Adam Finkelstein
Princeton University
Craig E. Thayer Walt Disney Feature Animation

A Non-Photorealistic Lighting Model for Automatic Technical Illustration
Amy Gooch, Bruce Gooch, Peter Shirley, Elaine Cohen
University of Utah

Painterly Styles for Expressive Rendering
Aaron Hertzmann New York University

Panel

synthetic actors

Characters on the Internet: The Next Generation

Room F 1-2

The Internet is breeding inspiration among designers, story tellers, and interactive programmers, compelling them to develop next-generation digital characters that fully exploit the interactive nature of the medium. These characters respond and interact with human participants and each other while displaying their own unique personalities, behaviors, and dramatic involvements. A diverse group of panelists discusses and demonstrates their latest works and inventive methods of delivering Internet character-based experiences.

Moderator
Steve DiPaola Darwin Digital

Panelists
Barrett Fox infoplasm, Inc.
Athomas Goldberg New York University
Mark S. Meadows Construct
Celia Pearce Celia Pearce & Friends

panel organizers/paper authors

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Douglas Zongker
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sketches

Lively presentations of interesting new ideas, unique collaborations, late-breaking results, works in progress, and novel applications of computer graphics and interactive techniques. Sketches are presented in four categories: Technical; Art, Design, and Multimedia; Animation; and Applications.

Sketches Committee

David S. Ebert
University of Maryland Baltimore County

Marc Kessler
University of Michigan

Jonathan Luskin
Franz Inc.

Thecla Shiphorst
Emily Carr Institute of Art & Design

Location

Technical Sketches	Room 224
Applications Sketches	Room 414 CD
Art, Design, and Multimedia Sketches	Room 414 AB
Animation Sketches	Room 330 DEFG

Sketches Chair

Rick Parent
The Ohio State University

Administrative Assistant

Viki Dennis
The Ohio State University

Days / **Hours**

Wednesday 22 July	10:30 am - 6 pm
Thursday 23 July	8:30 am - 6 pm
Friday 24 July	10:30 am - 6 pm

technical sketches

Wednesday, 22 July 10:30 am - 12:15 pm

modeling

Another Fine Mesh *Chair* **Hugues Hoppe, Microsoft Research** **Room 224**

Too Many Triangles

Wolfgang Seibold and Geoff Wyvill
Department of Computer Science
University of Otago
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Dunedin, NEW ZEALAND
geoff@rabbit.otago.ac.nz

In most triangle-mesh representations of curved surfaces, the triangle vertices lie on the surface. This sketch shows that, by relaxing this condition, the error of approximation can be halved.

Multiresolution of Arbitrary Triangular Meshes

Wei Xu and Don Fussell
Texas Institute of Computational and Applied Mathematics and Department of Computer Sciences
The University of Texas at Austin
Austin, Texas 78712 USA
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A new method for multiresolution analysis of arbitrary triangular meshes using a new general subdivision scheme and a new type of wavelets based on the resulting subdivision trees.

Geometric Reconstruction with Anisotropic Alpha-Shapes

Michael Capps and Marek Teichmann
MIT Lab for Computer Science
545 Technology Square
NE43-242
Cambridge, Massachusetts
02139 USA
marekt@graphics.lcs.mit.edu

Two extensions (anisotropic scaling and density scaling) to alleviate problems with anisotropic alpha-shapes and allow reconstruction from a larger class of point sets.

Converting Sets of Polygons to Manifold Surfaces by Cutting and Stitching

Andre Gueziec, Gabriel Taubin, Francis Lazarus, William Horn
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Many real-world polygonal surfaces contain topological singularities (edges shared by more than two triangles, several triangle fans incident to a single vertex) that represent a challenge for processes such as simplification, compression, smoothing, etc. This automated algorithm removes such singularities, thus converting non-manifold sets of polygons to manifold polygonal surfaces (orientable, if necessary).

Wednesday 22 July 2:15 - 4 pm

Colliding, Caving & Coloring *Chair* **Andrew Glassner, Microsoft Research** **Room 224**

virtual reality

Collision Detection Framework Using Model Simplification

Tiow-Seng Tan, Ket-Fah Chong, and Kok-Lim Low
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A framework that automatically exploits output of a simplification algorithm to construct bounding volume hierarchies for collision detection. Preliminary experiments show very encouraging results.

Optimizing Stereo Video Formats for Projection Based Virtual Reality

Gary Lindahl, Tom DeFanti, Dan Sandin, Greg Dawe, and Maxine Brown
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Many of today's high-end, projection-based virtual reality systems generate frame-interleaved video for stereoscopic equipment. Integrating LCD shutter glasses, high-end graphics computers, and large-scale projectors is difficult. This sketch identifies problems discovered as part of the VR efforts at the Electronic Visualization Laboratory and offers solutions.

3D Painting for Non-Photorealistic Rendering

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The 3D Expressive Painter is an interactive, expressive 3D painting and rendering system intended for use in production of hand-drawn natural-media-style animations. By using some imported scene geometry, created in a general-purpose modeller, the system allows interactive placement of paint strokes in 3D. The user is able to rotate the scene, select a suitable viewing angle, and paint from the desired direction, with the depth values for the stroke positions calculated from the imported scene.

Visually Representing Multi-Valued Scientific Data Using Concepts from Painting

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Layers of varying brush strokes are used to visually represent 2D images of multi-valued scientific data. Example visualizations display up to eight values simultaneously so that they can be understood in context.

Wednesday 22 July 4:15 - 6 pm

virtual reality

Reality ++ *Chair* **Chris Shaw, University of Regina** **Room 224**

interaction

Star Cursors in Content Space: Abstractions of People and Places

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C. v Heerden, J. Mama, L. Nikolovska, R. den Otter, J. Rutgers,
Philips Design
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THE NETHERLANDS
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A 3D multi-user virtual world supporting novel, abstract representations for content and users, coupled via models of users' profiles and their social context, is envisioned and illustrated by computer prototypes.

A 3D Stereo Window System for Virtual Environments

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A 3D stereo window system is being developed for use in a virtual environment. The system allows users to create and interact with objects and scenes in multiple independent, overlapping workspaces.

Visorama: A Complete Virtual Panorama System

Andre Matos, Luiz Velho, Jonas Gomes, Andre Parente, Heloisa Siffert
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Visorama combines hardware and software components to provide a natural and immersive interaction with virtual panoramas. The system includes an authoring environment well suited for panorama-based virtual worlds.

Remote Reality Demonstration

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Discussion/demonstration of a system that combines 360 x 210-degree field-of-view, full-motion video with frame-rate warping and a HMD to create a geometrically correct, model-free immersive environment.

Thursday 23 July 10:30 am - 12:15 pm

animation & FX

Adventures in Moving *Chair* **Jessica Hodgins, Georgia Institute of Technology** **Room 224**

Assisted Articulation of Closed Polygonal Models

Marek Teichmann and Seth Teller
Laboratory for Computer Science
Room NE43-242
Massachusetts Institute of Technology
545 Technology Square
Cambridge, Massachusetts
02139 USA
marekt@lcs.mit.edu

A system for automating the correspondence between skeletons and mesh models in articulation of models represented by polygonal meshes.

Dynamic Modeling of Human Hair and GUI Based Hair Style Designing System

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Faculty of Engineering
Seikei University
3-3-1 Kichijoji-kitamachi
Musashino
Tokyo 180-0001 JAPAN
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New methods for dynamic modeling of hair. GUI-based hair-editing tool helps to create any style by manipulating a tuft model. This sketch features a realistic animation of hair blowing in the wind.

Directing Physics

Stephen Chenney
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University of California at Berkeley
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An extension of the traditional world model for physically based animations using a Markov chain Monte Carlo algorithm to sample animations that are both physically plausible and satisfy a director's constraints.

Faster Integration of the Equations of Motion

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Physical simulation techniques generate realistic motion at a computational price. This sketch examines ways of reducing that cost through the use of leapfrog methods.

Thursday 23 July 2:15 - 4 pm

Creating Coherence *Chair* **Jules Bloomenthal, Unchained Geometry** **Room 224**

Physics-Model-Based 3D Facial Image Reconstruction from Frontal Images Using Optical Flow

Shigeo Morishima, Takahiro Ishikawa, Demetri Terzopoulos
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Automatic estimation of facial muscle parameters from optical flow using a neural network. This technique corresponds to 3D facial motion tracking from a 2D image under the physics-model-based constraint.

Vector Field Comparisons Using Earth Mover's Distance

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A method for computing a quantitative measure of the closeness between vector fields. The method produces feature descriptions that allow for comparisons of vector fields.

Measuring Volumetric Coherence

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Issei Fujishiro
Ochanomizu University
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In order to achieve a time-critical environment for indirect volume visualization, a cogent measure of the volumetric coherence is devised on the basis of well-known, second-order, gray-level statistics for 2D textures.

modeling

Artificial Evolution of Implicit Surfaces

Edward J. Bedwell and David S. Ebert
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University of Maryland Baltimore County
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ebedwe@cs.umbc.edu

A system that combines implicit surfaces, as modeling primitives, with genetic programming to facilitate automated generation of exceedingly complex models.

The Light Brigade

Chair **Holly Rushmeier, IBM T.J. Watson Research** **Room 224**

A Progressive Global Illumination Solution Considering Perceptual Factors

Vladimir Volevich, Karol Myszkowski, Andrei Khodulev, Edward A. Kopylov
Russian Academy of Sciences

Karol Myszkowski
The University of Aizu
k-myszk@u-aizu.ac.jp
www.u-aizu.ac.jp/~k-myszk/progress

Jerzy Sas
Technical University of Wroclaw

A high-speed, progressive global illumination solution for complex environments combines stochastic and deterministic techniques, and utilizes perceptually-based tuning of simulation parameters.

Visibility Driven Hierarchical Radiosity

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www-imagis.imag.fr/

A novel visibility driven hierarchical radiosity algorithm that uses an extended skeleton to compute accurate visibility at vertices, to insert important discontinuities, and to effect an efficient refinement strategy. The method uses hierarchical triangulations and introduces a novel push-pull procedure for accurate display.

Radiance Maps: An Image-Based Approach to Global Illumination

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www9.informatik.uni-erlangen.de/Persons/Slusallek

A new image-based approach to global illumination that is designed to explicitly make use of coherence in the radiance field of a scene.

Interactive Modification of Real and Virtual Lights for Augmented Reality

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A new method to allow interactive modification of real light sources for augmented reality. Real light shadows are removed from captured textures, and a modified interactive radiosity system is used.

Friday 24 July 10:30 am - 12:15 pm

Cool Shades *Chair* **David S. Ebert, University of Maryland Baltimore County Room 224**

animation & FX

Fast Multi-Layer Fog

Justin Legakis
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Massachusetts Institute of Technology
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graphics.lcs.mit.edu/~legakis

The standard uniform-density fog model is extended to fog that varies as a function of height. The computation is still performed in constant time, independent of the complexity of the density function.

rendering

A Model for Anisotropic Reflections in Open GL

Wolfgang Heidrich
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A novel approach for simulating anisotropic reflections on OpenGL-based hardware in real time. Rendering of anisotropic surfaces with one light source is as expensive as traditional texturing and lighting.

rendering

Quadratic Interpolation for Near-Phong Quality Shading

Larry Seiler
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Rendering hardware can easily compute coefficients for a second-order shading functions. This is more efficient than per-pixel Phong shading or Gouraud shading with triangle subdivision at equivalent quality.

modeling

Editing 3D Objects without 3D Geometry

Rui Yamada
Mitsuhari Ohki
Hashimoto Signal Processing Lab
Media Processing Lab
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Given a single-source image, this system can perform 3D manipulations directly onto objects in the image without explicitly recovering the underlying 3D geometry.

Friday 24 July 2:15 - 4 pm

Natural Causes *Chair* **Rick Parent, The Ohio State University Room 224**

Procedural Field Grasses

Lee A. Butler
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U.S. Army Research Laboratory
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butler@arl.mil

David S. Ebert
University of Maryland Baltimore County

A method for generating large fields of grasses. The procedural techniques achieve substantial savings in storage space, modeling, and animation effort.

Modeling Fiber Stream of Internal Wood

Naoki Kawai
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"Figure" is one of the most obvious features of wood surfaces. It's caused by the cross grain, a fiber stream of internal wood. We introduce a modeling method of cross grain and render the figure.

Botanical Tree Structure Modeling Based on Real Image Set

Tatsumi Sakaguchi
ATR Media Integration & Communications Research Laboratories
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Form and branch structures of a botanical tree are reconstructed from real images. The technique is an easy way to model an existing tree in a natural scene.

A Particle System for the Direct Synthesis of Landscapes and Textures

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Alex. Panagouli 32
Keratsini 187 56 GREECE
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A new fast method for generation of landscape images and textures. A particle system following simple rules generates images that give the illusion of a 3D model, although images are generated directly in 2D space.

Sensory Overload

Chair **John Hart, Washington State University** **Room 224**

interaction

Plane-Shape Perception Using Point-Contact Type Force Feedback Device

Juli Yamashita, Yukio Fukui, Osamu Morikawa
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Cai Yi
Japan Science and Technology Corporation

Although haptic rendering requires a high control rate (~kHz), modeling and simulation processes are much slower and can provide only discrete shape information. Haptic interpolation of such discrete shape fragments is thus vital. Our experiment on haptic thresholds in static plane-shape recognition gives useful results for interpolation algorithm design.

A Psychophysical Study on Human Perception of Surface

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Shin'ya Nishida
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Human perception of surface reflectance properties is psychophysically examined, and the experimental results suggest that the perception is based on image features rather than the reflectance distribution itself.

The Analysis and Visualization of Metamorphopsia through 3D Scene Regeneration

Peter Presti, Stephen Sinclair, Amit Gupta
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Metamorphopsia is a vision disorder that transforms one's environment into an Escher-like world of fluctuating shapes and double vision. MAVES quantifies and visualizes metamorphopsia through 2D warping and 3D animation.

The Use of Distortion for Special Venue Films

Toshi Kato, Keith Goldfarb, Bob Powell
Rhythm & Hues Studios
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This sketch discusses three Rhythm & Hues projects that used image-distortion for special venue ride films, so that when the animation is projected, it appears undistorted to the viewer.

Wednesday 22 July 10:30 am - 12:15 pm

Mixing the Real and the Synthetic

Chair **Gabriel Taubin, IBM T.J. Watson Research** — **Room 414 CD**

synthetic actors

Hairstyle Simulation System

Kazunori Miyata
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A hairstyle simulation system that automatically fits a stored hairstyle image to a captured face image. The target hairstyle image is adjusted in accordance with face-feature data and is then transformed by an image-warping operation to fit the face image.

Panned/Zoomed Landscape Video Sequences Composited with Computer-Generated Still Images

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Xueying Qin and Guofang Jiao
Sanei Co.

Przemyslaw Rokita
Warsaw University of Technology

Katsumi Tadamura
Yamaguchi University

Yuji Usagawa
Chugoku Electric Power Co.

This sketch presents panned/zoomed landscape video sequence images that are well matched with photorealistic computer-generated still images of large-scale constructions by considering camera distortion and a TV interlaced-scanning system.

synthetic actors

Virtual Stage: An Interactive 3D Karaoke System

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Virtual Stage is an extended karaoke system based on virtual reality technology. Participants sing along to the song and interact with the virtual characters in a virtual environment.

Wednesday 22 July 2:15 - 4 pm

Exploration *Chair* **Jeff Vroom, Art Technology Group** **Room 414 CD**

Studying Sculpture with a Digital Model: Understanding Michelangelo's Pietà of the Cathedral

Fausto Bernardini, Joshua Mittleman, Holly Rushmeier, Gabriel Taubin
IBM T.J. Watson Research Center
30 Saw Mill River Road
Yorktown Heights, New York
10598 USA
holly@watson.ibm.com

Jack Wasserman
Temple University

Scanning of a large, complex statue to produce a high-quality 3D model to allow art historians to study large- and small-scale features in otherwise impossible ways.

A Hierarchical Focus & Context Method for Image Browsing

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Viktoria Research Institute
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S-405 30 Gothenburg,
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www.viktoria.informatics.gu.se/

A method for browsing hierachically ordered image collections. The application allows users to examine an image in detail while simultaneously keeping an overview of the whole set.

virtual reality

Time Travels in Virtual Landscapes

Ingo Braun, Anja Kutzner
Kulturbox GmbH

Birgit Böhme, Uta Simmons
Centre for Berlin Studies

Askan Striepe, Christian Quintus
Fraunhofer Institute for
Production Systems and Design
Technology

Andreas Knoche, Leonie Schäfer
Technical University of Berlin
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Development of a four-dimensional multimedia information system. An historical landscape offers a space-and-time-related entry to information on historical subjects.

virtual reality

Smithsonian without Walls

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Razorfish developed Revealing Things, the Smithsonian's first Web-based exhibit. Through unique navigation, the exhibit showcases objects that reveal their owners' stories and cultures, and the meanings they associate with their possessions.

Wednesday 22 July 4:15 - 6 pm

virtual reality

Training and Simulation *Chair* **Marc Kessler, University of Michigan** **Room 414 CD**

Applying Depth-of-Field Effects to Power Substation Simulation System Using Virtual Reality Technique

Koichi Arai and Shigenobu Furuta
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Arata Watanabe and Noboru Kamizi
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This experimental study was conducted to apply depth-of-field effects techniques to an indoor distribution substation simulation system in an attempt to improve the sense of distance.

Coupled Models for Visualizing Respiratory Mechanics

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An interactive virtual environment for simulating cardiopulmonary mechanics. The environment integrates 3D anatomy reconstructed from CT scans with novel mechanical models of physiology.

Language through Gesture in a VRML World

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Stephen Maher
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This sketch evaluates the visual clues required to communicate linguistic meaning through gesture in an interactive environment. It reviews the results of human testing of two avatars designed to teach American Sign Language in a VRML-based world.

Techniques

Chair **Bertram Herzog, Fraunhofer CRCG, Inc.** **Room 414 CD**

Internal Representation by the Magic Light

Seiki Inoue
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Soraku-gun
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We propose a new method for representing three-dimensional objects. When observers turn the spotlight on an object in a monitor, they can see inside the object.

The Making of Black-Hole and Nebula Clouds for the Motion Picture "Sphere" with Volumetric Rendering and the F-Rep of Solids

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This fly-through sequence of a massive nebular gas cloud was created for "Sphere" using volume rendering of implicit surfaces to represent solid gas clouds with stars.

Web-Based Sonification of Space Science Data

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Adding sonification capability (display data as sounds) to the CDAWeb space science data browsing system.

Lagrangian Visualization of Natural Convection Mixing Flows

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An example of complex natural-convection flow analysis using Lagrangian tracking and sophisticated graphic techniques.

Thursday 23 July 2:15 - 4 pm

Production *Chair* **Kurt Fleischer, Pixar** **Room 414 CD**

TVML (TV Program Making Language)

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This sketch reports on software called TVML Player that can produce full TV programs in real time by interpreting a script written with TVML, a newly designed description language.

modeling

DView

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dview.jpl.nasa.gov

A multi-platform, language-independent 3D modeling and animation system with VRML compatibility that is easily integrated with languages including TCL.

animation & FX

Previsualization for "Starship Troopers:" Managing Complexity in Motion Control

Colin Green
Pixel Liberation Front
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Venice, California 90291 USA
colin@thefront.com

How computer-based previsualization tools were used to accurately design, plan, and execute "Starship Troopers" visual effects scenes involving numerous motion control set-ups and hundreds of miniatures.

Thursday 23 July 4:15 - 6 pm

virtual reality

Emerging Technologies *Chair* **Dave Zeltzer, Sarnoff Corporation** **Room 414 CD**

Virtual Fishtank

Henry Kaufman, Brian Knep, Aubrey O. Francois, Tinsley A. Galyean, Stacy Koumbis
Nearlife, Inc.
147 Sherman Street, Suite 102
Cambridge, Massachusetts 02140 USA
henry@nearlife.com
www.nearlife.com
www.tcm.com

The Virtual Fishtank is a large, real-time 3D exhibit that immerses visitors in a fanciful undersea world where they create and interact with fish while learning about emergent behavior.

Solve et Coagula: Mating Man and Machine

Stahl Stenslie
c/o Telenor R&D
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Solve et Coagula is primarily an attempt to give birth to a new life form: half digital, half organic. Through a multisensorial, full-duplex sensory interface, the installation networks the human with an emotional, sensing and artificially intelligent creature.

Diorama

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Diorama is an augmented-reality project in which virtual 3D objects are placed in real-world environments. The goal is to create a system that allows people to build an imaginative parallel universe superimposed on their everyday space.

Wednesday 22 July 10:30 am - 12:15 pm

Group Sex and Other Collaborative Efforts *Chair* **Sara Diamond, Banff Centre for the Arts** **Room 414 AB**

Exquisite Fun: A Digital Sketchbook

Peggy Reinecke
10314 Rockbrook Road
Omaha, Nebraska 68124 USA
pardfa@home.com

Rebecca Hermann
5610 Hickory Street
Omaha, Nebraska 68106 USA
jmbbah@aol.com

An ongoing three-year-old collaboration between two artists using computers to develop imagery stored on a shared disk. This source material outputs in formats ranging from traditional art show to garden installation.

interaction

Electronic Remapping: Body Augmentation in the Electronic Age

Bill Hill
Florida Southern College
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Jacksonville, Florida 32217 USA
hill@wvwc.edu

As our collective culture and physical bodies coalesce with technology there is an essential and traumatic remapping of our psychological networks. Two recent electronic installations by Bill Hill.

interaction CAL

Interactive Poem

Naoko Tosa
ATR Advanced
Telecommunications Research Lab
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Through the process of exchanging words between a computer poet and humans, Interactive Poem allows the user to build an improvised poem filled with inspiration.

Virtual Scenery in Broadcast Television: The Time 100 Project at CBS Television

Ann Latham Cudworth
CBS Design and Production
530 West 57th Street, Room LE-2
New York, New York 10019 USA
ACDesigns@compuserve.com

Integration and collaboration of real-time scenery development and broadcast television production in the CBS News/Time 100 Project.

Wednesday 22 July 2:15 - 4 pm

Hyperformance *Chair* **Diana Gromala, University of Washington** **Room 414 AB**

synthetic actors

It/I: Theater with an Automatic and Reactive Computer Graphics Character

Claudio Pinhanez and Aaron Bobick
Massachusetts Institute of Technology
20 Ames Street
Room E15-368C
Cambridge, Massachusetts 02139 USA
iti@media.mit.edu
www.media.mit.edu/~iti

"It/I" is an experimental play featuring a computer graphics character projected on screens. The character uses computer vision to recognize and react to the actions of the human actor.

CAL

Designing with Words: a Model for a Design Language in a MOO

Anna Cicognani
University of Sydney
anna@arch.usyd.edu.au

Design in text-based virtual worlds can be approached from a linguistic perspective. A model for a design language shows how words perform in these environments. This sketch presents a new scenario for design.

Developing the Interactive First Person P.O.V.: Using Characters as a Sensory Lens

Ella Tallyn and John F. Meech
Hewlett Packard Laboratories
Filton Road
Stoke Gifford
Bristol BS7 9JZ
UNITED KINGDOM
ella@hplb.hpl.hp.com

This technique gives participants a close relationship with complex story characters by presenting a scene from directable first-person points of view, which illustrate the characters' physical and emotional perspectives.

Personal Computers as Performance Instruments

Lucia Grossberger-Morales
103 Natoma #5
Santa Barbara, California 93101 USA
lllucia@well.com

Performance art, by its nature, is more experimental and focuses on smaller audiences than traditional theater. Because they are widely available with accessible software, personal computers have the potential to be powerful tools in performance art.

Peep Show and Tell

Chair **Diana Gromala, University of Washington** — **Room 414 AB**

Digitarama

Takehiko Nagakura
Massachusetts Institute of Technology
takehiko@mit.edu

Digitarama was designed to interactively display architectural form in multiple projections, to operate in response to the viewer's physical action, and to expose and visualize its mechanical principles for intuitive comprehension.

Las Meninas: The Articulation of Vision

Hisham Bizri
Electronic Visualization Lab
University of Illinois at Chicago
851 South Morgan Street, Room 1120 SEO
Chicago, Illinois 60607 USA
bizri@evl.uic.edu

Las Meninas is a virtual reality artwork that investigates the enigmatic nature of representation in VR. Vision is no longer fixed on a vanishing point but is now dispersed over multiple planes of form, function, and subjective meaning.

Gestalt Inhibition Sequence: Digital Hypnosis

Andy McIntire
1449 South Milledge Avenue
Athens, Georgia 30605 USA
amcintire@mindspring.com
www.mindspring.com/~amcintire/gest.html

Visualization of a proposed method of psychological immersion into virtual environments using audio-visual wave sequencing linked to biofeedback.

Wednesday 22 July 10:30 am - 12:15 pm

animation & FX

Lizards & Liners *Chair* **Jonathan Luskin, Independent** **Room 330 DEFG**

Titanic and Digital Character Animation

Daniel Loeb and Andre Bustanoby
Digital Domain
300 Rose Avenue
Venice, California 90291 USA
bhoffman@d2.com

Digital character animation was a primary accomplishment of the visual effects created for "Titanic." The work integrated performance capture and "rotocapture" as the basis of digital extras and digital stunt people.

Wiring Cracker: The Mechanics of a Non-Anthropomorphic, Real-Time, Performance Animation Puppet

Mike Morasky
Protozoa, Inc.
2727 Mariposa, Studio 100
San Francisco, California 94110 USA
mike@protozoa.com

The dark art of "wiring" exposed: creative mapping techniques used to construct an expressively versatile, non-humanoid, real-time performance animation monster.

Wednesday 22 July 2:15 - 4 pm

animation & FX

Bugs 'n Space *Chair* **Joshua Pines, Industrial Light & Magic** **Room 330 DEFG**

Starship Troopers

Craig Hayes
Tippett Studio
2741 10th Street
Berkeley, California 94710 USA
craig@tippett.com

In its first large-scale foray into all-CG production, Tippett Studio relied exclusively on computer-graphic technologies to model, animate, light, and composite 225 digital bug shots, some with thousands of bugs.

Starship Troopers

Walt Hyneman
Sony Pictures Imageworks
walt@spimageworks.com

Execution of the major battle sequences and establishment of the Starship fleet's presence as air cover and troop transport involved creation of 122 visual effects shots and utilized thousands of elements and a vast combination of techniques including digital composites, scale models, pyrotechnics, stop-motion animation, practical elements and in-camera effects enhanced, expanded, and supported by digital animation, compositing, and model work.

The PDI Crowd System for ANTZ

Luca Prasso, Juan Buhler, Jonathan Gibbs
Pacific Data Images
3101 Park Boulevard
Palo Alto, California 94306 USA
prasso@pdi.com

The computer graphics techniques used in the production of crowd sequences in the upcoming feature film "ANTZ" co-produced by PDI and DreamWorks SKG.

Wednesday 22 July 4:15 - 6 pm

animation & FX

2D/3D Toons *Chair* **Jonathan Luskin, Independent** **Room 330 DEFG**

Pontiac Coyote

Indira Guerrieri and Izzy Acar
Industrial Light & Magic

Wile E. Coyote pursuing Road Runner in a Pontiac? When animators at ILM and Warner Bros. team up, sparks fly, wheels spin, and Wile ... almost ... gets his prize!

Coca-Cola Factory

George Evelyn
Colossal Pictures

Chuck Gammage
Chuck Gammage Animation

Jerry van de Beek
Little Fluffy Clouds
Pier 29 Annex
San Francisco, California 94111 USA
betsy@littlefluffyclouds.com

Harmonious integration between cel and digital animation recreating the "Rubber Hose" style of the jazz age.

CPU

Wayne Gilbert
Lucas Digital
48 Magnolia Avenue
San Anselmo, California 94960 USA
wayne@lucasdigital.com

An ill-prepared artist experiences many frustrations in producing work and when you add to the mix the "ever-cooperative" computer, it's enough to make anyone plan properly.

Loose and Sketchy Animation

Cassidy J. Curtis
University of Washington
Box 352350
Seattle, Washington 98195 USA
cassidy@cs.washington.edu

An animator presents a fast, easily implemented, non-photorealistic filter for animation that can convert any 3D scene into a loose, gestural drawing, using stochastic, physically based particle systems.

Thursday 23 July 10:30 am - 12:15 pm

animation & FX

Invisible Effects

Chair **Stephen Rosenbaum, Sony Pictures Imageworks** — **Room 330 DEFG**

Matte Painting in the Digital Age

Craig Barron
Matte World Digital
24 Digital Drive, #6
Novato, California 94949 USA
cbarron@matteworld.com
www.matteworld.com

Traditional matte paintings have been an important visual effects technique since the turn of the century. Computer graphics can now be used to generate whole 3D environments, giving film makers even greater flexibility to turn their vision into reality.

Hard Rain: A Journey from Title to Story

Brad Kuehn
Cinesite Digital Studios
1017 North Las Palmas Avenue
Los Angeles California 90038 USA
jill@cinesite.com

At 4,997 frames in length, the opening sequence from "Hard Rain" shows how computer graphics can add possibilities to film and jettison you into a story, leaving you clueless as to where the real ends and the fake begins.

Computing Procedural Soundtracks from Animation Data

Robin Bargar, Alex Betts, Insook Choi
National Center for Supercomputing Applications
University of Illinois at Urbana-Champaign
Urbana, Illinois 61801 USA
rbargar@ncsa.uiuc.edu

Principles of procedural animation are applied to generate soundtracks that are impractical or impossible to create by hand. This sketch demonstrates sound authoring of data-driven synchronous animation soundtracks in real time and non-real time.

Thursday 23 July 4:15 - 6 pm

animation & FX

It's Character, Stupid!

Chair **Andrew Schmidt, Pixar** — **Room 330 DEFG**

ImageTimer: A Traditional Approach to 3D Character Animation

Michael Blum, Nhi Casey, Greg Heflin
Walt Disney Feature Animation
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Burbank, California 91521 USA
mikeb@fa.disney.com
nhic@fa.disney.com
gregh@fa.disney.com

ImageTimer is a combination of tools that allow a computer animator to change the timing of key frames in an animation package by adjusting the spacing and order of images recorded at those key frames.

The PDI Facial Animation System for ANTZ

Dick Walsh and Beth Hofer
Pacific Data Images
3101 Park Boulevard
Palo Alto, California 94306 USA
beth@pdi.com

The facial animation issues encountered on "ANTZ," the feature film co-produced by PDI and DreamWorks SKG and the muscle-based approach developed to meet these challenges.

The StormRiders Feature Film

Mike Wong
Centro Digital Pictures LTD
601 HKITC
72 Tat Chee Avenue
Kowloon Tong, HONG KONG
mikool@centro.com.hk

Based on Hong Kong's best-selling super hero comic book, The StormRiders is Hong Kong's first feature film that utilizes elaborate digital visual effects, such as digitally created sets, supernatural phenomena, and mythical creatures.

Flubber

Tom Bertino
Industrial Light & Magic

Let's get this straight. It has no face, no dialogue, and its only dependable physical characteristic is that it doesn't have one. And you want it to ACT? Sounds impossible. Sign us up.

educators program

Educators at all levels (K-12 through university) discuss and explore how they teach computer graphics or use computer graphics to teach science, math, the arts, social science, language skills, and history. The Electronic Schoolhouse is a hands-on exhibit area where teachers demonstrate innovative applications of computer graphics.

Educators Lounge (Room 331)
Monday - Friday 9 am - 5 pm
The Educators Lounge, a quiet place to get away from the noise and commotion of the conference, provides a message board and a limited number of computers for Web surfing and idea exchange.

Opening Session

Room 340 AB
Thursday 9 - 10 am

Using Computer Graphics to Unleash Creativity in the Classroom

Randy Pausch Carnegie Mellon University

Randy Pausch, associate professor of computer science, human-computer interaction and design at Carnegie Mellon, was a National Science Foundation Presidential Young Investigator and a Lilly Foundation Teaching Fellow.

Location

Room 340 AB
Room 340 CD
Room 331

Days

Thursday 23 July
Friday 24 July

Hours

9 am - 6 pm
8:30 am - 4 pm

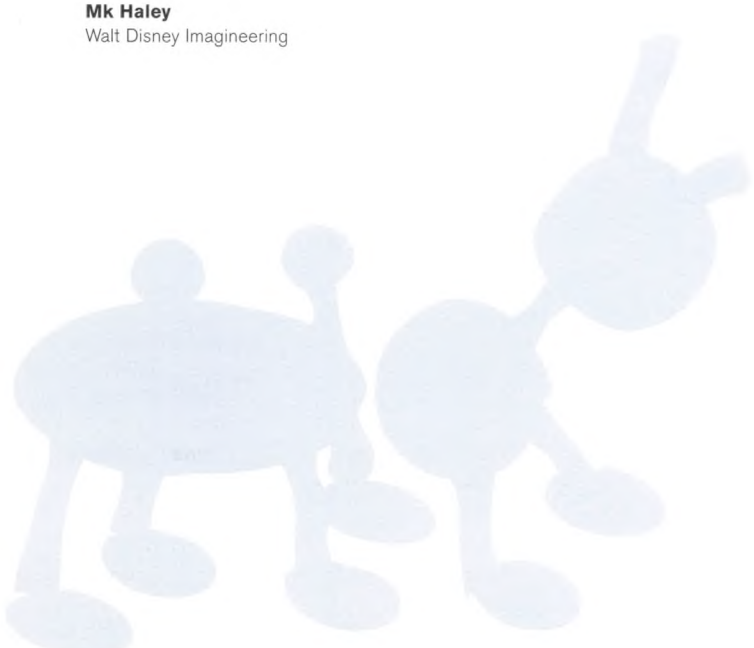
Educators Program Chair
Scott Grissom
University of Illinois at Springfield

Administrative Assistant
Ann Cole

Educators Program Committee
Chris Carey
Orange County Public Schools

Jodi Giroux
The Allen-Stevenson School

Mk Haley
Walt Disney Imagineering



Thursday 23 July

Papers

Room 340 AB
Thursday 10:30 am - 12:15 pm
Chair: **Dena Elisabeth Eber** Bowling Green State University

The K-12 Classroom

Illinois Chickscope: Using Emerging Technology to Promote Professional Development and Inquiry-Based Learning in the K-12 Classroom

Daniel E. Weber, Barbara Mason Fossum, C. Bertram Bruce, Umesh Thakkar, Clinton S. Potter, Janet Sinn-Hanlon
National Center for Supercomputer Applications
How the Internet is used in the classroom to provide a learning collaboratory where students and teachers explore development of a chicken embryo by evaluating magnetic resonance images.

How to Get Web Presents! Designing a Collaborative K-12 Web Project

June Julian New York University
Using a world community of old trees as an example, this project presents methods for K-12 teachers and students to design, maintain, and evaluate their own collaborative project for the World Wide Web.

Improving Instruction and Staff Development by Building K-12/University Partnerships

Brian D. Monahan North Rockland School District
Rodney Zagury New York Institute of Technology
This partnership has created innovative ways of teaching and learning about the use of graphics in education.

Panel

Room 340 CD
Thursday 10:30 am - 12:15 pm

Collaborations in Higher Education

Andrea Polli Robert Morris College
Mary Murphy The Chicago Cultural Center
Thomas Fowler, IV California Polytechnic State University
Neil B. Rolnick, Branda Miller Rensselaer Polytechnic Institute
Innovative educators from varied disciplines including media and sound arts, architecture, and performance/installation discuss successful collaborations among students and cultural institutions, industry, other schools, and professional artists.

Electronic Schoolhouse

Room 331
Thursday 10:30 am - 12:15 pm

interaction

Desktop Publishing: An Online Distance Learning Course

Elizabeth A. Hornak
Rochester Institute of Technology
An online course that covers desktop publishing and the basics of design.

Papers

Room 340 CD
Thursday 2:15 - 4 pm
Chair: **Mk Haley** Walt Disney Imagineering

Teaching Science and Mathematics

interaction

The Physics 2000 Project: Interactive Physics on the World Wide Web

Martin V. Goldman, David Rea
University of Colorado at Boulder
An innovative interactive Web site (www.colorado.edu/physics/2000) designed to make modern physics and technology accessible to K-12 students, college students, and the general public.

The Ceren Web Resource: Enabling Students to Become Anthropologists in a Virtual Site

Jen Lewin, Mark Ehrhardt, Mark D. Gross
University of Colorado at Denver
An interesting, informative, and interactive Web learning resource on Ceren, an ancient agricultural village in Western El Salvador that was buried by volcanic ash over 1,400 years ago.

An Interactive Course on Fractals and Chaos

Cary Laxer, Aaron Klebanoff Rose-Hulman Institute of Technology
A team-taught course in which students interact with software to learn fractals and chaos.

Panel

Room 340 AB
Thursday 2:15 - 4 pm

Reading, Writing, Reload: New Three Rs for a New Millennium

Sarah Feldman, Anthony Chapman Thirteen/WNET
Henry Bar-Levav OVEN Digital
Aliza Sherman Cybergrrl Internet Media
How digital media can be strategically developed, and creatively used, to instigate learning.

Electronic Schoolhouse

Room 331
Thursday 2:15 - 4 pm

University and Industry Partnerships: Creating Multimedia Solutions to Solve Unique Industry Problems

James L. Mohler Purdue University
Several education and marketing multimedia projects that have been produced through university and industry partnerships at Purdue University.

Electronic Schoolhouse

Room 331
Thursday 2:15 - 4 pm

interaction

Moving Mountains: Using Interactive Graphics to Teach Geography

Joshua Seaver Science Museum of Minnesota
How students are developing interactive simulations to learn geography and other science concepts. Hands-on demonstrations and discussions of games created by kids ages 9-16 using inexpensive software that incorporates graphics, video, and sound.

Thursday 23 July

Papers

Room 340 CD
Thursday 4:15 - 6 pm
Chair: **Rosalee Wolfe** DePaul University

Teaching History and Multimedia

virtual reality

Virtual Reality in Education: Irish and American Students on the Virtual Frontier

Casey D. Charvet University of Texas at Austin
J. Matthew Miller III Duke University
Jonah Peretti Isidore Newman School

American and Irish students teach each other about their own respective national histories in a media-rich environment.

Integrating Digital Technology into Classes Through Collaborative Projects: The Making of "Warp & Weft, Might & Magic, Mettle & Motherhood," an Electronic Exploration of Women's History, Colonial Times to 1877

Barbara K. Iverson, Teresa Prados-Torreia
Columbia College Chicago

An interactive CD-ROM and Web site were created via a collaboration between a history class and a CD-ROM multimedia production class.

The Art and Science of Multimedia: An Interdisciplinary Approach to Teaching Multimedia at a Liberal Arts College

Naomi Ribner Wellesley College

Art and computer science students worked in pairs to produce an interactive multimedia project on topics of their choice. The results far exceeded expectations for the excellence of the projects, the motivation of the students, and the impact on the students in their subsequent studies and career paths.

Media Technologies and an Interdisciplinary Approach to Program Design

David J. Keskeys Cheltenham & Gloucester College of Higher Education

Design, philosophy, and implementation of an interdisciplinary, flexible-media, first-degree program developed to equip students with the skills, understanding, and knowledge they need for careers in the rapidly changing media industries.

Panel

Room 340 AB
Thursday 4:15 - 6 pm

P.L.U.N.G.E. Into School

Karl Hook, Debi Barrett-Hayes, David Godwin, Marleni Young
Florida State University School

Teachers and students summarize the P.L.U.N.G.E. project, which integrates technology into the K-12 curriculum.

Electronic Schoolhouse

Room 331
Thursday 4:15 - 6 pm

Zoom Into the Past: Illustrating History in Middle School

Karen Jo Kresge Argyle Middle School

As a digital, interdisciplinary, culminating activity in the study of an historical period, students create either hypermedia stacks or slide presentations that appear to zoom through an architectural structure of the period to a close-up of an object inside.

Friday 24 July

Papers

Room 340 AB
Friday 8:30 - 10:15 am
Chair: **Douglas C. Acheson** Purdue University

Teaching Fine Arts and Animation

CAROL: Students Working on Real-World Projects Empowering Local Cultural Non-Profits

Gordon Goodman, Stephen Jacobs
Rochester Institute of Technology

How the impact of student work has extended far beyond initial Web sites to change the way local museums view and use the Web.

Creative Expression on the Digital Canvas: An Online Digital Art Class

Jeremy Sutton
Portrayals

An online digital art class in which students master and apply digital paint tools to create expressive portraits.

Digital Image/Sound and the Fine Arts: A Double Major with Computer Science

Gregory P. Garvey
Concordia University

A new double major in digital image/sound and the fine arts in conjunction with an option in computer science.

animation & FX

The Language of Cinema and Traditional Animation in the 3D Computer Animation Classroom

Pamela Turner
Virginia Commonwealth University

Finding a balance between instructing students in new software and addressing conceptual issues can be a challenge, especially in an advanced 3D computer graphics class. The solution can come from identifying where traditional media, especially film and animation, overlap 3D computer graphic animation and where 3D has "rules" of its own.

Panel

Room 340 CD
Friday 8:30 - 10:15 am

Where Industry and Academia Meet: An International Perspective

Mark Ollila, Joakim Kempff, Johan Ljungman University-College of Gävle

The problems and issues faced by both academia and industry throughout the world as they develop digital media, including the convergence of traditional computer science students with traditional artists, obtaining qualified staff, and how industry is working together with academia in the search for solutions.

Papers

Room 340 AB
Friday 10:30 am - 12:15 pm
Chair: **Jodi Giroux** The Allen-Stevenson School

Teaching Computer Science

Teaching Computer Graphics with Spreadsheets

Francis T. Marchese Pace University

Through direct manipulation of numbers, students develop a more concrete understanding of the data they compute from the formulas they derive and use in computer graphics.

interaction

Web-Based Teaching of Computer Graphics: Concepts and Realization of an Interactive Online Course

Reinhard Klein, Frank Hanisch, Wolfgang Strasser University of Tübingen

Topics within computer graphics still cannot be adequately presented and explored with traditional teaching methodologies and tools. This paper presents concepts, realization, evaluation, and experiences of a computer graphics course that focuses on this problem.

Fuse-N: A Platform for Collaborative Pedagogy

Seth Teller, Brandon W. Porter, Nathan D. T. Boyd, Nicholas J. Tornow
Massachusetts Institute of Technology

An instructional, collaborative, Web-based, platform for teaching algorithmic concepts through implementation and verification.

Panel

Room 340 CD
Friday 10:30 am - 12:15 pm

Multimedia Boot Camp: Adventure for the New Millennium

Laurie Burruss Pasadena City College
Karen Owen
San Diego Community College District

Creative Technologies Institute, a consortium of four California community colleges, presents a hands-on and online experience in which faculty from diverse disciplines develop an instructional multimedia curriculum that enhances student learning and creates multimedia experiences in the classroom.

Workshop

Room 340 CD
Friday 2:15 - 4 pm

Concept Development for Computer Animators

Karen Sullivan, Claudia Cumbie-Jones
Ringling School of Art and Design

A workshop for educators who teach time-based media using computers. The major question: How do you take students through a process that will empower them to develop robust concepts that can and should be implemented with computer technology?

25th conference celebration

Exhibits and events celebrating the history of SIGGRAPH and computer graphics, and their influence on technology, society, business, applications, education, and aesthetics:

- **Videoconference with panelists at SIGGRAPH 98, the Smithsonian Institution, and the National Museum of Photography, Film & Television, Pictureville, Bradford, United Kingdom**
- **Digital Campfire – the great stories and legends of computer graphics told by the luminaries themselves**
- **25th Conference Recognition Ceremony**
- **Historical displays and exhibits – hardware, software, and memorabilia**
- **A Visual Tribute to Computer Graphics Laboratories: 1971 - 1998**
- **Classic animations and art**
- **A collection of computer graphics seminal writings**
- **25th Celebration Party, hosted by SIGGRAPH 98, SIGGRAPH Professional Chapters, and friends**

25th Conference Celebration Chair
Carl Machover
Machover Associates Corporation

Coordinator
Alyce Branum

Richard M. Mueller
Grand Casions, Inc.

Mary Whitton
The University of North Carolina at Chapel Hill

Tom Brigham
Sightline Sytems

Rosalee Wolfe
DePaul University

Dick Davison
Dolch Computer Systems

Ceila Pearce
Celia Pearce & Friends

Robert McDermott
University of Utah

Roger Webster
Holly Mohler
Millersville University

Norman Badler
University of Pennsylvania

Bertram Herzog
Fraunhofer CRCG, Inc

David Allison
Smithsonian Institution

David Arnold
University of East Anglia

Robin Williams
IBM

Seminal Graphics: Pioneering Efforts that Shaped the Field

Chair
Rosalee Wolfe
DePaul University

Jury
Jim Blinn
Michael Cohen
Microsoft Research

Jim Foley
Mitsubishi Labs

Don Greenberg
Cornell University

Carl Machover
Machover Associates

Stephen Spencer
The Ohio State University

Turner Whitted
Microsoft Research

Visual Tribute to Computer Graphics Laboratories: 1971-1978

Chair
Robert McDermott
University of Utah

Jury
Robin Forest

Jim Blinn
Microsoft Research

Pat Hanrahan
Stanford University

Hardware Exhibits Booth Managers

Nate Kaiser
The Premisys Corporation

Rich Schaefer
Areus Consulting

25 Years of Discovery

The centerpiece of the 25th Conference Celebration, 25 Years of Discovery is a 100-foot-long and 30-foot-wide display of artifacts and memorabilia from 1974 through 1998, where attendees experience some of computer graphics' influence on our world.

A Visual Tribute to Computer Graphics Laboratories: 1971-1998

Hall F Lobby

Twelve laboratories are presented in this exhibit:

Brown University
California Institute of Technology
Carnegie Mellon University
Cornell University
Microsoft Research
New York Institute of Technology
Pixar Animation Studios
Silicon Graphics, Inc.
Stanford University
University of North Carolina at Chapel Hill
The University of Utah
University of Washington

Criteria for inclusion in this tribute were a balance of substance underlying the imagery and striking visual impact and a balance of long-term sustained contributions with short-term focused contributions.

Laboratory principals provided images and names to represent their organizations. The result is a richness of imagery that summarizes some of the key developments in computer graphics.

Seminal Graphics: Pioneering Efforts that Shaped the Field

Significant papers from the past 25 years compiled in one volume to guide and inspire future scholars. The publication covers the areas of visibility, antialiasing, shading, modeling, animation, architecture, rendering from samples, and foundations.

Conetree

In recognition of the human side of the meteoric rise of computer graphics, a 3D VRML conetree traces PhD contributors to the computer graphics field and their progeny. Also, see the Web site: iml.millersv.edu/SIGGRAPH_tree/index.html.

Pioneering Artists

Along with its juried artists, SIGGRAPH 98 showcases the work of 24 well-known practicing artists who have contributed to a number of SIGGRAPH art shows over the past 25 years.

Film Show Classics

Tuesday 21 July 10 - 11:30 pm
Thursday 23 July 10 - 11:30 pm
Auditorium

Attend one of the special showings of the classics of past SIGGRAPH animations.

Portraits in Computer Graphics

Photographic portraits of 80 noteworthy individuals in the field of computer graphics.

Academy Awards

Members of the SIGGRAPH community who have received Scientific and Technical Academy Awards in computer graphics.

Hardware Exhibits

Relive the past by viewing the technology of the 1960s, 70s and 80s.

Trading Cards

SIGGRAPH 98 has produced a set of trading cards featuring award winners, art, and hardware from the past 25 years.

25th Conference Recognition Ceremony

Wednesday 22 July 6 - 6:45 pm
Hall C Lobby

Champagne for toasting, birthday cake, and recognition of those who have made important contributions to the SIGGRAPH conference.

25th Celebration Party

Wednesday 22 July 9 pm - 1 am
Wide World of Sports at Walt Disney World

Videoconference

An International Videoconference: Computer Graphics Pioneers Assess Computer Graphics

Thursday 23 July 10:30 am - 12:15 pm
Room 240 AB

Pioneers discuss computer graphics' most significant contributions over the last 25 years, its greatest current challenges, and what CG will look like between now and 2023.

Organizers
Carl Machover Machover Associates Corporation
David Arnold University of East Anglia

Panel Chair: Orlando
Carl Machover Machover Associates Corporation
Panelists
Judith R. Brown University of Iowa
David Arnold University of East Anglia

Panel Chair: Smithsonian Institution, Washington, D.C.
John C. Gebhardt InterCAP Graphic Systems
Panelists
Robert E. Thurber Intergraph Corporation
Charles O. Heller Charles Heller Associates

Panel Chair: National Museum of Photography, Film & Television, Bradford, United Kingdom
Phil Willis University of Bath
Panelists
Richard Guedj
Institut National des Telecommunications
Klaus Kansy
German National Research Center for Information Technology

Digital Campfire

Room 223

Behind every significant innovation in computer graphics, there is a great story. The Digital Campfire is an intimate storytelling program that provides a context for sharing the legend, lore, and anecdote of computer graphics, the funny stories and classic tales behind some of our most important discoveries and innovations.

The first campfire session of each day lasts 1.25 hours. The remaining sessions last 45 minutes each. The last session of each day is an open forum where anyone who has a story to tell on the following topics can drop by and tell a story or two:

- The First SIGGRAPH
  Anyone who was at the first SIGGRAPH Conference is invited to tell a story about what happened in 1974.

- Great Moments at SIGGRAPH
  Did you ever get a standing ovation? Remember the papers that caused the biggest sensations? Share your memorable SIGGRAPH moments.

- Great Napkins of Computer Graphics
  Some of the greatest ideas and discoveries started out as doodles on napkins or note pads. If you have a doodle or sketch that ended up in a SIGGRAPH course, paper, panel, or other presentation, bring it to the campfire and share it with the community.

Chair
Celia Pearce
Celia Pearce & Friends

Co-Chair
Roger Wilson

School Daze: Academic Generations

Wednesday 22 July

University of Utah Generations
9:30 - 10:45 am

MIT Generations
11 - 11:45 am

University of Illinois, Chicago Generations
2 - 2:45 pm

New York Institute of Technology Generations
3 - 3:45 pm

Open Session: The First SIGGRAPH
4 - 4:45 pm

Movie Morning & Pioneers

Thursday 23 July

Tron Generations
9:30 - 10:45 am

Ancestry of Virtual Humans
11 - 11:45 am

Digital Architecture
2 - 2:45 pm

Pioneer Women
3 - 3:45 pm

Open Session: Great Moments at SIGGRAPH
4 - 4:45 pm

Interactivists

Friday 24 July

GUI Generations
9:30 - 10:45 am

Virtual Realities
11 - 11:45 am

Fun & Games
2 - 2:45 pm

Art on the Edge
3 - 3:45 pm

Open Session: Great Napkins of Computer Graphics
4 - 4:45 pm

SIGGRAPH 98 recognizes the following organizations and individuals who contributed to the collection of artifacts, equipment, facts, and figures for our celebration of the 25th SIGGRAPH Conference.

Individuals

Louis Fabian "Chip" Bacherach
David Barkan
Gwen Bell
Jim Blinn
Walt Bransford
Alyce Branum
Tom Brigham
Fred Brooks
Chase Chasen
Pat Cole
Geo Cummings
Steve Cunningham
Scott Duncan
David Em
Jose Encarnação
Nick England
Bruce Finney
Jim Foley
John Foust
John Fujii
John Gartman
Brad Holtz
David Kasik
Joe Kranak
Marc Levoy
Carl Machover
Michael Mackay
Art Olson
Richard Parent
Frank Park
Dick Phillips
David Rogers
Judson Rosebush
Steven Schwartz
Earl Schweppe
David Sieg
Alvy Ray Smith
Dag Spicer
Cindy Stark
Randall Stickrod
Oliver Strimpl
Richard Taylor
Edwin Tripp
Andries van Dam
Jane Veeder
Victor L. Wallace
Lee Whitney
Mary Whitton
Rosalee Wolfe

Organizations

ACM SIGGRAPH
Annals of the History of Computing
Boeing Commercial Airplane Group
The CAD Rating Guide (WBH Associates)
The Computer Museum
Evans & Sutherland Computer Corporation
Hewlett Packard
Lockheed Corporation
University of Kansas
University of North Carolina
United States Naval Academy

art gallery: touchware

A milestone exhibition chronicling 25 years of computer art from early algorithmic drawings and paintings to modeled figures and "pebble drawings" by pioneering computer artists. Artistic insights reveal the simultaneity of touch as a sensory experience and the ephemeral experience of being in touch electronically via the Internet. Artworks include digital paintings, drawings, and photographs; interactive installations; teleperformance projects; ARTSITE Web-based creations (www.siggraph.org/s98/conference/art/artsite.html); and work by some of the earliest pioneers of computer art.

Monday through Thursday, 20 July - 23 July, from noon to 1:00 pm, artists discuss their work in the Art Gallery.

Location

Hall C

Days	Hours
Sunday 19 July	5 - 7 pm
Monday 20 July	9 am - 6 pm
Tuesday 21 July	9 am - 6 pm
Wednesday 22 July	9 am - 6 pm
Thursday 23 July	9 am - 6 pm
Friday 24 July	9 am - 1 pm

Art Gallery: Touchware Chair
Joan Truckenbrod
The School of the Art Institute of Chicago

Administrative Assistant
Heather Elliott
The School of the Art Institute of Chicago

Assistants
Heather Davis Wang
Jessica Westbrook
The School of the Art Insitute of Chicago

Committee

John Grimes
Illinois Institute of Technology

Ron Hutt
The School of the Art Institute of Chicago/Columbia College

Deanna Morse
Grand Valley State University

Jane Stevens
Illinois Art Gallery

Valerie Sullivan-Fuchs
The School of the Art Institute of Chicago

Jury
Annick Bureaud
IDEA

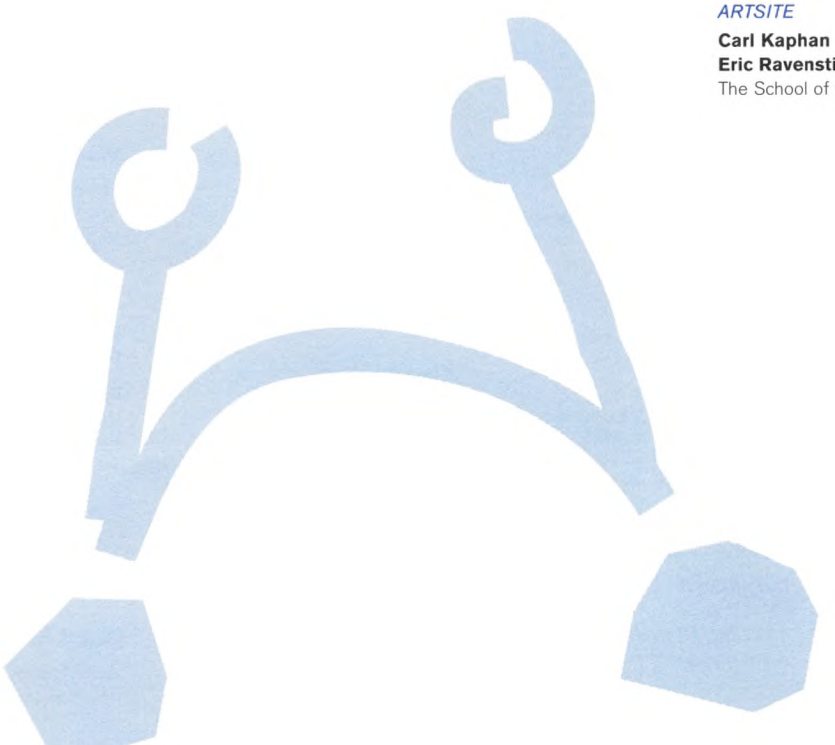
Stephen A. Benton
Massachusetts Institute of Technology

Judith Malloy
Arts Wire

Deanna Morse
Grand Valley State University

Jane Stevens
Illinois Art Gallery

ARTSITE
Carl Kaphan
Eric Ravenstien
The School of the Art Institute of Chicago



The Lacemaker

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The Bush Soul

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World Skin

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Windgrass

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Swimming Pool

Paul Brown
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Untitled 67
Untitled 76
Untitled 82

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Artist Block 2
Indecision

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KAGE

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In Conversation

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Why Water Always Scares Me
Wolf

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b97.9.3
with left and right boundary

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The Winds that Wash the Seas

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Synthesis: A Dream Footnote to the Millennium II

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untitled

Penny Feuerstein
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Liquid Views - Rigid Waves

Monika Fleischmann
Wolfgang Strauss
Christian-A. Bohn
MARS - Media Art Research Studies
GMD-Institute for Media
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Heading Out

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Stroke

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Moving Towards the Event Horizon

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Replica

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Streaming

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A Digital Frottage

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Iconica

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Case Study 309

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Image to Touch
To Bury Recollection In...

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Token City: Subway Wall

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Digital Fukuwarai

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C&C Media Reseearch Labs
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Small Appliances

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Regrowth from the Wreckage
The Doll Floated by (Quilt for Flight 800)

Leslie Nobler Farber
William Paterson University
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Vise from Vise Versa Series

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Firefly Dress and Necklace
Musical Jacket

Maggie Orth
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Pages From a Diary: Leaving

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Manicomlo Judciario

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If These Walls Could Talk: The Fiddler's Story

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Litt'l havoc

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Thirteen Sketches for an Incompetent User Interface

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Is it really Over?

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BeWare02: satellite

sensorium/BeWare02:
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or
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Telematic Vision

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Noman'sland
Oral History
Scent Posts

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Escape Velocity

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C5

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Stream of Consciousness

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The Sky is Always Blue

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Lost Worlds: Micro/Macro World, River World, City, Dwelling

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Landscape in Circle #1
Landscape in Circle #3

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Project Paradise

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ADRIFT

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Family Portrait: Father
Family Portrait: Mother

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"Juicy Details" and "Precious Pink" from Embrasure Series

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Catherine Courier
Taut Turnip

Anna Ullrich
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No Man No Shadow

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Items 1-2,000

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Undecided 2: Market Research in the Narrow Way

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Battered
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The Other Woman

Corinne Whitaker
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ARTSITE

www.siggraph.org/s98/conference/art/artsite.html

SIGGRAPH 98 initiated a Web site for Web artwork. The objective of ARTSITE is to stimulate creation of new forms of artistic expression in the Web context. This site is available online in the Art Gallery and via the Internet before, during, and after the conference. These projects illustrate innovative thinking about Web sites: artwork that absorbs and creatively utilizes the indigenous nature of the Web, its capabilities and its artifacts. Artists have created new forms of artistic expression that wrap around and extend beyond the Web. Jurying for ARTSITE was done on the Web by jurors in remote locations.

ARTSITE Artists

GRAMMATRON 1.0

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Genderbender

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Please Stay on the Line

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As Worlds Collide

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ARBOR ERECTA

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Beast

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Urban Diary

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re:volution e/motion HELP - is there anybody out there?

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www2.arnes.si/~ljintima1/help

Pedestrian: Walking as Meditation and the Lure of Everyday Objects

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an inquiry about hair

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25th Anniversary Celebration of Pioneering Computer Artists

This exhibition chronicles 25 years of computer art, from early algorithmic drawings and paintings to modeled figures and "pebble drawings" by pioneering computer artists. These artists have participated in and contributed to a number of SIGGRAPH art shows and are currently practicing artists. This section documents their early work together with their current artwork.

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computer animation festival

Animations, performances, and interactions that show computer graphics as product, media, and process. A broad, international selection of this year's most outstanding work is featured in the Animation Theaters as well as in matinée and evening shows of the Electronic Theater. SIGGRAPH 98 also presents two animation events: sigKIDS Theater and, in honor of the 25th conference celebration, Film Show Classics.

Computer Animation Festival Chair
Ines Hardtke
National Film Board of Canada

Location

Electronic Theater	Auditorium
Animation Theaters	314, 315 B

Days	**Hours**
Electronic Theater	
Monday 20 July	7 - 9 pm
Tuesday 21 July	7 - 9 pm
Wednesday 22 July	7 - 9 pm
Wednesday 22 July	10 pm - midnight
Thursday 23 July	7 - 9 pm
Electronic Theater Matinée	
Tuesday 21 July	2 - 4 pm
Wednesday 22 July	2 - 4 pm
Animation Theaters	
Sunday 19 July	5 - 7 pm
Monday 20 July	9 am - 6 pm
Tuesday 21 July	9 am - 6 pm
Wednesday 22 July	9 am - 6 pm
Thursday 23 July	9 am - 6 pm
Friday 24 July	9 am - 1 pm

sigKIDS Theater
Animation Theaters and KidsDeck

Film Show Classics
Tuesday 21 July 10 - 11:30 pm
Thursday 23 July 10 - 11:30 pm
Auditorium

Director
Johnie Horn
big Research

Coordinator
Sue McTavish
National Film Board of Canada

Animation Theater Co-Producers
Susan Gourley
John Matthias
National Film Board of Canada

sigKIDS Theater Co-Producers
Kathy Tanaka

Scott Lang
Academy for the Advancement of Science & Technology

Film Editor
Ladd McPartland
Digital Dharma

Jury
Thomas Linehan
Ringling School of Art & Design

Christine Schöpf
Ars Electronica/ORF

Kathy Tanaka

Marceli Wein
National Research Council of Canada / University of Waterloo

Electronic Theater

Antz

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Baby Elephants Day Out

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Bingo

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Bjork - Joga

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Building and Sailing the Titanic

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CPU

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George of the Jungle

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Geri's Game

(By special invitation)

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The Goner

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Grim Fandango - Sneak Peak

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Hewlett-Packard - The Bee

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CAL

Kazematsuri

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The Making of Sid and the Penguins

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Marienkirche

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Music For Unprepared Piano

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Noh Mask - Application of Image-based Rendering

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The Optiverse

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Polygon Family

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Rendering with Natural Light

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SIGGRAPH 98 Interactive Experience

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Small Soldiers

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The Smell of Horror

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Sony Playstation - Jet Moto II/Old Lady

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Spacetime Swing

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Stà Calando Il Soul

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Underwater Sunbeams

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Virtual Bill Highlights

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Wild River - motion ride

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Animation Theaters

Advancing Captured Motion

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The Adventures of Mighty Guy

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Aerobot

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Arthur

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Atlantis "Royal Towers Preview"

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Bunkie & BooBoo

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The Cornell Box - Up in Smoke

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Danteum of Giuseppe Terragni and Pietro Lingeri

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A Dirge for a Digirati

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Goldies

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Hamlet Glow Worm

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Handling Video in Virtual Environments

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Hard Rain

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Invisible Ocean

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Lagrangian Visualization of Natural Convection Mixing Flows

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Lights and Water

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Loose and Sketchy Animation

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Lost In Space

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Machsumo: Flaming Fat Men on Ice Skates

(also in sigKIDS Theater)

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Making of Nebula Clouds for the Motion Picture "Sphere," with Volumetric Rendering and the F-Rep of Solids

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Modeling and Animation of Realistic Facial Expressions

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Mouse Hunt

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A Narrow Martian of Error

(also in sigKIDS Theater)

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News from Hubble Space Telescope

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Orifice

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Pepsi Goose

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The Physics of Cartoons Part I

(also in sigKIDS Theater)

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Pings

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Quest for Camelot

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Race For Atlantis - in Imax 3D

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Red Corner - Making of

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Rice Vévés

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Southeastern United States Fly-By

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Sphere

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Titanic / DS20.1 - Making-of

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Tomorrow Never Dies

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Virtual Time Machine

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WAL*ART

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Whose Hat is That?

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sigKIDS Theater

Antics

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"The Ark" as seen through the eyes of a child

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Bob's Body Parts

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Brain Freeze

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Bunkie & BooBoo

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Chaco: A Sacred Center - Excerpt

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Clear Cut

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Dick and Jane Do Math

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Different Eyes

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The Fly Band!

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Flying Fish Tobby Who Aimed for the Stars

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Goldies

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Indiscriminate Killer

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Machsumo: Flaming Fat Men on Ice Skates
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A Narrow Martian of Error
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News from Hubble Space Telescope
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Pepsi Goose
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The Physics of Cartoons Part I
(also in AnimationTheater)

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Pings
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playground Zero

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In-Between Animations

Celebration

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Dancing

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Drummmm Roooooollllll

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Evolution

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The Gallery of Light

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Guy with Wacom Pen

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The Hidden Truth

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Moving Forward

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Pong

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Pooh

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Spirit Dance

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Untitled

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Yellow No. 9

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digital pavilions

Better living through networks and computer graphics: a premier showcase of near-future applications inspiring us to reconsider our impact on new media, to dream what may be possible for a "personal reality," and to rediscover our interconnectedness in a global community.

Location

Hall C

Days	Hours
Sunday 19 July	5 - 7 pm
Monday 20 July	9 am - 6 pm
Tuesday 21 July	9 am - 6 pm
Wednesday 22 July	9 am - 6 pm
Thursday 23 July	9 am - 6 pm
Friday 24 July	9 am - 1 pm

Digital Pavilions Chair

Janet McAndless
Sony Pictures Imageworks

Committee

Omar Ahmad
Netscape Communications Corp.

Rob Lewis
MultiGen, Inc.

Paul Lipsky
Manhattan Transfer

Joe Munkeby
LWUP

Guerilla VR

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Two roving ImmersaDesks travel throughout SIGGRAPH 98 to:

- Demonstrate networked virtual environments in the Orange County Convention Center.
- Run "multi-way" networked environments connected to users at remote sites.
- Showcase stand-alone, interactive, VR projects.

The virtual worlds in Guerilla VR present participatory narratives; push technical limitations to create lush, almost tangible imagery; and launch users into networked interaction with other people.

Among other applications, Guerilla VR features:

- Asteroid A-612, an application that allows several remotely located participants to simultaneously explore a very small planet. It is designed to help teach children that the world is round by allowing them to explore a world that is much more obviously spherical than our own.
- Dimension World, which uses the three dimensions of VR to teach about hypercubes and 4D math. The instructor is remotely located.
- The Thing Growing, where a participant in one location interacts with a virtual character while, in another location, another participant influences the character's behavior and the progression of the virtual story.

Jennifer James, Celebrity Auto Spokesperson

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Jennifer James is a consumer-friendly, intelligent, interactive 3D ex-NASCAR driver who greets visitors at a virtual auto show and engages them in a dynamically customized five- to ten-minute dialog. Through natural social conversation, Ms. James elicits and offers information as she matches visitors to vehicles suited to their lifestyles and preferences. During this sales process, she applies dialog, facial expressions, and animated gestures to establish a relationship between her sponsor and each visitor. Ms. James exemplifies a new generation of interactive characters who will offer consumers a familiar and compelling sales experience.

Islands of Adventure

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Islands of Adventure is a series of imaginary experiences based on a real place-to-be: the Universal Studios Islands of Adventure theme park in Orlando, now under construction. Working with Universal Creative and Real3D, the University of Central Florida's CREAT Digital Media Program, a student-faculty team, is pushing the edges of what is possible in VRML by developing and rendering elaborate computer-generated scenery and hand-drawn animation.

The project simulates what a typical Web interaction might be like when homes are routinely equipped with high-performance 3D graphics-capable and sound-capable information systems. SIGGRAPH 98 attendees use Silicon Graphics workstations and high-performance PC equipment equipped with Real3D graphics systems to experience a virtual theme park. Others visit the theme park via a VRML-based Web site.

Isle of Write: Communication is the Landscape

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The Isle of Write is a dynamic VRML world for temporal messaging based on the metaphors of writing in the sand and skywriting. Adapted for the SIGGRAPH 98 community, it provides alternatives to the physical message boards, programs and calendars, handwritten posters announcing new Birds of a Feather (BOF) meetings, etc. typically used by attendees.

On this island surrounded by an animated seascape, the beach is the surface of several bulletin boards, and the sky is the surface on which broadcast messages are written. Visitors post messages using the SandTypewriter, and they dispatch the skywriting plane with the SkyWriter. Other conference materials populate the island, including paper abstracts printed on flying LiveWebStationery, BOF updates in SandCastles, and campfires fed by log statistics.

MicroDisplay Camera Phone

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The MicroDisplay Camera Phone is an innovative, interactive demonstration created to illustrate the potential of the convergence of telecommunications, computer, and information technology. Attendees can make virtual calls with the Camera Phone, viewing real-time video on the phone's tiny display. When speaking normally into the phone, the user views live video images communicated to the phone's virtual viewer by the camera, which is directed to gather images from the user's field of view. Other visitors can participate in the virtual calls by viewing the same video feed on large, stationary monitors.

MAGNET

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MAGNET, France Telecom's research and development project for streaming, interactive multimedia, is an implementation of VRML97 and MPEG4 for scalable platforms in telecommunications environments.

MAGNET will enable delivery of a media-rich environment over very low, consumer-available bandwidth such as 33K modems. Because it implements the VRML97 and MPEG4 standards, MAGNET represents a near-future technology that will be widely accessible to an Internet consumer audience, to business intranets and extranets, and to content creators. The compression capabilities in MPEG and binary encoding for VRML will demonstrate the exploitation of this low-bandwidth medium. The MAGNET architecture is scalable, and future work will include implementations for scaled-down clients such as laptops or smaller devices.

Gesture VR: Gesture Interface to Spatial Reality

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Collaborator
Senthil Kumar
Bell Laboratories

In this demonstration, users interact with spatial simulations by means of a novel hand gesture recognition interface technology developed at Bell Labs. A freely moving, gloveless hand is the sole input device. Image sequences of the user's hand motions, acquired by video cameras, are processed by a computer program that recognizes gestures and calculates the hand's parameters. This information is used for precise control of navigation in 3D space, for grasping and moving objects on the screen, or to provide a new kind of interface in video games.

Users fly through the Yosemite Valley by pointing in 3D; they "grasp" and move objects to compose 3D scenes; they play a video game (such as Doom) in which a character is directed by hand pointing, and game actions are triggered by gestures.

CIMBLE: A Collaborative Learning Environment

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CIMBLE (CADETT Interactive Multi-User Business Learning Environment) enables six participants and a facilitator to enter a VRML world as 3D avatars and work together as a team on a guided task. The project is designed to integrate structured training methods into a sophisticated 3D world where the participants are no longer working in the same location. Since virtual, distributed work teams are replacing many traditional work teams, guidelines need to be developed to make this training effective in this new virtual environment. The CIMBLE prototype and project evaluation data highlight the results of a new effort in this area of online communities.

underscore

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Hearing music: we know this sort of thing well. Looking at music: there is such a thing as that, but we know it not nearly so well. The one is effortless, you say. The other is difficult.

But if, you then muse: if there were something that you could apply, that led you through a printed score in synchrony with its aural performance and in a way that always made clear the relationship of the seen to the heard...

If, you ponder: if it let you navigate this music, not just with PLAY and PAUSE and REW and FF but also by swooping and diving, peering forward and back piloting through the score as if above a landscape of notes...

If, you mull: if it gave you breadcrumb-like markers to drop so you could find your way back to the best parts, if it let you create excerpts, if it ran on SGI hardware, if it above all venerated the beauty of musical typography...

Well, then...

enhanced realities

1998's international showcase of innovations that facilitate human/idea/machine interaction and strive to recapture our child-like wonder of discovery. Where computer graphics combine with emerging technologies to envision a new, enhanced reality with clever new interfaces that challenge our ideas about computing in the physical world.

Location

Hall C

Days	Hours
Sunday 19 July	5 - 7 pm
Monday 20 July	9 am - 6 pm
Tuesday 21 July	9 am - 6 pm
Wednesday 22 July	9 am - 6 pm
Thursday 23 July	9 am - 6 pm
Friday 24 July	9 am - 1 pm

Enhanced Realities Chair

Janet McAndless
Sony Pictures Imageworks

Jury

Bruce Blumberg
Massachusetts Institute of Technology

Ken Perlin
New York University

Jacki Morie
Blue Sky | VIFX

Kathryn Saunders
Royal Ontario Museum

Andrew Glassner
Microsoft Research

HoloWall: Interactive Digital Surfaces

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HoloWall is an interactive wall system that allows visitors to interact with digital information displayed on the wall surface without using any special pointing devices. It demonstrates several interactive environments, including a world of autonomous digital insects that respond to body movements and an interactive sound environment that reactively creates music sequences based on the user's actions.

Swamped! Using Plush Toys to Direct Autonomous Animated Characters

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Swamped! is a multi-user interactive environment in which instrumented plush toys are used as an iconic and tangible interface to influence autonomous animated characters. Each character has a distinct personality and decides in real time what it should do based on its perception of its environment, its motivational and emotional state, and input from its "conscience," the guest. A guest can influence how a given character acts and feels by manipulating a stuffed animal corresponding to the character. For example, the guest could direct her character's attention by moving the stuffed animal's head, comfort it by stroking its belly, or have it wave at another character by waving its arm.

AR2 Hockey

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In AR2 Hockey (Augmented Reality AiR Hockey), players share a physical game field, mallets, and a virtual puck to play air hockey in simultaneously shared physical and virtual space. They can also communicate with each other through the mixed space. Since real-time, accurate registration between both spaces and players is crucial to playing the game, a video-rate registration algorithm is implemented with commercial head-trackers and video cameras attached to optical see-through head-mounted displays.

PingPongPlus

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The goal of this project is to explore systems for collaborative play that push the physical world back into the forefront of design, without relying on simple GUI controllers, such as a mouse, keyboard, and joystick. Various audio and visual augmentations have been added to a conventional ping-pong table with a non-invasive, sound-based ball tracking system. The "reactive table" displays patterns of light and shadow as a game is played, and the rhythm and style of play drives accompanying sound. At times, the game is subtly enhanced, and sometimes it is powerfully changed. In one mode, the table appears to be covered with water, so that playing on it creates patterns of subtle ripples. In another mode, images that race around the table change the entire scoring system and method of play.

Object-Oriented Displays

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In Object-Oriented Displays, users perceive and operate a virtual object as if it were real. Design and implementation of three types of object-oriented displays are demonstrated: MEDIA-Ace, a liquid crystal display (LCD) and position sensor; MEDIA-Cube, a position sensor and four LCDs arranged in the shape of a cubic body; and MEDIA-Crystal, which uses optical projection.

Mass Hallucination

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This imaging display changes according to the number of people watching it, their behaviors, and whether they've watched the device before. It is reflexive: the displayed image is a function of the people watching the display. It encourages crowds of people to collectively manipulate the display with their bodies or faces. Yet it is also personal, in that it can recognize the appearance of a user for short-to-medium periods of time and tailor the display accordingly. As in Magic Morphin' Mirror, a SIGGRAPH 97 Electric Garden project by the same group, this display captures video along the same optical axis as video is displayed, so images of observers can be directly manipulated, composited, or distorted on the display. In contrast to the previous work, which only considered a single user at a time and had no persistence after they left, this display is designed to visually track a crowd of people and provide a shared graphical experience.

Foot Interface: Fantastic Phantom Slipper

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People should be able to use their feet just as freely in a virtual environment as they do in the real world. Wearable interfaces should not cause psychological and/or physical discomforts. This slipper-like multi-modal interface is based on those two assumptions. It features a slipper interface with cyberworlds. Each foot's movement is measured in real time with an optical motion capture system, and feedback signals are transmitted to the soles. Phantom sensations elicited by multiple tactile stimuli allow transmission of complicated feedback information such as objects moving around the feet. Optical markers for motion capture and vibrators for tactile stimulation are installed in the slippers. Players interact with virtual objects projected onto a floor screen, sense them, and use them to play games.

inTouch

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Touch is a fundamental aspect of interpersonal communication. Yet while many traditional technologies allow communication through sound or image, none is designed for expression through touch. The goal of inTouch is to bridge this gap by creating a physical link between users separated by distance. InTouch consists of two separate identical objects, each consisting of three cylindrical rollers mounted on a base. The two objects behave as if corresponding rollers are physically connected, but in reality, the objects are only virtually linked. Sensors are used to monitor the states of the rollers, and computer-controlled motors synchronize those states, creating the illusion that distant users are interacting through a single, shared physical object.

Virtual FishTank

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The Virtual FishTank is a simulated aquatic environment featuring a 400-square-foot tank populated by whimsical and dynamic fish. Participants can:

- Create their own fish
- Design behaviors for their fish
- Observe their fish interacting with other fish.
- Manipulate behavioral rules for a group of fish.
- Discover how these behaviors can emulate schooling.
- Analyze emerging patterns.

Through real-time 3D graphics, visitors are introduced to ideas from the sciences of complexity – ideas that explain not only ecosystems, but also economic markets, immune systems, and traffic jams. In particular, visitors learn how complex patterns arise from simple rules.

Haptic Screen

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Haptic Screen is a new force-feedback device that deforms itself to present shapes of virtual objects. Typical force-feedback devices use a grip or thimble, but users of Haptic Screen can touch the virtual object without wearing anything. Haptic Screen employs an elastic surface made of rubber. A 6 X 6 array of 36 actuators deforms the surface and controls its hardness according to the force applied by the user. An image of the virtual object is projected onto the elastic surface so that the user can directly touch the image and feel its rigidity.

Natural 3D Display System Using Holographic Optical Element

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In this natural 3D display system, a holographic optical element (HOE) overcomes conflicts between convergence and accommodation. Users experience clear stereoscopic vision, without glasses, of a broad field of view. With its multiple-focus HOE, the system offers two pairs of viewing points in back-and-forth or horizontal locations.

Direct Watch & Touch

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This 3D display offers access to a virtual stereoscopic world without special glasses. When users "touch" the world with real tools (for example, a hammer, a surgical knife, a wrench, tweezers, etc.), directly and interactively, they hear and feel contact and transform virtual objects. This binocular parallax display combines virtual and real environments in full, high-resolution (XGA) color. It is a new approach to virtual reality that handles virtual objects with "real" tactile feedback.

Media & Mythology

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In ancient times, mythology was the high-tech method for storing data on a society's history, rituals, and ethical systems. The paradigm in use for these early information systems was storytelling. Media & Mythology explores the link between traditional mythologies from several cultures and new technology/new media. Man and Minotaur allows visitors a chance to portray the two ancient combatants and the gods that taunt them within a fully immersive, synthetic version of Dedalus' Labyrinth in ancient Crete. In Video Totem, expressionistic visitors create and view their own mythologies on a large digital totem pole. Dear Oracle integrates contemporary media into traditional soothsaying. The result is a new form of oracle: digital divination.

Natural Pointing Techniques Using a Finger-Mounted Direct Pointing Device

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Pointing with the index finger is a natural way to select an object, and if it can be incorporated into human-computer interaction technology, a significant benefit will be obtained for certain applications. This demonstration presents a prototype solution. Based on an infrared signal power density weighing principle, a small infrared emitter on the user's finger and multiple receivers placed around the laptop screen generate data for a low-cost microprocessor system. The microprocessor sends its output to a laptop computer, where it is used to determine coordinates for the cursor location. The prototype is not only a proof of concept. It is also a tool for further research on human performance in pointing and further development of interactive techniques.

Virtual Head

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Virtual Head is a new approach that enhances communication in virtual environments and telepresence. It tackles one of the key problems in the field of innovative telecommunication technology: how to represent oneself in virtual environments in such a way that an emotional and natural way of communicating with others is possible?

The Virtual Head conferencing prototype renders three-dimensional images of every communication partner in real time. It establishes eye-to-eye contact among the communication partners by projecting live-video textures onto 3D geometry of a head. The application translates the head movement so that video images show the original movements. Compressed video and audio information is exchanged via a high-bandwidth network to establish a remote conferencing scenario. Video and audio are decompressed on both sides, and the images are projected onto a screen.

Stretchable Music with Laser Range Finder

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Stretchable Music with Laser Range Finder combines an innovative, graphical, interactive music system with a state-of-the-art laser tracking device. An abstract graphical representation of a musical piece is projected onto a large vertical display surface. Users are invited to shape musical layers by pulling and stretching animated objects with natural, unencumbered hand movements. Each of the graphical objects is specifically designed to represent and control a particular bit of musical content. Objects incorporate simple behaviors and simulated physical properties to generate unique sonic personalities that contribute to their overall musical aesthetic.

Shall We Dance?

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Real-time 3D computer vision gives users control over both the movement and facial expression of a virtual puppet and the music to which the puppet "dances." Multiple cameras observe a person, and human silhouette analysis achieves real-time 3D estimation of human postures. Facial expressions are estimated from images acquired by a viewing-direction controllable camera, so that the face can be tracked. From the facial images, deformations of each facial component are estimated. The estimated body postures and facial expressions are reproduced in the puppet model by deforming the model according to the estimated data. All the estimation and rendering processes run in real time on PC-based systems. Attendees can see themselves dancing in a virtual scene as virtual puppets.

interactive dance club

The SIGGRAPH 98 Interactive Dance Club is a multi-participant, interactive environment with live computer-generated imagery and lightin, synchronized to real-time-generated dance music (acid jazz, world, ambient, drum 'n bass).

The SIGGRAPH 98 Interactive Dance Club is a multi-participant interactive environment with real-time computer-generated imagery, lighting, and video, synchronized to dance club music (i.e. acid jazz, tribal, ambient, drum & bass).

Instead of dancing to prerecorded music and images, or passively watching a performance, members of the audience become participants.

Within interactive zones located throughout the club, participants influence music, lighting, projected computer graphics images and video. There are zones for single participants, dual participants and groups of participants. Like sections in an orchestra, output from the interactive zones combines with a pre-defined basic rhythm to form the overall performance. Moving from zone to zone, participants experience different blends of musical and visual elements.

A sophisticated system of hardware and software keeps all the zones in sync while analyzing and filtering participant input, in order to deliver a musically coherent and visually satisfying experience. Feedback to the participants is designed to be immediate and responsive.

Interactive Dance Club Chair
Interactive Music Producer
Ryan Ulyate
Synesthesia, LLC

Location

Hall B Lower Level Lobby

Days	Hours
Monday 20 July	9 pm - 1 am
Tuesday 21 July	9 pm - 1 am
Wednesday 22 July	9 pm - 1 am
Thursday 23 July	9 pm - 1 am

System Designer
David Bianciardi
Synesthesia, LLC

Hardware Integration
Dan Comins
Interactive Technologies

Computer Graphics Supervisor
Judith Crow
Digital Domain

Video System Designer
Tim Z. Falconer
Digital Domain

Project Manager
C.J. Flynn
OpsCenter Technologies, Inc.

Computer Graphics Software
Greg Hermanovic
Side Effects Software

Associate Lighting Designer
Andris Kasparovics
design one corporation

Video Display System Designer
Mike McLean
Hoffman Video Systems

Technical Director/ Lighting Designer
Christien Methot
design one corporation

Hardware Integration
Michael Moorhead
Interactive Technologies

Computer Graphics Supervisor
Paul Simpson
Realise Studios

Coordinator
Kristen Stratton
Warner Bros. International Television Production

Interface Coordinator/Integrator
Peter Wyngaard
InterConnect of Ann Arbor, Inc.

Contributors

Computer Graphics Artists
Rob Barios
Jeff Bastedo
Shannan Burkley
Matthew Butler
Leo Chen
John Courte
Stewart Gordon
Craig Halperin
Caleb Howard
Carol Hunt
Alan Kapler
Franklin Londin
Kevin Mack
Martha Mack
Morris May
Rodney McFall
Scott Petill
Jarrett Smith
Hannah Walker
Petria Whelan

Audio Loops and Samples
Clilly Castiglia
Daniel Coleman
Jerome Groove
Jerrold Launer
Marc Mann
Jonatas Manzolli
Mark Thorley

Featured Musicians
Joel Peskin
Saxophone and Flute
George Doering
Guitar
Brice Martin
Exotic Woodwinds

sigKIDS

Parents, teachers, children, and communities creating innovative learning opportunities that excite young minds about the world around them through the art and science of computer graphics. sigKIDS features two programs: sigKIDS Art and sigKIDS Interactive.

sigKIDS Co-Chair
Adele Newton
Newton Associates

sigKIDS Co-Chair
Chris Stapleton
Universal Studios

Co-Director
Scott Lang
The Academy for the Advancement of Science and Technology

Co-Director
Anne Richardson
O.C., Inc.

Location
Hall C

Days	Hours
Sunday 19 July	5 - 7 pm
Monday 20 July	9 am - 6 pm
Tuesday 21 July	9 am - 6 pm
Wednesday 22 July	9 am - 6 pm
Thursday 23 July	9 am - 6 pm
Friday 24 July	9 am - 1 pm

sigKIDS Animation Festival Coordinator
Kevin McTiernan
The Academy for the Advancement of Science and Technology

Heidi Dunphy
Independent Animator

Nancy Krebsbach
Evans High School

Mitchel Groter
Video Central

Steve Schain
O.C., Inc.

Lynn Finch
Finch Interactive

Chris Carey
Orange County Public Schools

Darlene Wolfe
River Ridge High School

Pat Johnson
The Art Institute of Fort Lauderdale

Sally Brahier
Former District Liaison, PTSA

Rob Brahier
River Ridge High School

sigKIDS Jury
Heidi Dunphy
Independent Animator

Tim Comolli
South Burlington High School Imaging Lab

Maria Roussos
University of Illinois at Chicago

Chris Carey
Orange County Schools

Alice

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Alice is a development environment for creation of interactive 3D worlds. Our primary goal is to make the program easy to learn and use for non-engineering junior high, high school, and undergraduate students. We want students with little or no programming experience to be able to run through a 30-minute tutorial and start building fun and interesting 3D worlds right away.

Binary Biker Project: An Exploration of Motorcycles, Art, and Technology

In support of the New York City ACM SIGGRAPH Dan Preda Scholarship Fund

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In July of 1998, a motorcycle convoy led by two specially rigged motorcycles and a support vehicle departed from the campuses of Pratt Institute and the School of Visual Arts in New York City, to begin an event-filled journey to SIGGRAPH 98 in Orlando. These Binary Bikers were accompanied by an invited entourage from the worlds of art, technology, education, and motorcycling.

During the journey, still and moving images were captured by both the Binary Bikers and the virtual bikers via the Web site and digitally stored on the Web server in an online "image pool" for common access by all participants. At SIGGRAPH 98, the Binary Biker exhibition area contains several workstations offering access to the Binary Biker Web site, as well as computer graphics software and hardware tools to enable artists to create original works and upload them to the SIGGRAPH 98 Guerilla Gallery.

CAROL (Culture and Arts of Rochester Online)

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Four years ago, students in "Topics in Interactive Multimedia" built a Web site for a Rochester, New York "living history museum." From that initial site, CAROL has grown to include over 20 local arts and cultural institutions' Web sites, an online events calendar, and a database of local artists. CAROL is also a consortium of organizations actively involved in shaping the future and growth of the sites.

The Cyberarium

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The Cyberarium is an innovative, integrative environment that stimulates discovery and exploration of creative and socially enriching interactive techniques through intelligence-engaging, imagination-inducing, hands-on experiences with novel human-computer interaction devices. The Cyberarium's intent is to develop an experimental environment in which "cultural rapid prototyping" can be observed, researched, and refined – a place where social dimensions can be intelligently combined with the rapid development of the information infrastructure.

Dream Map Tapestries

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This event celebrates the work that sigKIDS groups everywhere have done throughout the year. The kids' work is presented on videotape. After the screening, a panel discussion takes place among people from industry and education who truly care about helping kids and their parents. The Dream Map Tapestries connects motivated sigKIDS with mentors who will continue the relationship beyond SIGGRAPH 98. The kids have a unique opportunity to talk one-on-one with people who can be role models for them. They hear, directly from the professionals, what it took to become successful in the computer graphics industry, what particular talents and skills they needed, what personal traits are the most helpful, and exactly how young people should prepare themselves for a successful career in computer graphics.

Express Link-Up

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Founded in January 1997, Express Link-Up empowers hospitalized children by providing appropriate computer and communications technology, including a dedicated secure intranet that enables them to play, learn, communicate, and develop critical life skills. 250,000 children pass through UK hospitals each year, of which 150,000 are considered long-stay. Some children (for example, those who require six-hour kidney dialysis three days a week) suffer terrible disruption to their education. With PCs next to their beds, they can bring work to the hospital, do school projects, study for exams, or use relaxation software to overcome stress.

Generation LEGO

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Two new products (LEGO Mindstorms Robotics Invention System and LEGO Technic CyberMaster) bring construction toys into the information age and give children an opportunity to build their own intelligent and interactive inventions. LEGO Mindstorms, developed in cooperation with the MIT Media Lab, is the first in a new generation of challenging, creative learning tools that enable children to use a PC to program intelligence into their own inventions. LEGO Technic CyberMaster is a futuristic play set that combines the virtual fun of on-screen adventure with physical models. Children can build their own models and bring them to life with a home computer.

These new products are designed to empower children in an age of increasing computerization and challenge their creativity, craftsmanship, programming, and critical thinking.

HistoryCity

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This 3D virtual world for kids is set in 1870s Singapore. The world features functional buildings; personal "decorate-able" rooms; animated objects that can be picked up and dropped; personal theater stages upon which dioramas can be built from objects found in the world; over 200 avatars representing people and occupations of the period; agents that provide news, stories, poems, jokes, pawn brokering services, and messaging services; clubhouse memberships; maps; and 22 communities, each with its own distinct architecture, and music.

Hyperscratch ver.7

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This interactive piece allows users to generate a variety of sounds and images as if they were using simple hand motions to paint a picture on a canvas of space or playing a piano with invisible keys. It is designed to provide users with uninhibited creative space and time. The only input devices are hands and bodies. Both hands can be used to create sounds and images, which allows users to move as if they are conducting a symphony or dancing. Such natural and free body movement is not possible through a mouse, a touch panel, or a space-input device. Thus Hyperscratch is not simply an input or pointing device but a unique environmental interface that mirrors the physical motion of the user.

InterSpace Station

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InterSpace Station is a networked 3D virtual environment that provides a shared laboratory. Students are able to conduct science experiments, interact with each other, and participate in unique presentations about astronomy, physics, and life aboard an orbiting space station. The InterSpace 3D multi-user virtual world client/server software platform from NTT allows users, as avatars, to navigate digital spaces and communicate with each other using real-time audio, facial image video, and text. Students and teachers participate from SIGGRAPH 98 and two remote sites, one in the San Francisco Bay area and one in Japan. Visitors may also participate via the Internet. NTT plans to collaborate with educators and SIGGRAPH Professional Chapters to allow students to participate in this unique interactive distance-learning environment.

KidCast For Peace: Solutions For A Better World

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Visionary Artists Resources Including
Other Unique Services
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Children of all ages share their art and direct us to their KidCast For Peace Web sites, VRML worlds, chat rooms, and interactive music spaces. Children at each participating site respond to comments and questions from local and cyber audiences. Free CU-SeeMe videoconference software enables real-time visual and audio interaction. The video camera focuses on the child and art together, then zooms into the art. A KidCast Central (creativity.net/kidcast2.html) moderator encourages the other sites to respond to what they see, evoking questions, feelings, and impressions.

The world needs an infusion of new ideas and loving connections to defuse the downward spiral of destructive human interactions. KidCast For Peace is part of a developing network of physical Creativity Cafes, other "New Schools," and evolutionary organizations that are drawn toward cooperative activities.

Living and Learning

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In Living and Learning, we research cultural issues, media conventions, and technological resources in the hope that this postmodern approach will help convey much needed information about AIDS to an age group that sees itself as unaffected and invincible. Our goal is to engage this group long enough for them to become involved in the interplay of moving imagery and sound, virtual games, and navigation of the work's topography via mouse-driven interactivity. The result, we hope, will be the work's ultimate goal: education, the best defense against AIDS.

The Virtual Archaeologist

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Developed for an archaeological museum in Nara prefecture, Japan, this kiosk program introduces young visitors to the world of archaeology. Nara prefecture is well-known for its historical artifacts. In ancient times, it was the capital of Japan. One of the most important objectives of this software is to inspire newer generations and help them understand the value and significance of archaeological studies. The kiosk uses "push" technologies in an "interactive document." Sometimes the software automatically opens up new pages and spontaneously conveys information to the users, who then feel as though they are discovering clues and mysteries.

The Virtual Art Gallery/Streaming Video on the Web

Ann Ioannides
Coral Reef Senior High School
10101 SW 152 Street
Miami, Florida 33157 USA
ioannia@mail.firn.edu
crhs.dade.k12.fl.us

Imaginative students from Coral Reef Senior High School (Miami) created two projects:

- A VRML art gallery, featuring works of art produced entirely by first- and second-year students.
- A streaming video newscast. This "Cudavision," five-minute daily newscast has been digitized for worldwide viewing. Tune in frequently to what is happening at the school!

The school features six magnet programs as well as a full athletic and extra-curricular program, attracting the best and brightest students from Dade County. The 1997-98 year is the school's first year of operation.

When Children Draw In 3D

Katiuska Varela
4 rue Calmels
75018 Paris, FRANCE
gonzalez@ensba.fr

In this project, children's drawings are used to create a 3D animation. It begins with a workshop that asks children a series of questions about a story: Who is this story about? What is it about? Where does it develop? The workshop results are used to prepare a script, then the script is adapted for a storyboard, and the children draw the characters and places where the story happens. Portions of the children's drawings (for example, the legs of one drawing, the head of another, and the ears of a third) are combined and scanned, then colored by the children. The colors are used as textures for elements of the story, and the scans are used to make the 3D forms. Finally, the storyboard scenes are prepared for animation, and characters, locations, cameras, lights, and other elements are organized to form the final edition of the story.

Where Stories Meet by TeleCommunity

Robert Dunn
TeleCommunity Project
College of Liberal Arts
Duquesne University
111 The Oaks
Pittsburgh, Pennsylvania 15215
USA

Where Stories Meet by TeleCommunity represents a confluence of ideas, images, and experiences expressed through digital media and shared over the Internet by students from Jerusalem, Istanbul, Orlando, Pittsburgh, New Orleans, and Los Angeles. Underlying the social fabric of this project are relationships enhanced by personal meetings, dialogue, and negotiated understandings between participants. This is sustained remotely by periodic and ongoing network contact, email, Internet videoconferencing, Web site updates, and file exchanges. Over-arching themes bring diverse responses and help to spark the imagination. The individual grows and experiments within the collaborative group setting, and energies are shared with remote partners.

Save the Planet: Eco-Art on the Web

June Julian
New York University
P.O. Box 81
Gladstone, New Jersey 07934
USA
julianj@acf2.nyu.edu
www.nyu.edu/projects/julian/

Since this project was first launched two years ago, students from around the world have been sending in their art work, poems, stories, and eco-facts about the special trees in their environment. So far, 21 U.S. states and 18 foreign countries are represented on at least 100 separate Web pages. The youngest contributors are Illinois kindergartners, and the oldest students are in the 12th grade in Nevada. One New Jersey boy designed his own interactive space on the project, where he asks the world to manipulate his pictures and send them back to the site. The project is especially designed to welcome unique ideas about the old trees of the world. Send them in! We still have lots of states and countries that are not represented. What is the oldest tree in your neighborhood?

sigKIDS Art

Digital Self-Portrait
Erin McCartney
Age 16

Teacher
Kristy Higby
The Mercersburg Academy

Hardware
Macintosh computer
Digital camera
Overhead projector

Software
Adobe Photoshop

Carla
Neddly Maxime
Age 14

Teacher
Nancy Krebsbach
Maynard Evans High School

Hardware
Gateway 2000 computer

Software
Kinetix 3D Studio Max

Digital Self-Portrait
A.J. Thieblot
Age 18

Teacher
Kristy Higby
The Mercersburg Academy

Hardware
Macintosh computer
Digital camera
Overhead projector

Software
Adobe Photoshop

Bath Scene
The Stregnar Civilization

Matthew Teichman
Age 17

Teacher
Kevin McTiernan
Academy for the Advancement of Science and Technology

Hardware
Hewlett-Packard Pentium Pro computer

Software
Kinetix 3D Studio Max
Adobe Photoshop

California Landscape
Jessica Yuan
Age 9

Teachers
Ramona Otto
Jane Shimotsu
The Mirman School

Hardware
Macintosh Power PC

Software
Fractal Design (Metacreations)
Dabbler
Hyperstudio

Split Personality
Daniel Sergile
Age 17

Teacher
Nancy Krebsbach
Maynard Evans High School

Hardware
Gateway 2000 computer

Software
Kinetix 3D Studio Max

Untitled #87
Sarah Dodson
Age 9

Teacher
Jean L. Perry
Germantown Elementary School

Hardware
Macintosh computer

Software
ClarisWorks

My Apartment
Angel R. Espinoza
Age 15

Teacher
Nancy Krebsbach
Maynard Evans High School

Hardware
Gateway 2000 computer

Software
Corel Draw 7

Digital Self-Portrait
Charlcie Legler
Age 18

Teacher
Kristy Higby
The Mercersburg Academy

Hardware
Macintosh computer
Digital camera
Overhead projector

Software
Adobe Photoshop

Trees
Laura Griffiths
Age 8
Teacher
Leanne Statland
The Mirman School

Hardware
Macintosh Power PC

Software
Fractal Design (Metacreations)
Dabbler
ClarisWorks

Life Dream
Joshua Hendle
Age 15

Teacher
Nancy Krebsbach
Maynard Evans High School

Hardware
Power Computing (Macintosh) computer

Software
Strata Studio Pro

Digital Self-Portrait
Eddie Kang
Age 17

Teacher
Kristy Higby
The Mercersburg Academy

Hardware
Macintosh computer
Digital camera
Overhead projector

Software
Adobe Photoshop

The Tree
Gizelle Mallillin Pera
Age 9

Teacher
Leanne Statland
The Mirman School

Hardware
Macintosh Power PC

Software
Fractal Design (Metacreations)
Dabbler
ClarisWorks

Alluromania
Toujour Byrd
Age 15

Teacher
Nancy Krebsbach
Maynard Evans High School

Hardware
Gateway 2000 computer

Software
Kinetix 3D Studio Max

I Saw a Tree
Mackenzie Wahl
Age 8

Teacher
Leanne Statland
The Mirman School

Hardware
Macintosh Power PC

Software
Fractal Design (Metacreations)
Dabbler
ClarisWorks

Pyramid of Darkness
Dayana Ottenwalder, Eileen Lied, Juan Diaz, and Zulma Gomex
Age 17, Age 17, Age 17, and Age 18

Teacher
Nancy Krebsbach
Maynard Evans High School

Hardware
Pentium 120 computer

Software
ClarisWorks

Untitled
Chip Collier
Age 16

Teacher
Nancy Krebsbach
Maynard Evans High School

Moonlit Men
Bettina Santo Domingo
Age 9

Teacher
Leanne Statland
The Mirman School

Hardware
Macintosh Power PC

Software
Hyperstudio

Spirit Tell Me
Alexandra Greene
Age 9

Teacher
Leanne Statland
The Mirman School

Hardware
Macintosh Power PC

Software
Hyperstudio

What Does it Feel To Have Freedom?
Jillian Banks
Age 9

Teacher
Leanne Statland
The Mirman School

Hardware
Macintosh Power PC

Software
Hyperstudio

I Hear the Bells
Claire Abramowitz
Age 9

Teacher
Leanne Statland
The Mirman School

Hardware
Macintosh Power PC

Software
Hyperstudio

Spirits of Wonder
David Halperin
Age 8

Teacher
Candace Corliss
The Mirman School

Hardware
Macintosh Power PC

Software
ClarisWorks and KidPix

Circle of Life
Emily Rosenthal
Age 8

Teacher
Candace Corliss
The Mirman School

Hardware
Macintosh Power PC

Software
ClarisWorks and KidPix

Untitled #11
Elizabeth Crowson and Kinsey Harris
Age 9

Teacher
Jean L. Perry
Germantown Elementary School

Hardware
Macintosh computer

Software
ClarisWorks

Isolation 3.11
Lam Nguyen
Age 18

Teacher
Nancy Krebsbach
Maynard Evans High School

Hardware
Power Computing (Macintosh) computer

Software
KPT (Metacreations) Bryce 2

Pacific Island
Vinh Nguyen
Age 18

Teacher
Nancy Krebsbach
Maynard Evans High School

Hardware
Pentium 90 computer

Software
KPT (Metacreations) Bryce 2

The Mayflower Voyage
Natasha Spottiswoode
Age 6

Teachers
Ellen Brown and Anita Tilley
The Mirman School

Hardware
Macintosh Power PC

Software
ClarisWorks and KidPix

Digital Self-Portrait
Eunji Mah
Age 18

Teacher
Kristy Higby
The Mercersburg Academy

Hardware
Macintosh computer
Digital camera
Overhead projector

Software
Adobe Photoshop

SIGGRAPH TV/online technologies

Live events, recorded programming, and video coverage of SIGGRAPH 98 broadcast throughout the Orange County Convention Center and beyond.

For SIGGRAPH 98, SIGGRAPH TV and SIGGRAPH Online join forces to create a prototype 21st century "all-media" production facility. Throughout the conference week, this state-of-the-art television studio, production facility, and multimedia broadcast center creates and broadcasts almost 60 hours of television programming and Internet content.

The facility occupies more than 6,000 square feet and includes the very latest in television and Internet hardware and software. The programming created in the facility is broadcast to over 30,000 attendees during SIGGRAPH 98, provided locally to SIGGRAPH 98 shuttle buses, and delivered to 200 million Internet users in over 200 countries through a variety of "streaming" media and Web-based reporting.

A staff of more than 50 producers, editors, scriptwriters, graphic artists, computer administrators, online publishers, and technical personnel was brought together to produce this week-long event. The content includes the world's best computer animations, interviews, and daily in-depth coverage of the 25th international conference on computer graphics and interactive techniques.

Designed as a showcase of technology, this facility is open to all SIGGRAPH 98 attendees. During production, attendees can take a self-guided tour through the facility and watch as television content is edited for broadcast and the Internet, and view first-hand the equipment used to create the content and manage the process.

Location
Room 221

SIGGRAPH TV Chair
Dave Tubbs
Evans and Sutherland Computer Corporation

Online Technologies Chair
Omar Ahmad
Netscape Communications

Online Technologies Committee
Steve Allison-Bunnell
Natureboy Media

Paul Hart
C/Net

John Hulson
Discovery Channel Online

Mario A. Jimenez
Orlando Sentinel

Kevin Lahey
NASA Ames Research Center

Mark C. Kilby
Orlando Sentinel

Meryle Mishkin
Netwizards

Danielle Weaver
Business/Technology Journalist

SIGGRAPH TV Committee
Lynn Finch
Finch Interactive Group

Michael Pavlinch
imageDESIGN Videographics

Marc Parrish
Middle Tennessee State University

Jeanie Taus
Independent Consultant

SIGGRAPH 98 adds a new component to SIGGRAPH TV: creation of an offsite production and animation capability. The following companies designed and created the bumpers, trailers, and intros used during the SIGGRAPH TV broadcast.

MOdi Studio
2814 Madison Avenue
San Diego, California 92116 USA

Pixel Factory
4081-C L.B. Mcleod Road
Orlando, Florida 32811 USA

Avid Neo Geo
4390A 35th Street
Orlando, Florida 32811 USA

Animations

Computer animation is ubiquitous in today's television programming, and SIGGRAPH TV is no exception. The following animations were selected during the Computer Animation Festival jury process to be used in the SIGGRAPH TV broadcast.

Adam & Eve

Julie Janower
1133 10th Street, #104
Santa Monica, California 90403 USA

Sesame Street Revisited

Ralph Destefano
Electronic Visualization Laboratory
University of Illinois at Chicago
3610 North Keeler, #2
Chicago, Illinois 60641 USA
ralph@evl.uic.edu

NPSNET: An Amphibious Virtual Environment

Michael Zyda
Department of Computer Science
Naval Postgraduate School
Spanagel Hall 252, Code CS/Zk
Monterey, California 93943-5118
USA
zyda@siggraph.org

The Dragon

Luc Larouche
ICARI Institute
85 St-Paul West, Suite 31
Montréal, Québec H4Y 3V4 CANADA
larouche@icari.com

Herrmann Hall

Michael Zyda
Department of Computer Science
Naval Postgraduate School
Spanagel Hall 252, Code CS/Zk
Monterey, California 93943-5118
USA
zyda@siggraph.org

H20

Aaron J. Hartline
1737 Lake Street
Whiting, Indiana 46394 USA
AJHARTLINE@aol.com

Falling Idol

Keiji Yamauchi
Dentsu Tec Inc. Creative Headquarters
1-8-9 Tsukiji, Chuo-Ku
Tokyo 104 JAPAN
+81.3.5551.8828
+81.3.5551.9405 fax

Rococo #506

Stefan Smith
Windmill Lane Productions
1558 10th Street
Santa Monica, California 90401 USA
stefan@windmill-lane.com

Trade Secrets of the Violin Masters

Laurence Leydier
Innovative Music Instructional Technology
15 English Place
Winnipeg, Manitoba R2M 5J1
CANADA
lleydier@total.net

Lotus Spring

Lifeng Wang
Xing Xing Computer Graphics Inc.
2366 Main Mall, Room 047
Vancouver, British Columbia V6T 1Z4
CANADA
wang@cs.ubc.ca

Test 001

Franÿois-Xavier Aubague
Université de Provence
13, les Grands Champs
63 360 St-Beauzire, FRANCE

Fool Running

Tomoyuki Harashima
2739-122 Negoya Tsukui-machi
Tsukui-gun
Kanagawa 220-0203 JAPAN
tomoyuu@ca2.so-net.or.jp

Distortion

Hiromi Habuto
2-3-4 Nagata Minami, Minami-Ku
Yokohamashi 232 JAPAN
+81.45.742.3050
habuto@interlink.or.jp

Crash Mapping

Youichi Horry
Central Research Lab.
Hitachi
1-280 Higashi-Koigakubo, Kokubunji
Tokyo 185 JAPAN
horry@crl.hitachi.co.jp

Gone Forever

Stuart Sharpe
42 Sunset Way
San Raphael, California 94901 USA
+1.415.256.9872
+1.415.256.9759 fax
gone@ssharpe.com

An Indirect Consciousness

Danny Kamhaji
51 Monitor Street, #3
Brooklyn, New York 11222 USA
friction@dcdu.com

Variation from "Tchaikovsky Pas de Deux"

Mitsuyo Hashida
Sonology Department
Kunitachi College of Music
5-5-1 Kashimwa-cho, Tachikawa-shi
Tokyo 190-8520 JAPAN
mitsuyo@kcm-sd.ac.jp

paysage sylvain

Sachiho Murata
Sonology Department
Kunitachi College of Music
5-5-1 Kashiwa-cho, Tachikawa-shi
Tokyo 190-8520 JAPAN
sachiho@kcm-sd.ac.jp

Intruding

Ming-Huei Shih
139-35 35th Avenue, Apt. 1D
Flushing, New York 11354 USA
jackyshi@aol.com

Bob & Scott

Guillaume Hellouin
SPARX
91, rue Lauriston
75016 Paris, FRANCE
sparx@imaginet.fr

Meta Baron

Guillaume Hellouin
SPARX*
91, rue Lauriston
75016 Paris, FRANCE
sparx@imaginet.fr

PMU Jouez avec vos émotions

Guillaume Hellouin
SPARX*
91, rue Lauriston
75016 Paris, FRANCE
sparx@imaginet.fr

Jurupa

John Clark Matthews
Sony Pictures Imageworks
9050 West Washington Boulevard
Culver City, California 90232 USA

To Begin With

Keisuke Imanishi
Tetra Vision
No. 1031-178, Higasi Tomigaoka
3-Chome, Nara-Shi, JAPAN
imanishi@kcua.ac.jp

The EyeCue System

Patrick FitzGerald
Intellimedia
2208 Creston
Raleigh, North Carolina 27608 USA
pat_fitzgerald@ncsu.edu

Age of Convergence

Michael O'Neill
1215 Bay Street, #7
San Francisco, California 94123 USA
moneill@macromedia.com

Equis

Fabian Tejada
43-59 161st Street, 3rd Floor
Flushing, New York 11358 USA
sheol7@rocketmail.com

Labyrinth

Masa Inakage
2-24-7 Shichirigahama-Higashi
Kamakura, Kanagawa 248 JAPAN
inakage@medi-studio.co.jp

Project Wivern

Toshiyuji Aoyama
2-24-2 202 Kokubunzishi, Honmachi
Tokyo, JAPAN
wivern@ceres.dti.ne.jp

Tune Quest

Toshiyuji Aoyama
2-24-2 202 Kokubunzishi, Honmachi
Tokyo, JAPAN
wivern@ceres.dti.ne.jp

Kachina Doll

Vicky Yu-tzu Lin
510 East Oglethorpe Avenue
Savannah, Georgia 31404 USA
ylinvicky@yahoo.com

Adventures of Spiderman

Jeff Kleiser
Kleiser-Walczak Construction Co.
87 Marshall Street
North Adams, Massachusetts 01247
USA
jeff@kwcc.com

Tibetan Dreams

Michael Carter
Two Quacks and a Baboon
c/o Side Effects Software Inc.
477 Richmond Street West, Suite
1001
Toronto, Ontario M5V 3E7 CANADA
mcarter@sidefx.com

Islands of Adventure Web Game Tour

David Haxton
University of Central Florida
Orlando, Florida 32816-1324 USA
haxtond@aol.com

Beryllium

Neal McDonald
ACCAD
The Ohio State University
1224 Kinnear Road
Columbus, Ohio 43212 USA
mcdonald@cgrg.ohio-state.edu

The Great Paper Deadline

Andrei State
University of North Carolina at Chapel
Hill
CB 3175 Sitterson Hall
Chapel Hill, North Carolina 27599-
3175 USA
andrei@cs.unc.edu

Frankenmouse

Juan Montes de Oca
Universitat de les Illes Balears
(Maisca)
Ctra. Valldemossa Km.7.5
07071 Palma de Mallorca
SPAIN – BALEARES
info@studio1.vib.es

Knife Runner

Juan Montes de Oca
Universitat de les Illes Balears
(Maisca)
Ctra. Valldemossa Km.7.5
07071 Palma de Mallorca
SPAIN – BALEARES
info@studio1.vib.es

The Wonder of it All

David Dohan
(c/o S. Trovas)
Ringling School of Art and Design
2700 North Tamiami Trail
Sarasota, Florida 34234 USA
strovas@rsad.edu

and so, she departed...

Celeste Ramirez
(c/o S. Trovas)
Ringling School of Art and Design
2700 North Tamiami Trail
Sarasota, Florida 34234 USA
strovas@rsad.edu

graphicsnet

A state-of-the-art fiber backbone network linking programs and exhibitors within the conference to the global computer graphics community.

GraphicsNet is the SIGGRAPH 98 conference intranet. It serves as the link among the many conference programs and events, and as the gateway to the global graphics community. Once again, GraphicsNet includes two different optical fiber backbones:

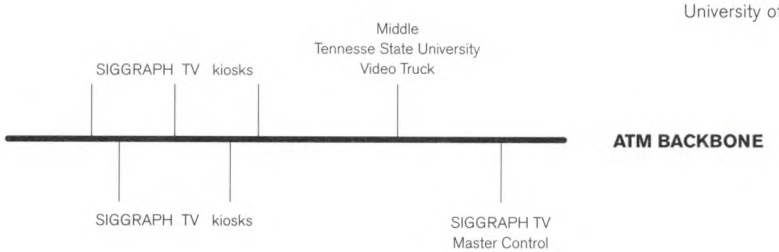
1. A production backbone based on Fast Ethernet (100 Mbps) links the Exhibition; the Internet Access Centers; the 18 presentation rooms for Papers, Panels, Courses, Sketches, and the Educators Program; Hall C; information kiosks; and the Creative Applications Lab (CAL). The production backbone is built with products from Cisco Systems, 3COM, Fluke, and others. It is connected to the Internet through a "burstable" T3 circuit on the Orlando Telephone Company optical fiber Synchronous Optical Network (SONET) ring that serves the Orange County Convention Center and metropolitan Orlando. A guaranteed bit rate of 25 Mbps to UUNET's Internet Services and their multiple Internet backbone providers has been obtained for SIGGRAPH 98.

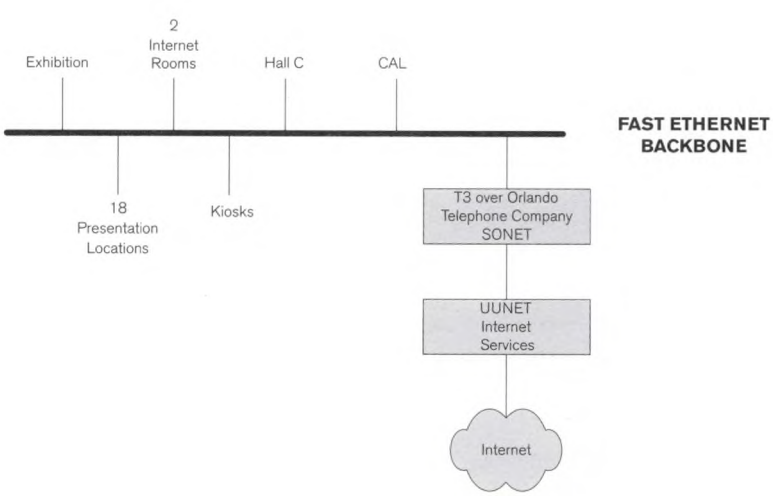
2. The other GraphicsNet backbone is based on ATM (155 Mbps, OC-3) and is designed primarily to serve as the highperformance video network for SIGGRAPH TV. It connects all the information kiosk locations with video and with SIGGRAPH TV Master Control. The ATM network uses switches and video encoding and decoding products from FORE Systems.

GraphicsNet also includes several dedicated optical fiber and copper connections that are being used by exhibitors and contributors to distribute digital video and for other applications.

The primary network management workstations and servers used in the Network Operations Center (NOC) are supplied by Sun Microsystems, Inc.

SIGGRAPH 98 Networking Chair
CJ Murzyn
University of Illinois at Chicago





Networking Committee
David Evans
Sandia National Laboratories

Larry Kauffman
USA Group

Keith Nesson
FORE Systems

Ralph Orlick
University of Illinois at Chicago

David Spoelstra
USA Group

Steve Van Frank
Van Frank Consulting

Alan Verlo
University of Illinois at Chicago

Bruce Whittet
Sandia National Laboratories

Onsite Support
Joe Cychosz
WorldServer

Jerome Kalisz

Ben Kao
University of Illinois at Chicago

Paul Rossman
University of Illinois at Chicago

Administrative Assistant
Michelle Kaysen
University of Illinois at Chicago

career services

Are you looking for a job in the computer graphics industry? Does your company have openings for qualified individuals in the computer graphics industry? If so, then the SIGGRAPH 98 Career Center is the perfect place for you!

- **Résumés are posted and distributed.**
- **Job openings are posted and distributed.**
- **Interview scheduling is offered.**
- **Career mentoring services are offered.**
- **A CD-ROM of résumés is available for purchase.**

Career Center Location

Rooms 307, 308

Days	Hours
Saturday 18 July	6 - 8 pm
Sunday 19 July	noon - 7 pm
Monday 20 July	8 am - 6 pm
Tuesday 21 July	8 am - 6 pm
Wednesday 22 July	8 am - 6 pm
Thursday 23 July	8 am - 6 pm
Friday 24 July	8 am - 3 pm

Job Seeker Services

All registered attendees are eligible to post a résumé in the Career Center. Résumés are posted in one of three categories:

- Art: film/video/animator, graphic/fine artist, and multimedia
- Science: engineer, scientist/researcher, and software developer/analyst
- Other: educator and other

Attendees are invited to bring résumés to the Career Center. At least two printed copies of your résumé are required to participate in the Career Center's services. Additional copies of your résumé are required if you want copies made available to interested companies. Due to limited space, résumés are posted in one category only. The Career Center staff also distribute copies of your demo tapes, if provided. Due to space limitations, a maximum of four demo tapes may be given to the Career Center for distribution. Additional copies may be added as needed.

Job seekers can also drop off their résumés for the Career Center staff to give to a specific company. This service is only offered for companies that have agreed to accept résumés. Bring extra copies of your résumé if you wish to take advantage of this service. Career Center staff also assist in scheduling interviews with prospective employers. Take advantage of the Career Mentoring Services offered during the conference. Volunteers from the SIGGRAPH committees will be available to discuss the current job situation in the computer graphics industry, job descriptions and responsibilities, and how to approach prospective employers.

Employer Services

Career Center job posting services are provided for SIGGRAPH 98 exhibitors free of charge and to non-exhibitors for a $500 service fee.

Companies are invited to bring their job postings directly to the SIGGRAPH 98 Career Center. All job postings are mounted on bulletin boards and may be as creative as you like, following a few simple guidelines:

- At least two copies of each posting must be submitted.
- Job posting copy cannot exceed 11 inches x 17 inches.

The SIGGRAPH 98 name and logo cannot appear on the posting. Use materials that can be easily hung on a bulletin board using push pins. Job postings are not accepted on disk or via email.

SIGGRAPH 98 offers participating companies the opportunity to purchase a compilation of the collected résumés on CD-ROM. For details on purchasing this CD-ROM, please contact SIGGRAPH 98 at +1.312.321.6830 or careers98@siggraph.org.

Job Fair

Wednesday 22 July 8 am - 6 pm
Room 311

In a relaxed, informal setting, job seekers can explore how their skills and experience match current job openings at participating companies. All registered SIGGRAPH 98 attendees are welcome to attend.

Job Fair Participants

(as of 22 June 1998)

The 3DO Company
Redwood City, California USA

989 Studios (formerly Sony Interactive Studios)
Foster City and San Diego, California USA

Advanced Visual Systems
Waltham, Massachusetts USA

The Art Institutes International
Fort Lauderdale, Florida USA

Cinesite Digital Studios
Los Angeles, California USA

Discreet Logic
Montréal, Québec Canada

Evans & Sutherland Computer Corporation
Salt Lake City, Utah USA

Incredible Technologies, Inc.
Rolling Meadows, Illinois USA

Meta Creations, Inc.
Santa Barbara, California USA

Mondo Media
San Francisco, California USA

MTV Networks
New York, New York USA

Reality by Design
Monterey, California USA

Scientific Placement
Houston, Texas USA

Sony Pictures Imageworks
Culver City, California USA

SQUARE USA, Inc.
Los Angeles, California USA

ViaGrafix
Pryor, Oklahoma USA

Yosemite Entertainment - A Sierra Company
Oakhurst, California USA

special interest groups

Special Interest Groups (SIGs) are for attendees who think and work in similar technologies and environments. Special Interest Groups are open to all attendees. They are usually informal. At some, general subjects are discussed; others convene around topics related to specific product vendors. See the SIGGRAPH 98 Conference and Exhibition Locator for room locations and times of SIGs.

Birds of a Feather meetings (Room 204 C) are impromptu gatherings. They can be scheduled at any time, to discuss any subject. To organize your own impromptu meeting, simply use the sign-up board in the Hall C Lobby, where late additions and revisions to the Special Interest Groups and Birds of a Feather schedule are posted.

For more information on these Special Interest Groups, contact:

3D Benchmarking
Greg Passmore
+1.206.861.9422

Advanced Visual Systems User Group Meeting
Adam Yee
+1.781.890.4300

Amapi 3D Modeler SIG
Stefanie Stagnaro/
Philip Staiger
+1.619.457.5359

Carto Project Birds of a Feather
David A. Taylor
+1.919.967.8965

CAVERNUS SIG
Tom Coffin
+1.212.244.3664

Computer Graphics Pioneers
Sherry Keowen
+1.818.347.2210

GPC Press Conference
Bob Cramblitt
+1.919.481.4599

IEEE TCCG Meeting
Bill Ribarsky
+1.404.894.6148

Inter-Society for the Electronic Arts (ISEA) Meeting
Maria Stukoff
+1.514.281.6543

International Color Consortium
William K. Smythe
+1.703.264.7200

Java 3D & Java Media SIG
Subra Mohan
+1.650.786.5863

Massively Parallel Rendering SIG
Patricia Crossno
+1.505.845.7506

Open Inventor SIG
Stefanie Stagnaro/
Robert Wiedeman
+1.619.457.5359

Ozone-Computer Art Festival
Kevin Cain
+1.415.274.2205

Ray Tracing Roundtable
Eric Haines
+1.607.277.5445

RenderMan Users Group
Renee Lamri
+1.510.620.6022

Reunião dos Brasileiros
John Michael
Pierobon
+1.954.771.0252

SENSE8_SIG-WTK
Angela Del Ponte
+1.415.331.6318

SIG on Digital Media Production Management Frameworks
Roger Rohrbach
+1.510.649.9711

SIGGRAPH Education Committee Meeting and Breakouts
Jack Bresenham
+1.803.343.2690

SIGGRAPH Public Policy SIG Meeting
Robert Ellis
+1.602.837.5202

SIGGRAPH Professional Chapters Annual Business Meeting
Scott Lang
+1.201.343.6000
extension 3380

Tokyo/ACM SIGGRAPH
Masa Inakage
+81.467.32.7941

UNC Chapel Hill Graphics Reunion
Jai Glasgow
+1.919.962.1791

Visualization Toolkit User's Group
William J. Schroeder
+1.518.393.2142

registration and media information

Member Rate

If you are currently an ACM or SIGGRAPH member, you are eligible for member discounts. You must provide your current membership number in order to receive the discount, otherwise you will be charged the non-member rate. Local or regional SIGGRAPH memberships are not eligible for registration discounts.

Student Rate

You must be a full-time student in order to qualify. You must attach copies of the following to your registration form to qualify for student rates:

- Your 1998 ACM student membership card OR your valid 1998 student identification card, AND
- A letter on school letterhead verifying you are a full-time student. The letter must include your registrar's name, address, and phone number so we can verify your student status.

If you do not attach both of the above items to your registration form, you will not receive the student discount and will be charged the non-member rate. In addition, you must present your ID card (not a copy) in order to pick up your credentials.

Special Policies

Conference registration in any category is limited to ages 13 and older. Children under 16 are not permitted in the Exhibition. No cameras or recording devices are permitted at SIGGRAPH 98. SIGGRAPH 98 may record all, or portions of, conference programs and events.

Registration Hours

If you registered by Friday 30 June, please go to Advance Registration, Hall B1, OCCC. Otherwise proceed to Onsite Registration, also in Hall B1.

Saturday 18 July	6 - 8 pm
Sunday 19 July	noon - 7 pm
Monday 20 July	8 am - 6 pm
Tuesday 21 July	8 am - 6 pm
Wednesday 22 July	8 am - 6 pm
Thursday 23 July	8 am - 5 pm
Friday 24 July	8 am - 1 pm

Media Headquarters Hours

Sunday 19 July	10 am - 6 pm
Monday 20 July	8 am - 6 pm
Tuesday 21 July	8 am - 6 pm
Wednesday 22 July	8 am - 6 pm
Thursday 23 July	8 am - 5 pm
Friday 24 July	8:30 am - 1 pm

Media Registration

Media representatives must register in the Media Headquarters Office, Room 208. You must submit full and proper media credentials for a media pass. No exceptions will be made.

Media Briefing

Room 315 B
Tuesday 21 July 8:15 - 8:45 am

The official SIGGRAPH media briefing is the place to hear what's new and what's hot at SIGGRAPH 98. Preview the Electronic Theater and receive insight into SIGGRAPH 98 programs and venues.

Exhibition Floor Tour

Immediately following the Media Briefing
Tuesday 21 July

The SIGGRAPH 98 Exhibition, a benchmark for the diversity and exponential growth of digital technologies, showcases over 250 exhibitors in more than 170,000 square feet. Gain access to the exhibit floor before it opens to the public. Get a "sneak preview" of the latest products and applications. Small groups of media representatives will be escorted onto the exhibit floor.

Media Tours

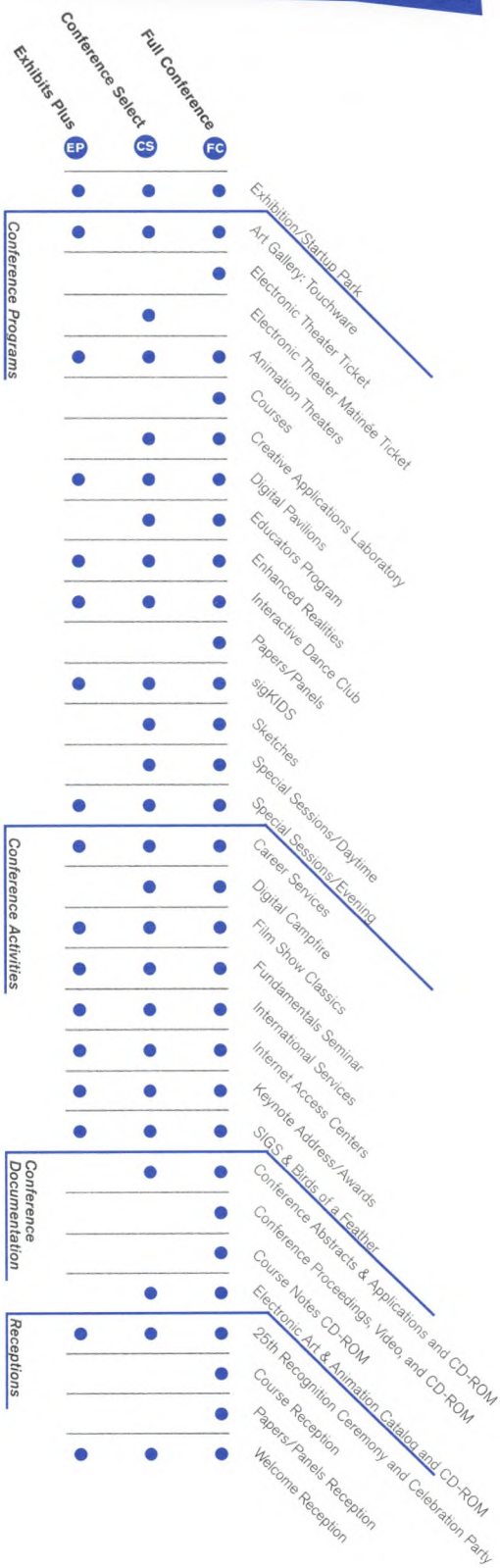
Art Gallery: Touchware
CAFFEINE++, Hall C
Monday 20 July 8:30 am

Enhanced Realities Tour
CAFFEINE++, Hall C
Wednesday 22 July 8:30 am

Exhibitor Media Events

A schedule of various exhibitor media events will be available in the Media Headquarters Office, Room 208.

programs, activities, and conference documentation included with your registration



international services

SIGGRAPH 98 and Orlando welcome thousands of international computer graphics scientists, developers, and practitioners to this year's 25th conference celebration. Members of the SIGGRAPH 98 International Committee and a multilingual staff of student volunteers are available to help international attendees take full advantage of all the programs and events, and the Exhibition.

Bilingual Panels

SIGGRAPH 98 provides a bilingual environment in one of its majorprograms. Panels are simultaneously interpreted into Japanese.

International Center

All international attendees are invited to make the SIGGRAPH 98 International Center their home away from home. During the conference, student volunteers provide assistance and conference information. Look for their yellow vests with-flags that indicate their language fluency.

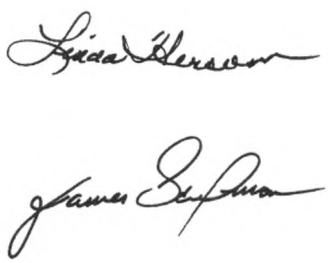
International Welcome Reception

The International Welcome Reception will be held in the Florida Ballroom of the Peabody Orlando hotel (across the street from the Orange County Convention Center), Sunday 19 July, 6 - 8 pm. All internationally registered attendees are invited.

Location

Hall C Lobby

Days	Hours
Saturday 18 July	6 - 8 pm
Sunday 19 July	noon - 7 pm
Monday 20 July	8 am - 6 pm
Tuesday 21 July	8 am - 6 pm
Wednesday 22 July	8 am - 6 pm
Thursday 23 July	8 am - 6 pm
Friday 24 July	8 am - 5 pm



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James Scidmore
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scidmore@siggraph.org

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+81.467.32.7943 fax
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BRAZIL
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mkzuffo@livorno.lsi.usp.br

Contact the international chairs for a brochure containing information about the International Center and how to become a member of the International Committee.

會說多種語言的國際運作委員會的成員，可解答問題及提供有關 SIGGRAPH 98 的資訊。

Les membres polyglotes de notre Comité Internationale restent à votre disposition pour répondre à vos questions et pour vous fournir toutes informations complémentaires sur le SIGGRAPH 98.

Mitglieder des mehrsprachigen Internationalen Komitees stehen bereit, um Fragen zu beantworten und Anskunft über SIGGRAPH 98 zu erteilen.

Membri multilingue del Comitato Internazionale sono disponibili a rispondere alle domande ed a fornire informazioni in riguardo a SIGGRAPH 98.

マルチリンガルな国際委員がSIGGRAPH 98に関する質問にお答えし、インフォメーションを提供いたします。

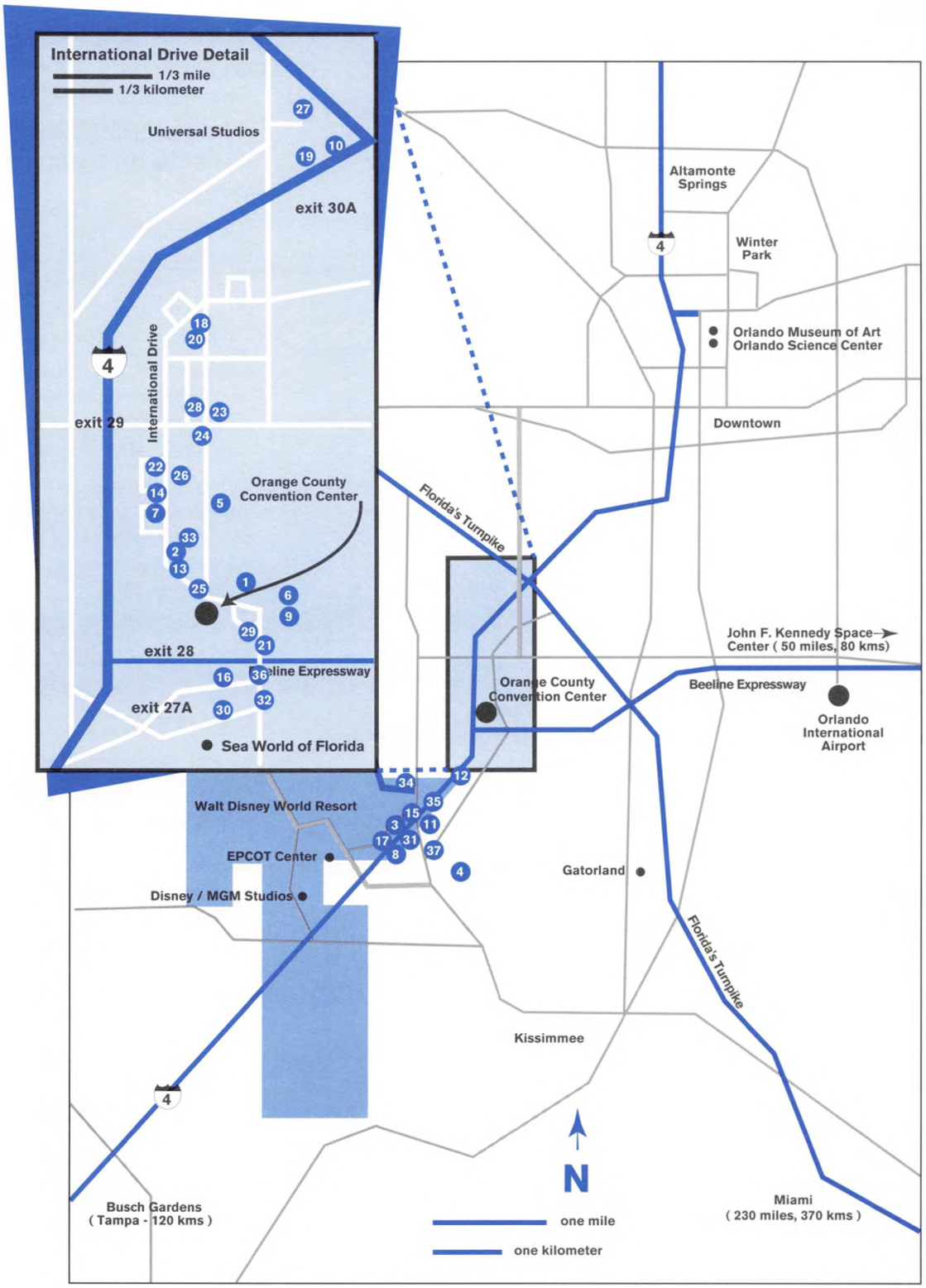
다 언어 국제운영위원회의 위원들은 SIGGRAPH 98에 관한 여러분의 모든 문의의 대답을 위해 대기하고 있습니다.

Membros poliglotas do Comitê Internacional estarão disponíveis para responder as suas perguntas e para dar informação a respeito da SIGGRAPH 98.

Члены-сотрйдники многоязычного Междйнародного комитета смогйт ответить на ваши воппосы и ппедоставить инфопмацию по SIGGRAPH 98.

Miembros multilingües del Comité Internacional están a su disposición para responder preguntas y proveer información sobre SIGGRAPH 98.

hotel map


International Drive Detail
1/3 mile
1/3 kilometer
Universal Studios
exit 30A
exit 29
International Drive
Orange County Convention Center
exit 28
Beeline Expressway
exit 27A
Sea World of Florida
Altamonte Springs
Winter Park
Orlando Museum of Art
Orlando Science Center
Downtown
Florida's Turnpike
John F. Kennedy Space Center (50 miles, 80 kms)
Orange County Convention Center
Beeline Expressway
Orlando International Airport
Walt Disney World Resort
EPCOT Center
Disney / MGM Studios
Gatorland
Kissimmee
Busch Gardens (Tampa - 120 kms)
Miami (230 miles, 370 kms)
N
one mile
one kilometer

1 **Peabody Orlando Headquarters Hotel**
9801 International Drive
Orlando, Florida 32819
+1.407.352.4000
+1.407.351.9177 fax

2 **Best Western Plaza**
8738 International Drive
Orlando, Florida 32819
+1.407.345.8195
+1.407.345.0417 fax

3 **Buena Vista Palace**
1900 Buena Vista Drive
Lake Buena Vista, Florida 32830
+1.407.827.2727
+1.407.827.6034 fax

4 **Caribe Royale Resort**
14300 International Drive
Orlando, Florida 32821
+1.407.238.8000
+1.407.238.8050 fax

5 **Castle Doubletree Hotel**
8629 International Drive
Orlando, Florida 32821
+1.407.345.1511
+1.407.248.8181 fax

6 **Country Hearth Inn**
9861 International Drive
Orlando, Florida 32819
+1.407.352.0008
+1.407.352.5449 fax

7 **Courtyard by Marriott**
1805 Hotel Plaza Boulevard
Lake Buena Vista, Florida 32830
+1.407.282.8888
+1.407.827.4623 fax

8 **Courtyard by Marriott-Walt Disney World**
8600 Austrian Court
Orlando, Florida 32821
+1.407.351.2244
+1.407.351.3306 fax

9 **Day's Inn Convention Center**
9990 International Drive
Orlando, Florida 32821
+1.407.352.8700
+1.407.363.3965 fax

10 **Delta Orlando Resort**
5715 Major Boulevard
Orlando, Florida 32819
+1.407.351.3340
+1.407.345.2872 fax

11 **Doubletree Guest Suites**
2305 Hotel Plaza Boulevard
Lake Buena Vista, Florida 32830
+1.407.934.1000
+1.407.934.1015 fax

12 **Embassy Suites Lake Buena Vista**
8100 Lake Avenue
Orlando, Florida 32836
+1.407.239.1144
+1.407.239.1718 fax

13 **Embassy Suites South**
8978 International Drive
Orlando, Florida 32819
+1.407.352.1400
+1.407.363.1120 fax

14 **Fairfield Inn**
8342 Jamaican Court
Orlando, Florida 32819
+1.407.363.1944
+1.407.363.1944 fax

15 **Grosvenor Resort**
Walt Disney World Village
1850 Hotel Pasta Boulevard
Lake Buena Vista, Florida 32830
+1.407.828.4444
+1.407.827.8230 fax

16 **Hawthorne Suites**
6435 Westwood Boulevard
Orlando, Florida 32821
+1.407.351.6600
+1.407.351.1977 fax

17 **Hilton at Walt Disney World Village**
1751 Hotel Plaza Boulevard
Lake Buena Vista, Florida 32830
+1.407.827.4000
+1.407.827.6369 fax

18 **Holiday Inn Express**
6323 International Drive
Orlando, Florida 32821
+1.407.351.4430
+1.407.345.0742 fax

19 **Holiday Inn Universal Studios**
5905 South Kirkman Road
Orlando, Florida 32819
+1.407.351.3333
+1.407.351.3577 fax

20 **Holiday Inn International Drive**
6515 International Drive
Orlando, Florida 32821
+1.407.351.3500
+1.407.351.5727 fax

21 **Howard Johnson Hotel**
9956 Hawaiian Court
Orlando, Florida 32819
+1.407.351.5100
+1.407.352.7188 fax

22 **La Quinta International**
8300 Jamaican Court
Orlando, Florida 32819
+1.407.351.1660
+1.407.351.9264 fax

23 **Marriott Residence Inn**
Residence Inn by Marriott
7975 Canada Avenue
Orlando, Florida 32819
+1.407.345.0117
+1.407.352.2689 fax

24 **Marriott Orlando**
8001 International Drive
Orlando, Florida 32819
+1.407.351.2420
+1.407.345.5611 fax

25 **Quality Inn Plaza**
9000 International Drive
Orlando, Florida 32819
+1.407.345.8585
+1.407.996.6839 fax

26 **Radisson Barcelo**
8444 International Drive
Orlando, Florida 32819
+1.407.345.0505
+1.407.352.5894 fax

27 **Radisson Twin Towers**
5780 Major Boulevard
Orlando, Florida 32819
+1.407.351.1000
+1.407.363.0106 fax

28 **Ramada Resort & Conference Center**
7400 International Drive
Orlando, Florida 32819
+1.407.351.4600
+1.407.363.0517 fax

29 **Red Roof Inn**
9922 Hawaiian Court
Orlando, Florida 32819
+1.407.352.1507
+1.407.352.5550 fax

30 **Renaissance Orlando Resort**
6677 Sea Harbor Drive
Orlando, Florida 32830
+1.407.351.5555
+1.407.351.9991 fax

31 **Royal Plaza**
1905 Hotel Plaza Boulevard
Lake Buena Vista, Florida 32830
+1.407.828.2828
+1.407.827.3977 fax

32 **Sheraton World Resort**
10100 International Drive
Orlando, Florida 32821
+1.407.345.0056
+1.407.352.3679 fax

33 **Summerfield Suites**
8480 International Drive
Orlando, Florida 32819
+1.407.352.2400
+1.407.352.4631 fax

34 **Villas of Grand Cypress**
One North Jacaranda
Orlando, Florida 32836
+1.407.239.4700
+1.407.239.7219 fax

35 **Wyndham Safari Resort**
12205 Apopka Vineland Road
Orlando, Florida 32836
+1.407.239.0444
+1.407.239.1778 fax

36 **Wynfield Inn Westwood**
6263 Westwood Boulevard
Orlando, Florida 32821
+1.407.345.8000
+1.407.345.1508 fax

37 **Orlando Marriott World Center**
8701 World Center Drive
Orlando, Florida 32821
+1.407.239.4200
+1.407.238.8777 fax

attendee services

SIGGRAPH 98 and the Orange County Convention Center offer several services during the conference to make your week more enjoyable.

Airport Shuttle
Hall B 4 Lobby

A service desk is available to make airport shuttle reservations. Return reservations should be made at least one day prior to your departure.

Attraction Ticket Desk
Hall B 1

Saturday 18 July	6 - 8 pm
Sunday 19 July	noon - 7 pm
Monday 20 July	8 am - 6 pm
Tuesday 21 July	8 am - 6 pm
Wednesday 22 July	8 am - 6 pm
Thursday 23 July	10 am - 5 pm
Friday 24 July	8 am -1 pm

SIGGRAPH 98 is providing discounted attraction tickets.

Disney
Two-day ticket includes two days of park-hopping privileges to the Magic Kingdom, Epcot, and Disney's MGM Studios. Prices: Adult-$81.75; Child-$65.50

Three-day ticket includes three days of park-hopping privileges to the Magic Kingdom, Epcot, and Disney's MGM Studios, Disney's Animal Kingdom, and one complimentary visit to Pleasure Island. Prices: Adult-$126.25; Child-$101.50

Four-day ticket includes four days of park-hopping privileges to the Magic Kingdom, Epcot, and Disney's MGM Studios, Disney's Animal Kingdom, and one complimentary visit to Pleasure Island. Prices: Adult-$158.75; Child-$126.50

Sea World
Prices: Adult-$38 (after 2 pm $27 for Adults); Child-$30

Universal Studios
Prices: Adult-$38 (after 2 pm $27.50 for Adults); Child-$30

Audio/Visual Services
Hall E 1
+1.407.248.5030

Sunday 19 July	7 am - 7 pm
Monday 20 July	7 am - 7 pm
Tuesday 21 July	7 am - 7 pm
Wednesday 22 July	7 am - 7 pm
Thursday 23 July	7 am - 7 pm
Friday 24 July	7 am - 2 pm

Direct all questions about audio/visual needs to this office. For more information on audio/visual services for speakers, see Speaker Prep Room.

Automated Teller Machines (ATMs)
There are several ATM located throughout the Orange County Convention Center.

Banks/Currency Exchange
The nearest bank to the Orange County Convention Center is Nations Bank. However, you are unable to exchange foreign currency unless you have an account there. The hotels that surround the Convention Center, Peabody Orlando, and the Omni have currency exchanges.

Bookstore
Hall F Lobby

Business Outreach Books is offering computer-graphics related books at the Orange County Convention Center during SIGGRAPH 98. Titles will also be available online after SIGGRAPH 98. See the SIGGRAPH 98 Web site for further details: www.siggraph.org/s98/

Sunday 19 July	noon - 7 pm
Monday 20 July	8 am - 6 pm
Tuesday 21 July	8 am - 6 pm
Wednesday 22 July	8 am - 6 pm
Thursday 23 July	8 am - 5 pm
Friday 24 July	8 am - 5 pm

Note: Bookstore refunds will only be processed during the conference. All bookstore policies are those of Business Outreach Books and not SIGGRAPH 98.

Busing
See Shuttle Services.

Check Room
Hall C Lobby, Hall B 4 Lobby, Hall E 1 Lobby

SIGGRAPH 98 provides complimentary luggage check services for briefcases, backpacks, and other small items during conference hours. SIGGRAPH 98 is not responsible for items left in the Check Room overnight. Items left after hours will be left unattended.

Child Care
Rooms 309, 310 A

Accent on Children's Arrangements provides age-appropriate child care activities for children from three months to 16 years of age at the Orange County Convention Center. Children must be registered for a minimum of three hours. Individualized evening child care is also available on a limited, first come, first served basis.

If you need to cancel a registration, you must call 48 hours in advance to qualify for a full refund of you child care fees. The Accent on Arrangements staff is certified in infant and child CPR. Child care services are guaranteed to be available during the following hours.

Sunday 19 July	11:30 am - 7 pm
Monday 20 July	8 am - 6 pm
Tuesday 21 July	8 am - 7 pm
Wednesday 22 July	8 am - 7 pm
Thursday 23 July	8 am - 6 pm
Friday 24 July	8 am - 6 pm

Costs: $8.50 per hour for children over 30 months; $10.50 per hour for children 30 months and under. One-time registration and processing fee: $10 per family.

Fees include snacks and beverages in the morning and afternoon for children over 30 months. Parents are responsible for their children's main meals.

Computer Animation Festival Office
Room 315 A
+1.407.248.4050

Contributors can gather here to exchange ideas, leave messages, or discuss questions and concerns.

Conference Management Office
Room 206
+1.407.248.5050

If you have questions regarding SIGGRAPH 98, call or stop by this office at anytime.

Exhibition Management Office
Room 209 C
+1.407.248.5040

If you have questions regarding the SIGGRAPH 98 Exhibition, feel free to call or visit a staff member here.

Exhibitor Registration
Hall B 2

Exhibitors should pick up their badges at the exhibitor registration counter, which is open during registration hours. See Registration.

First Aid Offices
Outside Room 231
+1.407.248.9848

Hall C Lobby
+1.407.248.9808

A nurse or paramedic is on duty at the first aid areas.

Food Services
The Orange County Convention Center operates several food concession for the convenience of SIGGRAPH 98 attendees. Food carts and casual seating, are available throughout the convention center including CAFFEINE++ in Hall C and two restaurants on the exhibit floor in Halls B 1 and Hall E 1.

Hall C Offices
(Art Gallery: Touchware, Digital Pavilions, Enhanced Realities, sigKIDS)
+1.407.248.5016

Information Desks
Hall B 1 Lobby, Hall C Lobby, Hall F Lobby

For answers to your questions about SIGGRAPH 98, stop by the information desks. They can provide information on conference programs and events and Orlando-related questions.

International Services
Hall C Lobby
+1.407.248.4060

In the International Center members of the SIGGRAPH 98 International Committee and a multi-lingual staff of student volunteers are available to help international attendees take full advantage of all the programs and events, and the Exhibition. Look for the student volunteers with yellow vests and flags indicating their language fluency.

Internet Access Centers

Hall C, Room 231

Two fully networked areas in the OCCC provide complete Internet access. The Internet Access Centers are available to all attendees during registration hours beginning Sunday, 19 July.

Lost and Found Security

After the conference, all items will be turned over to the OCCC security office. To inquire about lost items during and after the conference, call OCCC security at +1.407.345.9828 (or extension 9828 from any OCCC house phone). Lost registration badges will be located in Special Assistance, Hall B 1.

Merchandise Fulfillment Center

Hall B 1

Your conference documentation (included with registration) must be picked up at the Fulfillment Center:

Technical materials and conference documentation will not be shipped, nor will refunds be given for any material that is not picked up at the conference.

Saturday 18 July	6 - 8 pm
Sunday 19 July	noon - 7 pm
Monday 20 July	8 am - 6 pm
Tuesday 21 July	8 am - 6 pm
Wednesday 22 July	8 am - 6 pm
Thursday 23 July	8 am - 5 pm
Friday 24 July	8 am - 1 pm

Technical Material Sold After the Conference

SIGGRAPH 98 Conference Proceedings contains the permanent record of the technical papers and panels program from SIGGRAPH 98.

SIGGRAPH 98 Proceedings CD-ROM contains the electronic version of the conference proceedings, including papers, images, and additional material not found in the printed version including QuickTime movies and extended versions of papers.

SIGGRAPH 98 Conference Proceedings Videotape contains videotape supplements to technical papers and panels.

SIGGRAPH 98 Conference Abstracts & Applications and CD-ROM contains the permanent record of images from Digital Pavilions, Educators Program, Enhanced Realities, Interactive Dance Club, Panels, sigKIDS Art, Sketches (Technical; Applications; Art, Design, and Multimedia; and Animation) and the SPACE Electronic Gallery.

SIGGRAPH 98 Electronic Art & Animation Catalog and CD-ROM contains images from The Art Gallery: Touchware, Computer Animation Festival, and sigKIDS Animations.

SIGGRAPH 98 Course Notes CD-ROM contains the electronic version of the course notes.

SIGGRAPH 98 Video Review contains animation's presented in the Electronic Theater and Animation Theaters.

To order, contact:
ACM Order Department
P.O. Box 12114
Church Street Station
New York, New York 10257 USA
800.342.6626
+1.212.626.0500
+1.212.944.1318 fax
orders@acm.org

Message Center

Hall C Lobby
+1.407.248.5000

The message center is located in the Hall C Lobby of the OCCC. Here you will find kiosks corresponding to each letter of the alphabet. You may leave a note for a friend pinned to one of the kiosks.

Orange County Convention Center

9800 International Drive
Orlando, Florida 32819
+1.407.345.9800

- **Accessibility**

The convention center is wheel-chair accessible. It has no curbs, and there are elevators to the upper levels. Wheelchairs are available for use in the OCCC at no charge. They may be checked out with an ID at any OCCC information desk. If you need a wheelchair for use outside the OCCC, call Randy's Mobility: +1.407.855.6562.

- **Kinko's Business Center**

There is a business center located in the Hall C Lobby. A variety of services are offered by the Business Center including:

- Computer time rental
- Faxing services
- Photocopying
- Shipping services
- Special finishing services (including hand stapling, collating, folding, binding and reduction/enlargement).

The business center also sells office supplies (including folders, scissors, paper clips, rubber bands, pencils, packing tape, paper, pens, glue, computer disks, transparencies and more). Business center hours are 8 am - 5:30 pm. Limited business services (faxing and copying) are also offered at the shipping desk in Hall B 1 and outside Hall E (9 am - 4 pm, Sunday - Friday)

- **Parking**

SIGGRAPH 98 attendees can park at the Orange County Convention Center for $5 per day.

Pathfinders
Hall B 1

A volunteer project dedicated to providing assistance to first-time SIGGRAPH conference attendees. Let us help you navigate your way through SIGGRAPH 98. Feedback always welcome at: pathfinders@siggraph.org

Registration (Advance & Onsite)
Hall B 1

Saturday 18 July	6 - 8 pm
Sunday 19 July	noon - 7 pm
Monday 20 July	8 am - 6 pm
Tuesday 21 July	8 am - 6 pm
Wednesday 22 July	8 am - 6 pm
Thursday 23 July	8 am - 5 pm
Friday 24 July	8 am - 1 pm

Restaurant Information Desks
Hall D 2 Lobby

There desks are staffed with individuals happy to assist you in making reservations at local Orlando restaurants. These desks are open during registration hours. The Restaurant Information desk is closed on Saturday.

Shipping Desk
Hall B 1

Staff can assist you in shipping your merchandise, course notes, and other conference materials. For your convenience, the shipping desk provides next-day air, second-day air, and regular ground shipping services to destinations throughout the world. The shipping desk is open during registration hours. You can also ship using the same services from the Kinko's Business Centers located in Hall C Lobby (8 am - 5:30 pm, Saturday - Friday) and outside Hall E (9 am - 4 pm, Sunday - Friday).

Shuttle Service
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Orange County Convention Center Shuttle Hours

Saturday 18 July	5 - 8:30 pm
Sunday 19 July	10 am - 7:30 pm
Monday 20 July	7:30 am - 9:30 pm
Tuesday 21 July	7:30 am - midnight
Wednesday 22 July	7:30 am - midnight
Thursday 23 July	7:30 am - midnight
Friday 24 July	7:30 am - 6 pm

SIGGRAPH 98 provides complimentary shuttle service between most conference hotels and the Orange County Convention Center. Look for signs and flyers indicating pick up times and locations at your hotel. Please note: Monday-Thursday there will be a very limited number of buses available from 9:30 pm - 1 am to transport attendees to and from the Interactive Dance Club.

If you have any shuttle questions contact the Shuttle Service directly during official shuttle hours. Also, for assistance with handicap service, please call +1.407.851.5222. SIGGRAPH 98 provides buses with wheelchair lifts and tiedowns.

Orange County Convention Center Shuttles to Receptions

Course Reception
Renaissance Orlando Resort Pool
6677 Sea Harbor Drive
+1.407.351.5555
Monday 20 July 8 - 11 pm

25th Celebration Party
Hosted by SIGGRAPH 98, SIGGRAPH Professional Chapters, and friends
Wide World of Sports Complex at Walt Disney World
Wednesday 22 July 9 pm - 1 am

Papers/Panels Reception
Orlando Science Center
777 East Princeton Street
+1.407.514.2000
Thursday 23 July 8 - 11 pm

Coaches begin shuttling from all hotels and the OCCC 30 minutes before the receptions start. The last coach departs 15 minutes after the receptions close. Attendees who are staying at the Peabody Hotel should ride Route 4.

SIGGRAPH Store
Room 207

The store is for casual browsers and serious shoppers. Stop by to purchase additional technical materials plus gifts (t-shirts, baseball shirts, baseball caps, calendars, trading cards, juggling balls, umbrellas) for your family, co-workers, and yourself. Technical material and conference documentation are available for purchase at the store. SIGGRAPH 98 merchandise is available on a first-come, first-serve basis.

Merchandise vouchers are only valid in the Fulfillment Center located in Hall B1 of OCCC.

Saturday 18 July	6 - 8 pm
Sunday 19 July	noon - 7 pm
Monday 20 July	8 am - 6 pm
Tuesday 21 July	8 am - 6 pm
Wednesday 22 July	8 am - 6 pm
Thursday 23 July	8 am - 5 pm
Friday 24 July	8 am - 1 pm

Speaker Prep Room
Room 232
+1.407.248.4044

Saturday 18 July	2 - 8 pm
Sunday 19 July	7 am - 7 pm
Monday 20 July	7 am - 7 pm
Tuesday 21 July	7 am - 7 pm
Wednesday 22 July	7 am - 7 pm
Thursday 23 July	7 am - 7 pm
Friday 24 July	7 am - 2 pm

- All speakers must check in at the Speaker Prep Room at least 24 hours before their presentation.
- Speakers and contributors should use the contributor registration desk in Hall B 1 to pick up registration credentials and obtain conference information.
- Speaker ribbons and badge holders are available only in the Speaker Prep Room.
- Speakers may use the Speaker Prep Room to prepare for their presentation, preview slides and videotapes, sort slides, and obtain slide carousels.
- Changes in audio/visual equipment needs in presentation rooms should be directed to the Speaker Prep Room.

Special Assistance Desk

Hall B 1 (Registration Area)
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Staff members at the special assistance desk help attendees resolve a wide range of possible problems and concerns, including:

- Credit card problems (validations, errors)
- Lost badges
- Registration corrections and upgrades
- Substitute registration (only if authorized on company letterhead)

Special Policies

- Conference registration in any category is limited to ages 13 and older.
- Children under 16 are not permitted in the Exhibition.
- No cameras or recording devices are permitted at SIGGRAPH 98.
- SIGGRAPH 98 may record all, or portions of, conference programs and events.

Ticket Purchases and Exchanges Counter

Hall B 1

Electronic Theater Tickets

One ticket per person is included with Full Conference and Conference Select registrants. Every attempt is made to accommodate your requested Electronic Theater evening. If you would like to exchange your ticket, you may do so at this counter based on availability. All performances contain the same material.

Badged attendees may purchase up to two Electronic Theater tickets (subject to availability) at Onsite Registration in Hall B 1 beginning at 6 pm Saturday, 18 July. Last-minute tickets are generally available. They will be sold at the door to the Electronic Theater one hour prior to showtime. All sales are final.

Reception Tickets

Course and Papers/Panels reception tickets are also available for sale at this counter. Cost is $45 per person, per reception. All sales are final.

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Conference Management Office
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Exhibition Management Office
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First Aid Offices
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exhibition

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Startup Park

Exclusively reserved for small, first-time exhibitors who are introducing their technologies to the SIGGRAPH audience. Many of the companies that dominated the computer graphics industry did not exist 10 years ago. Startup Park presents the products and services that could dominate the SIGGRAPH 2002 Exhibition.

Locations

Hall B 1 - 4
Hall D 1 - 2
Hall E 1

Days	Hours
Tuesday 21 July	10 am - 6 pm
Wednesday 22 July	10 am - 6 pm
Thursday 23 July	10 am - 5 pm

Exhibits Plus Registration

With Exhibits Plus, you receive admission to the Exhibition, Startup Park, Art Gallery: Touchware, Animation Theaters, Digital Pavilions, Enhanced Realities, Interactive Dance Club, sigKIDS, Special Sessions/Evening, Career Services, Fundamentals Seminar, International Services, Internet Access Centers, Keynote Address/Awards, Special Interest Groups & Birds of a Feather, 25th Conference Recognition Ceremony, 25th Celebration Party, and the Welcome Reception. Exhibits Plus registration is non-refundable.

Space Reservation

To purchase exhibition space for SIGGRAPH 99, call or write:

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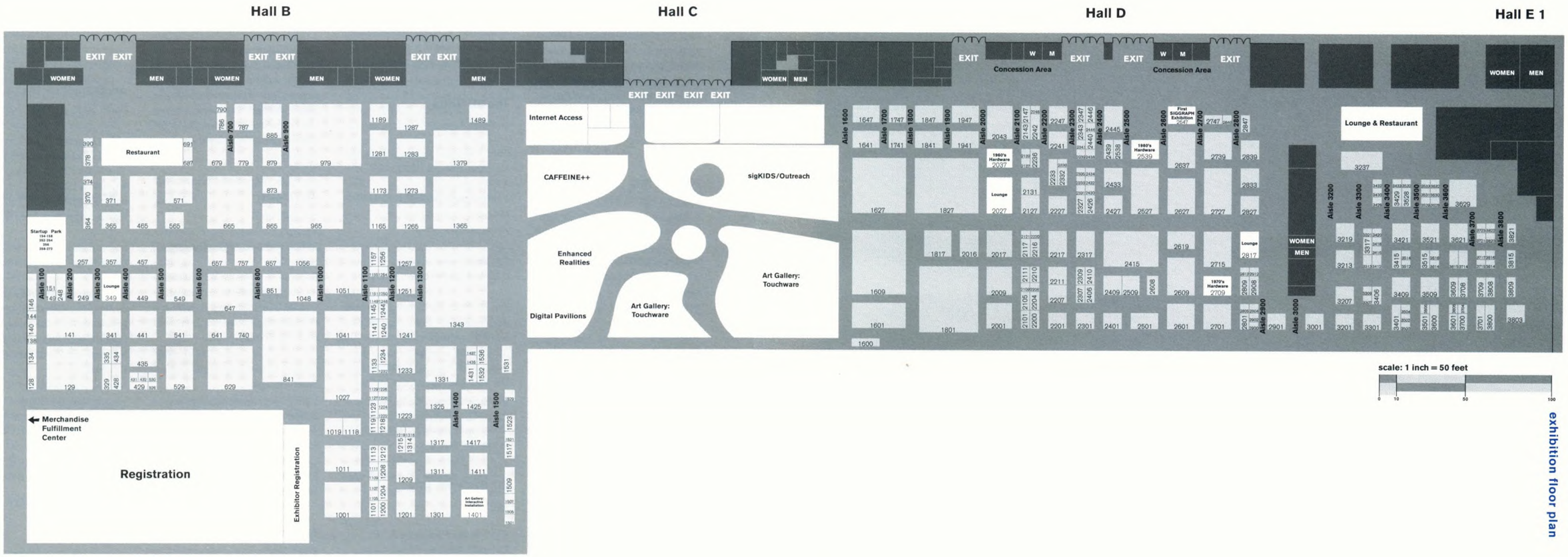
Please fold out for exhibition hall floor plan

exhibition floor plan



exhibition floor plan

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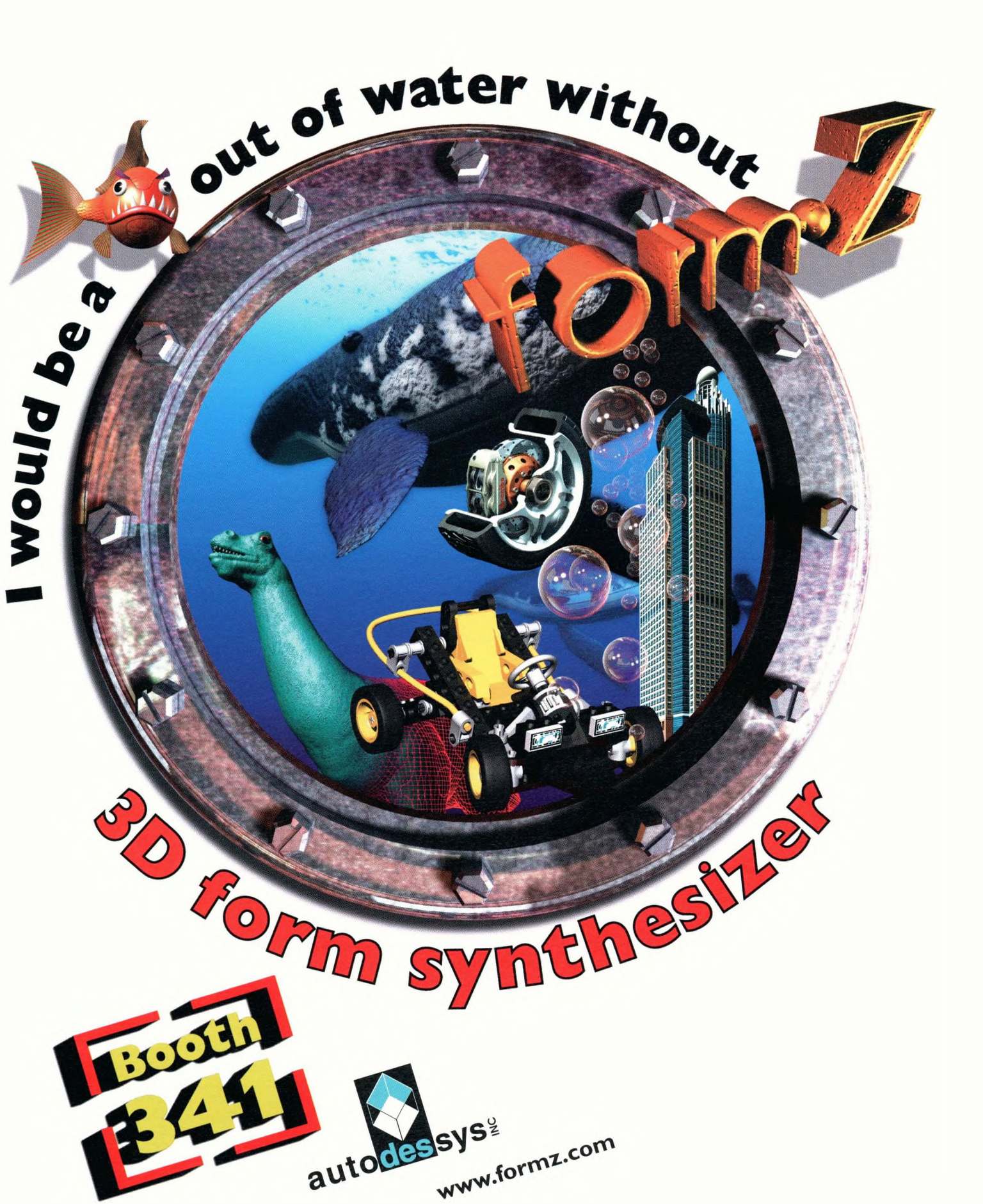

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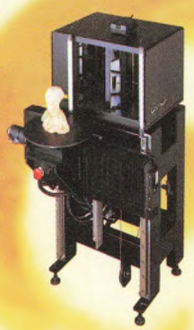

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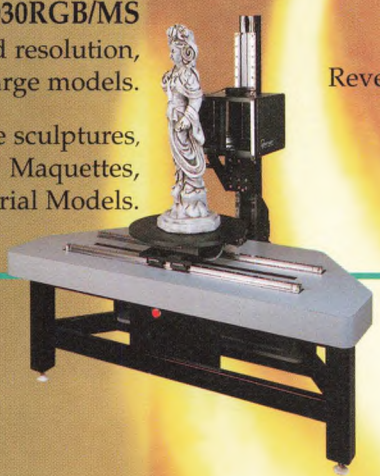

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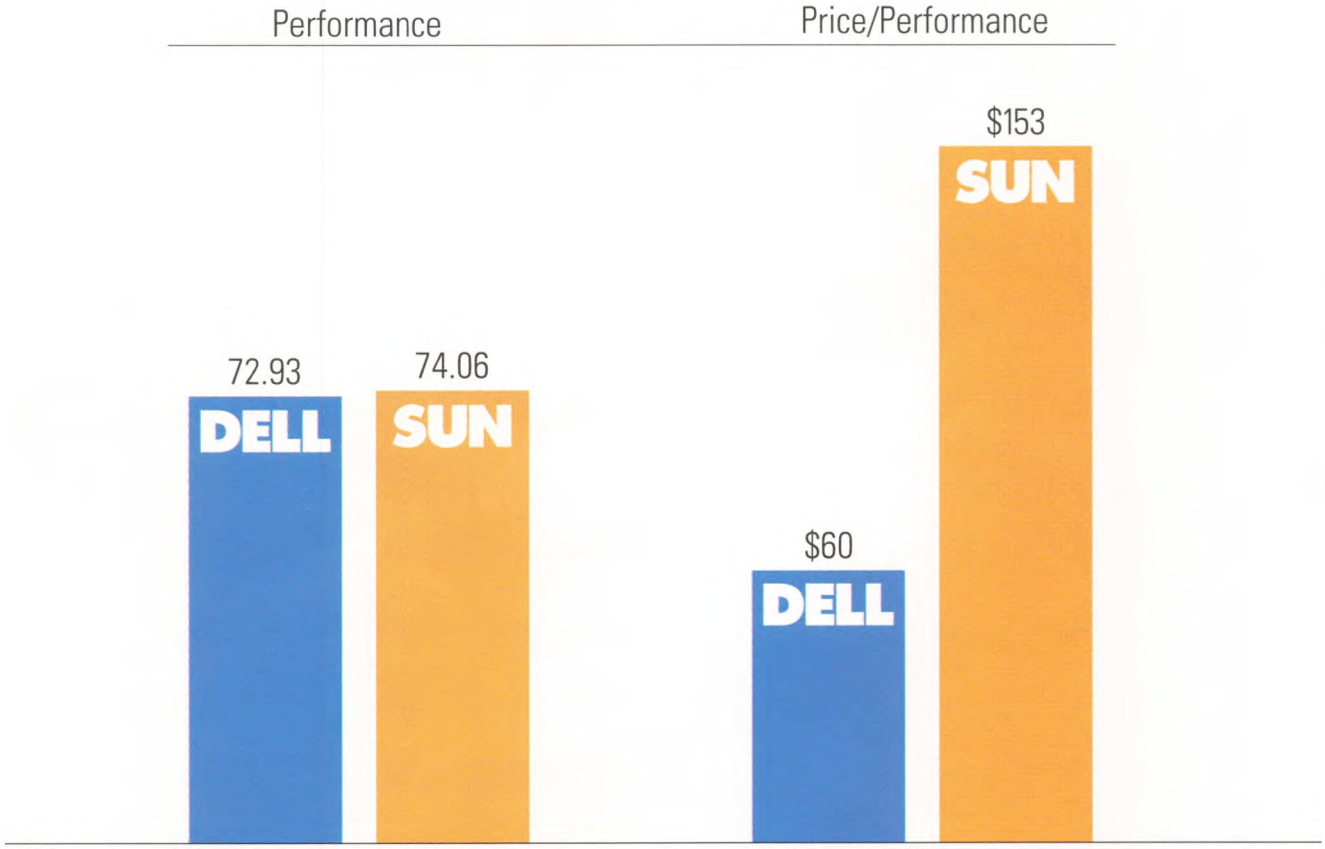

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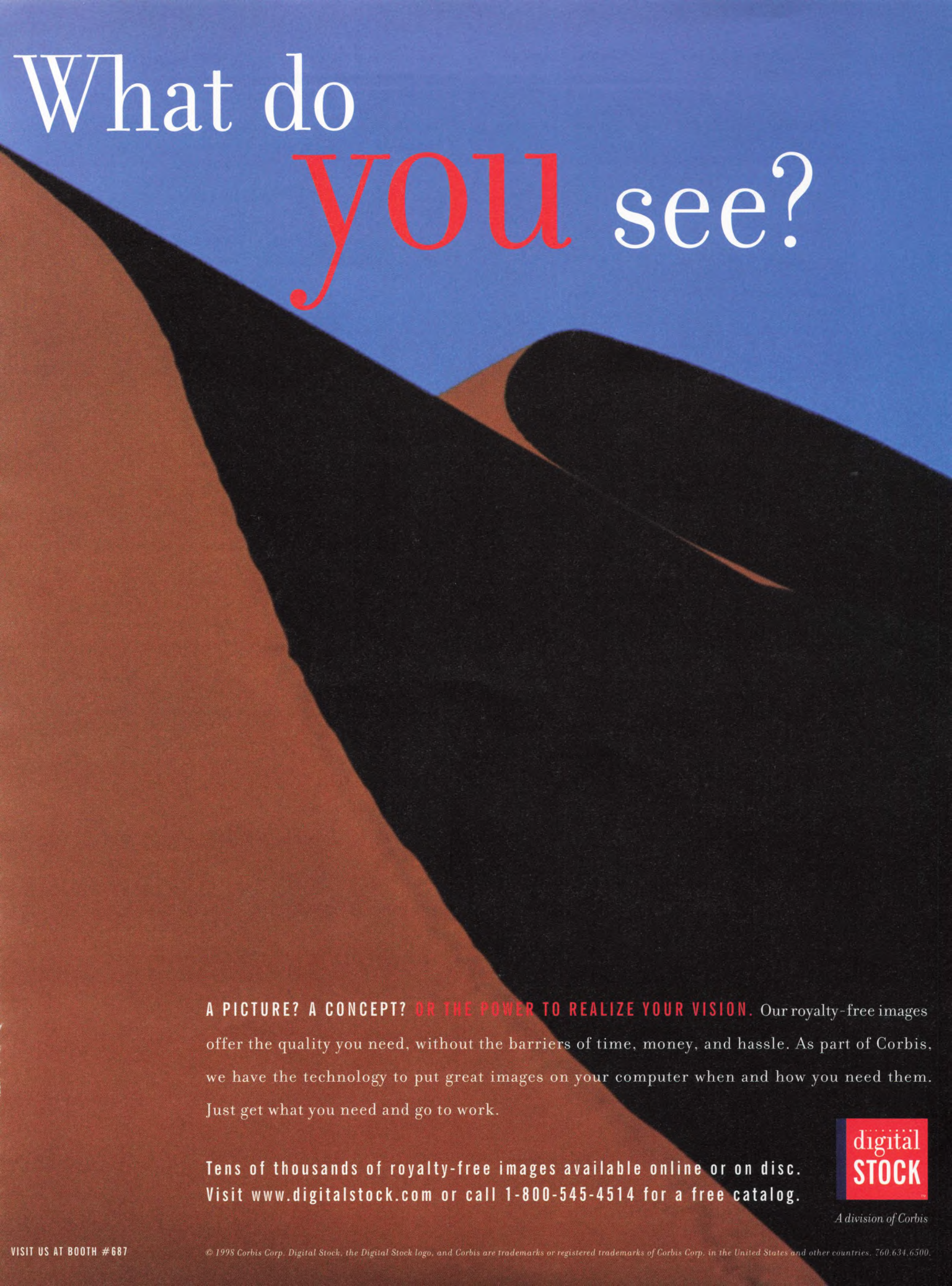
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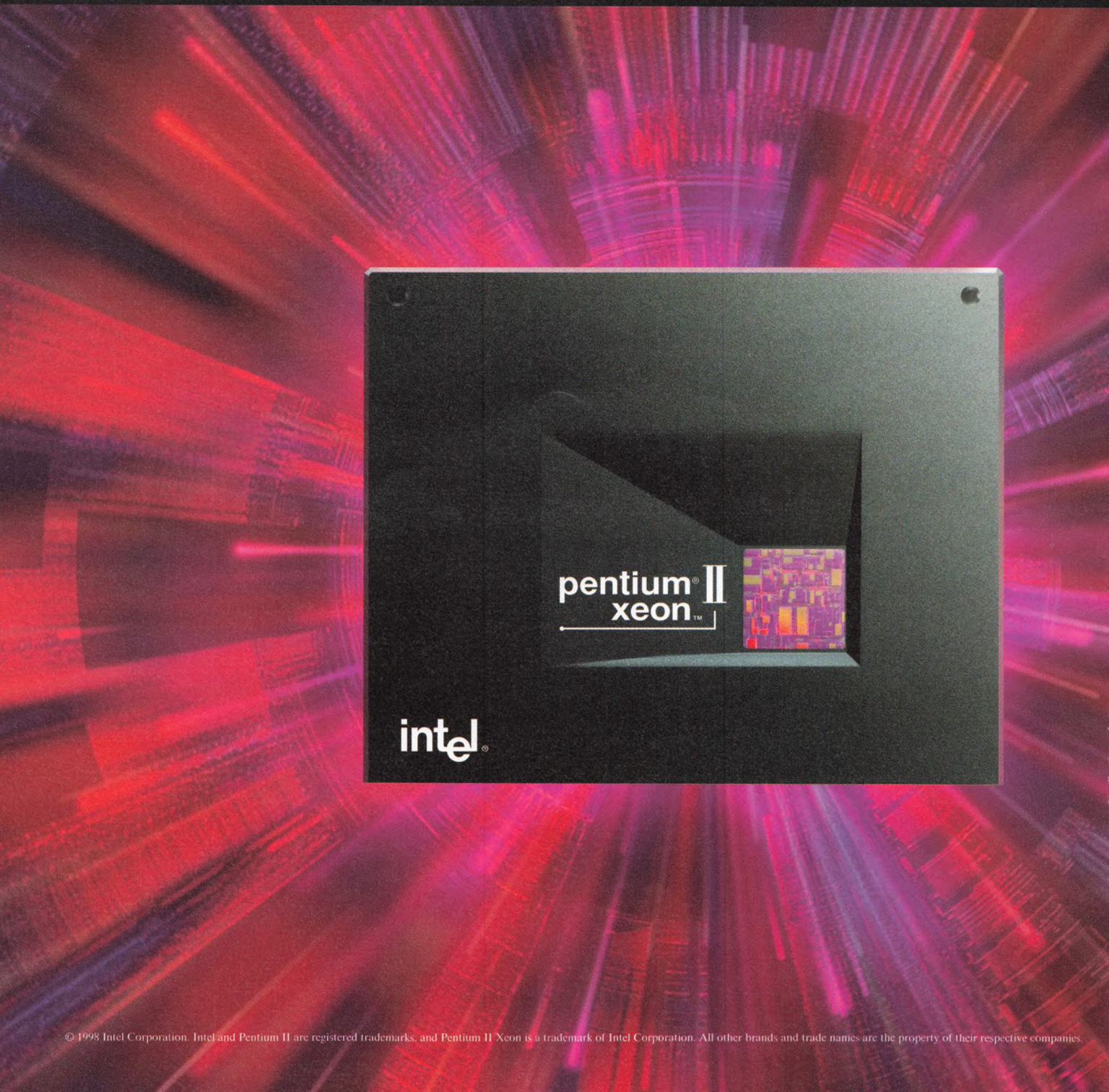

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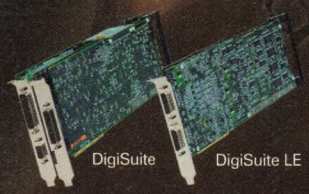

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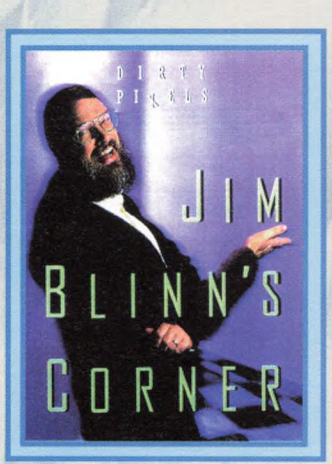

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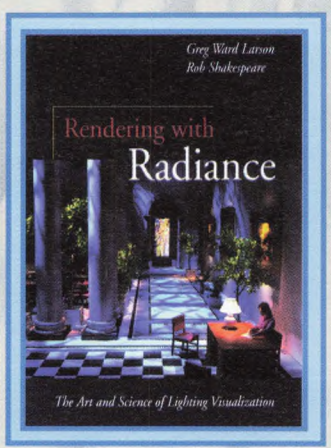

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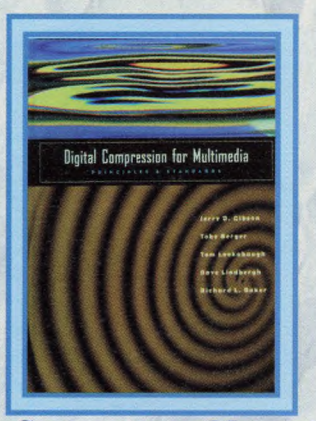

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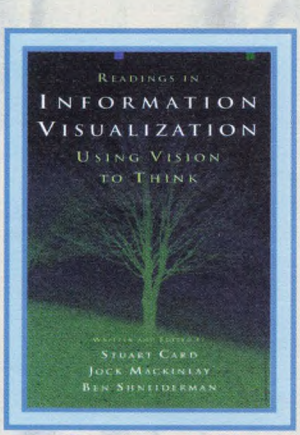

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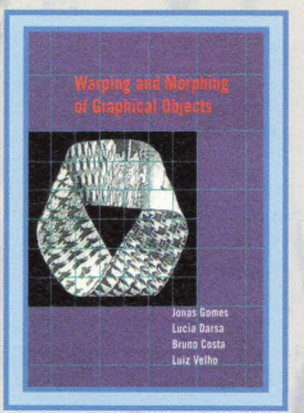

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Monika Moravan
Marketing Manager

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Jim Aneshansley
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Daryl Manning
Marketing Communications Director

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Steve Risenhoover
Principal Systems Engineer

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Renée Lamri
Events Manager

Pixar demonstrates MTOR, their new Maya-to-RenderMan plug-in. Pixar is also acccepting applications for Technical Directors and Programmers. Detailed information on Pixar products and career opportunities are available at the Pixar booth.

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Post Digital Software develops and markets graphics software for professionals working in digital video and film. The company's offerings include the Roto professional painting, rotoscoping, and special-effects program for desktop computers.

Post Magazine, Advanstar Communications

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Associate Publisher and Editorial Director

Post is the magazine for post and production professionals interested in the latest techniques and technologies employed in high-end animation, graphics, compositing, editing, sound design, and audio post work.

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Yoly Casaprima
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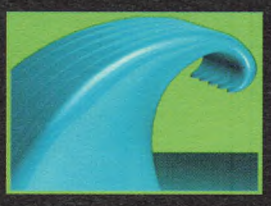

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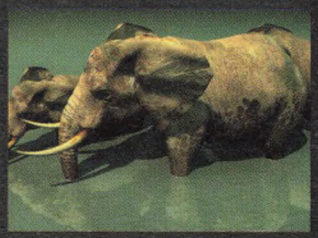

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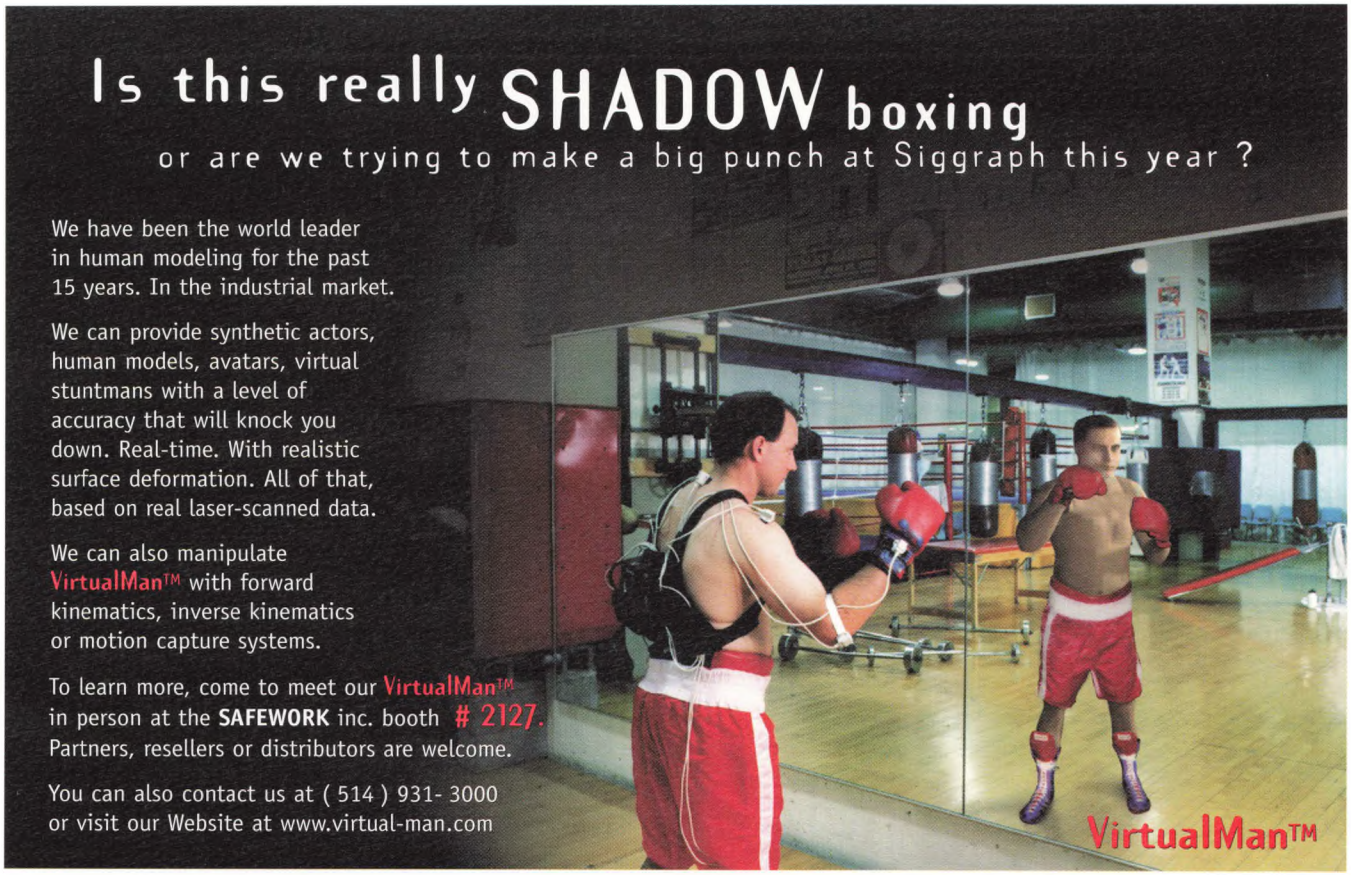

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Tradeshow Coordinator

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Hank Larabell
CEO

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Silicon Grail

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Screen Actors Guild?

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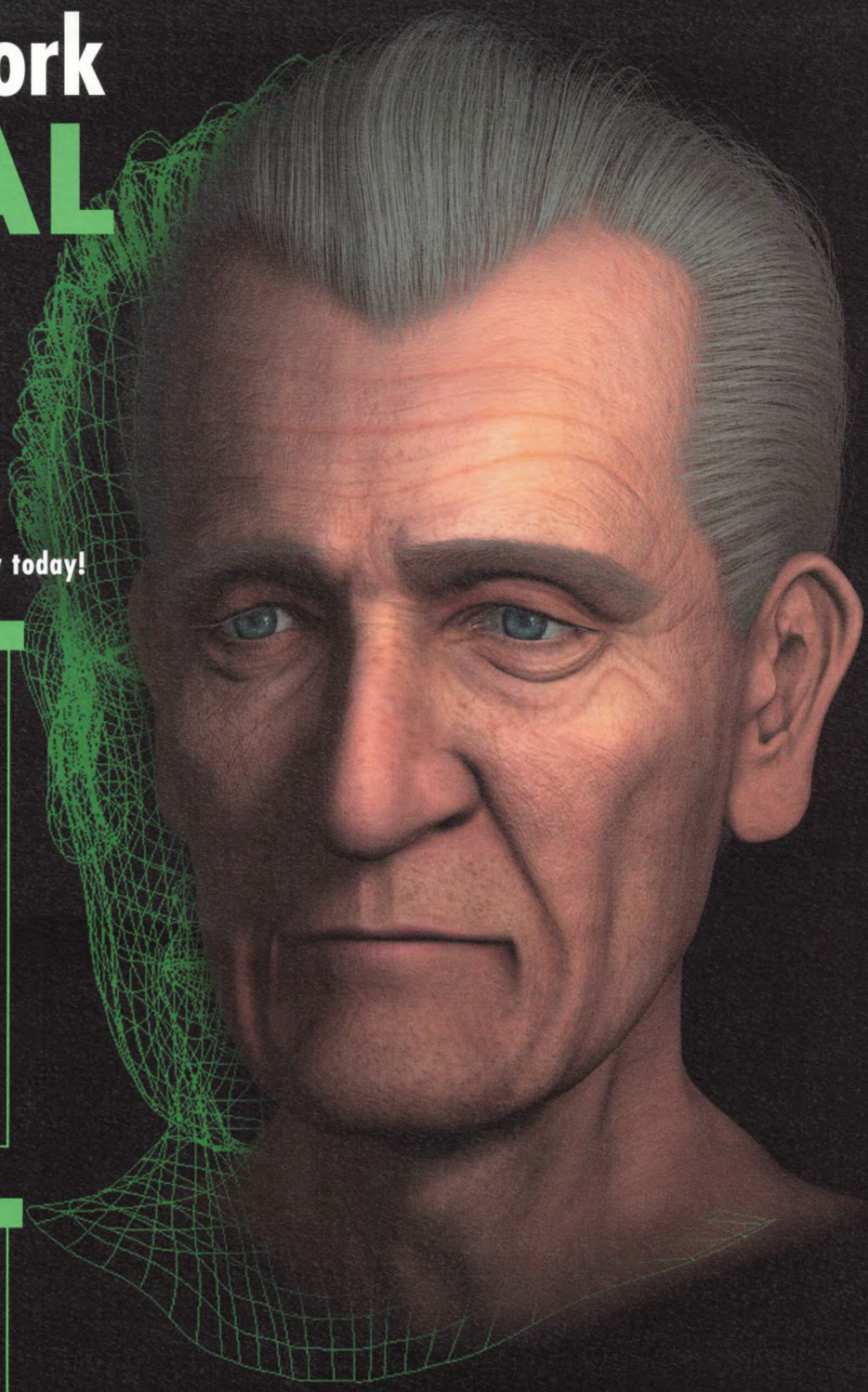

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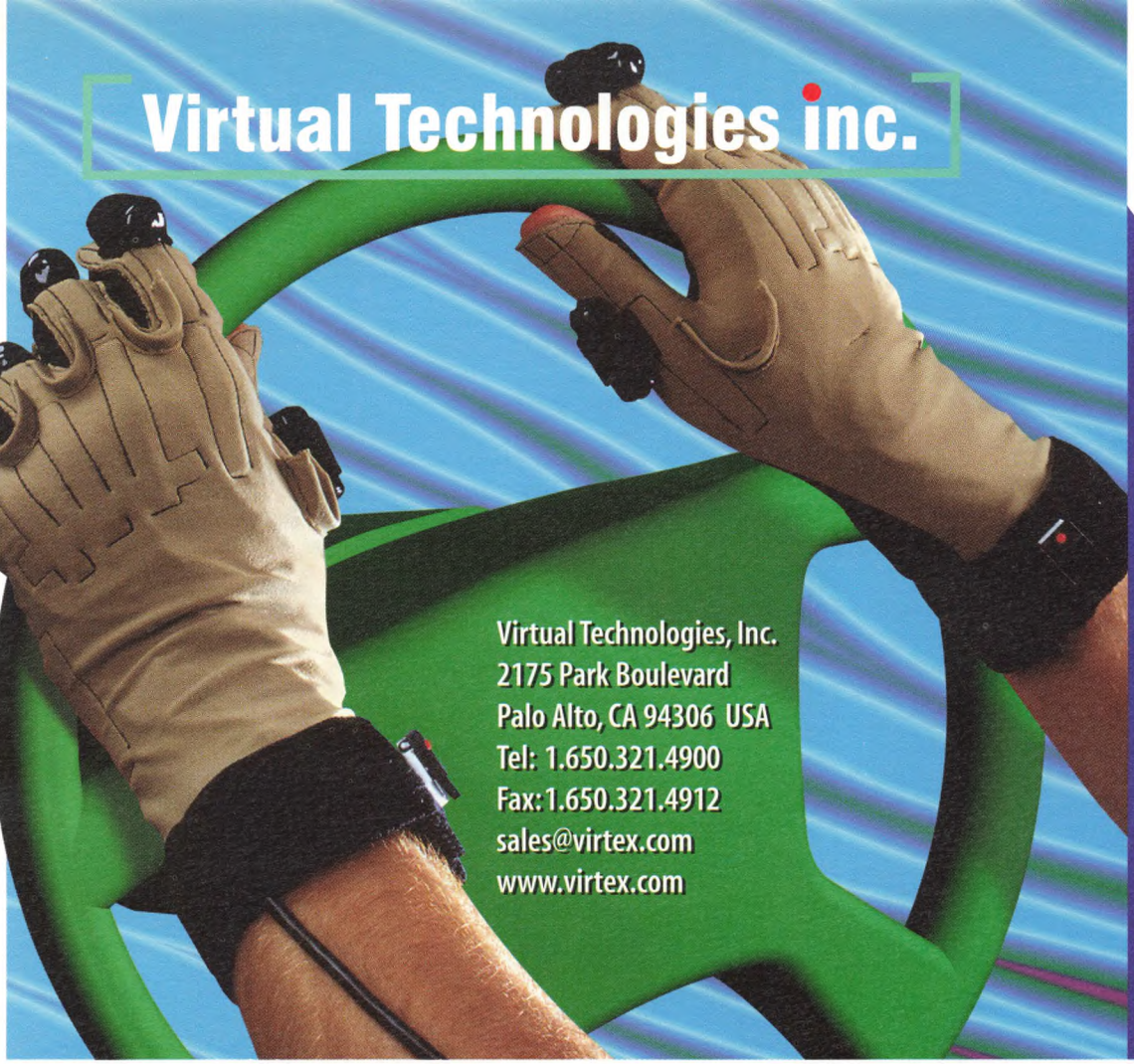

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Animation
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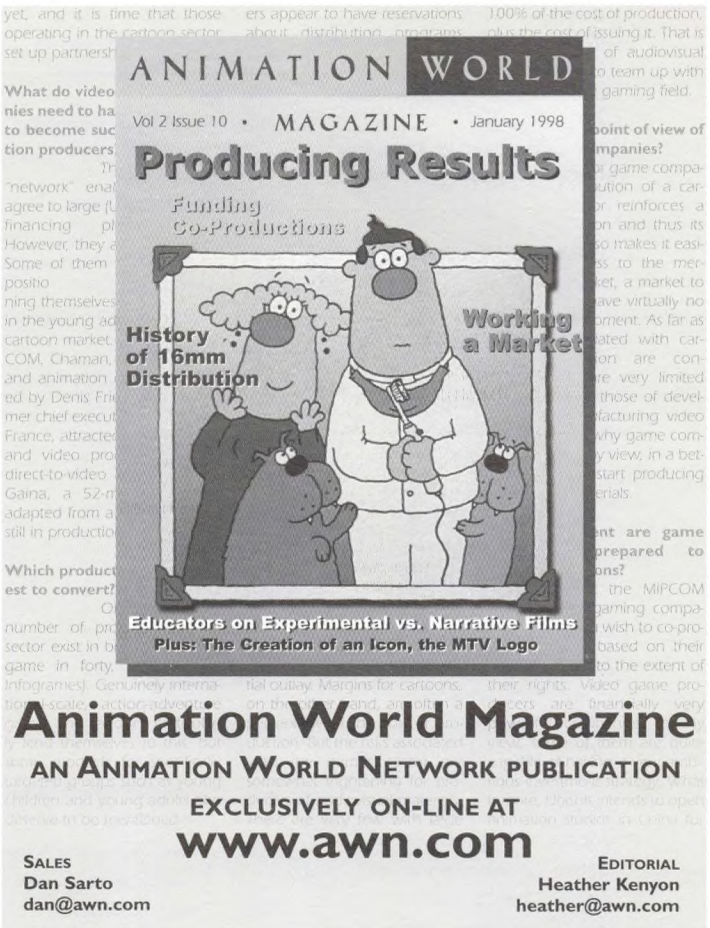

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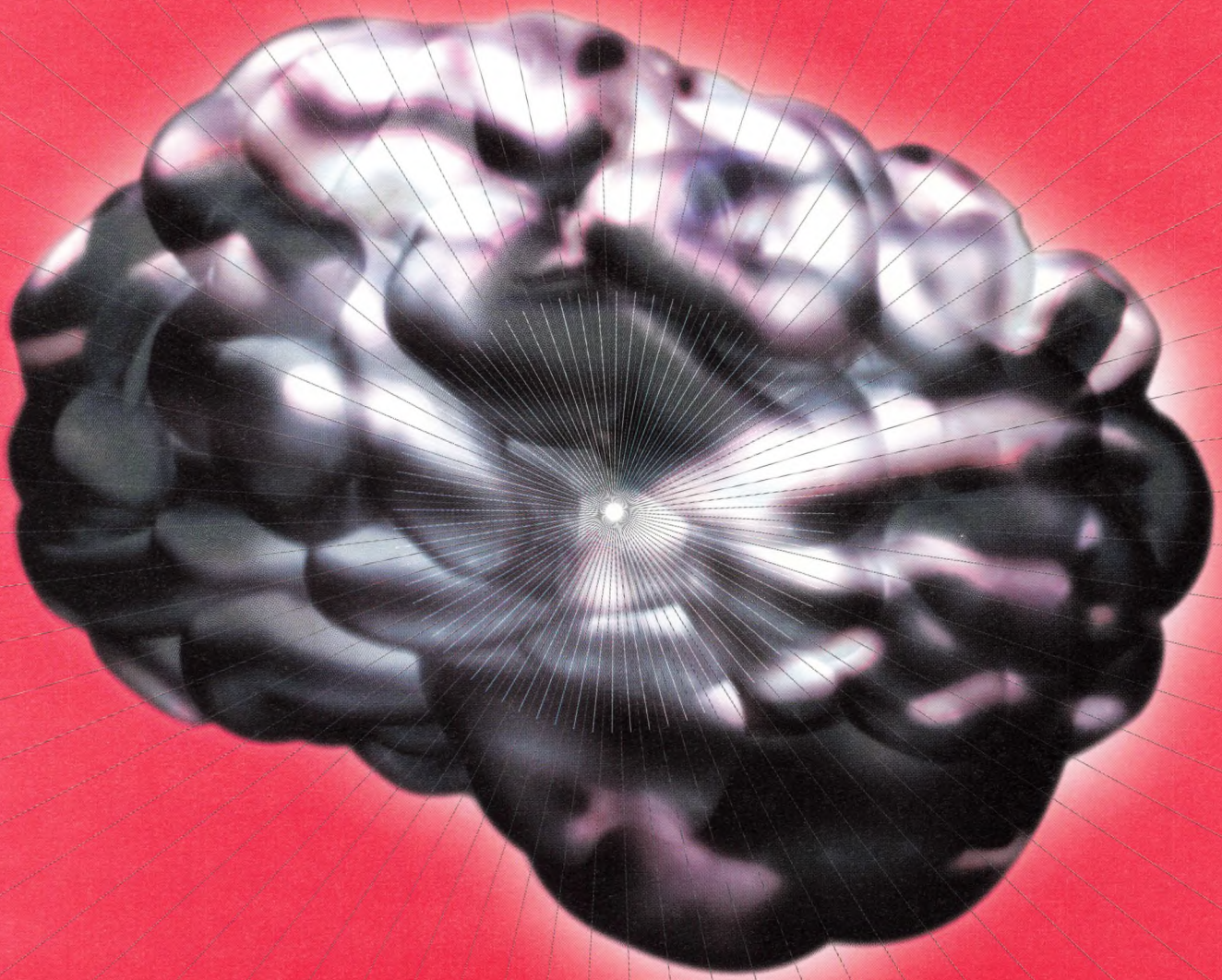

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2538	DVS Digital Video Systems
2805	Elsevier Science
2415	Evans & Sutherland Computer Corporation
140	Haptic Technologies Inc.
1041	Hewlett-Packard Company
3514	In-Harmony Technology Corporation
665	Intergraph Computer Systems
740	LightWork Design
2327	Maxon/3D Gear
2439	MMS Multi Media Systems
1257	Nichimen Graphics, Inc.
1244	Numerical Algorithms Group Inc.
2247	n-Vision, Inc.
1212	NVision, Inc.
2438	Onyx Computing, Inc.
1431	PixelFusion
2839	Pyramid Systems, Inc.
146	Questar Productions
268/3500	Raindrop Geomagic
1532	Reality by Design
144	Research Systems
2127	Safework inc.
3321	Scientific Placement Inc.
1609/1627	Silicon Graphics, Inc.
1149	SMPTE
3723	Solid Modeling Solutions
841	Sun Microsystems, Inc.
3708	Sven Technologies
1600	Texas Memory Systems
2143	Toyobo Co., Ltd.
1501	Trinity Animation, Inc.
2121	Virtual Research Systems/Sense 8 Corporation
3601	Virtual Technologies, Inc.
3432	Volume Graphics GmbH
2904	Voxar
3512	Western Micro Technology

GIS/mapping
GIS/mapeo
GIS/cartografia
GIS/지도처리
GIS/Kartographie
GIS/mappage
GIS/マッピング
GIS/mapeamento

Booth	
2434	3D Construction Company
357	Advanced Visual Systems
571	Autometric, Inc.
3715	Bordeaux Region Development Agency (BRA)
873	Chromatek Inc.
2236	CIRAD
371	Diamond Multimedia
272	Dot C Software, Inc.
140	Haptic Technologies Inc.
1041	Hewlett-Packard Company
665	Intergraph Computer Systems
2332	Journey Education Marketing
1244	Numerical Algorithms Group Inc.
2438	Onyx Computing, Inc.
1431	PixelFusion
2017	Polhemus, Incorporated
146	Questar Productions
268/3500	Raindrop Geomagic
144	Research Systems
841	Sun Microsystems, Inc.
3708	Sven Technologies
3504	TerraSim, Inc.
249	Tri-Star Computer
2121	Virtual Research Systems/Sense 8 Corporation
2904	Voxar
3512	Western Micro Technology
1119	John Wiley & Sons

Graphic art/design systems
Sistemas de arte/diseno gráfico
Sistemi di arti grafiche/disegno
그래픽 예술/디자인 시스템
Graphik- und Designsysteme
Systémes d´árt graphique et de conception
グラフィック - アート／デザイン システム
Sistemas de desenho e arte gráficos

Booth	
2434	3D Construction Company
129	Adobe Systems
370	Alien Skin Software
3317	AnimaTek International Inc.
341	auto.des.sys, Inc.
364	AutoMedia Ltd.
1379	Avid Technology, Inc.
1107	BIG MAC/W.C.N.
1223	Caligari Corporation
528	Centre NAD Center
134	Chroma Graphics
873	Chromatek Inc.
1233	Chyron Corporation
3406	The Coriolis Group
371	Diamond Multimedia
3418	DigiEffects
687	Digital Stock
2727	Discreet Logic
272	Dot C Software, Inc.
2009	Fujitsu Microelectronics, Inc.
140	Haptic Technologies Inc.
1041	Hewlett-Packard Company
965	IBM Corporation
1827/3412	Imageware Corporation
3514	In-Harmony Technology Corporation
979	Intel Corporation
665	Intergraph Computer Systems
1257	Nichimen Graphics, Inc.
2438	Onyx Computing, Inc.
1431	PixelFusion
1019	Puffin Designs
2637	Quantel Inc.
1417	REM Infografica, SA
1609/1627	Silicon Graphics, Inc.
1947	STB Systems, Inc./Symmetric
2901	Storage Concepts
841	Sun Microsystems, Inc.
3708	Sven Technologies
3629	TechImage, Ltd.
2619	TGS, Inc.
2143	Toyobo Co., Ltd.
249	Tri-Star Computer
549	Viewpoint DataLabs
2904	Voxar
2217	Wacom Technology Corporation

Graphics accelerator boards
Tableros de aceleración de gráficas
Boards per acceleratori grafici
그래픽 가속장치
Beschleunigungsplatte für Graphiken
Cartes accélératrices de graphiques
グラフィック - アクセレレータ - ボード
Cartao de acelerçao de gráficos

Booth	
1165	3Dlabs, Inc.
1265	
151	The 3D Shop
2609	AccelGraphics Inc.
2445	Advanced Rendering Technology
2301	Advanstar Digital Media Group
434	Appian Graphics
1107	BIG MAC/W.C.N.
1343	Compaq Computer Corporation
2227	Computer Graphics World
371	Diamond Multimedia
2401	Dynamic Pictures, Inc.
1817	ELSA Inc.
2415	Evans & Sutherland Computer Corporation
2009	Fujitsu Microelectronics, Inc.
665	Intergraph Computer Systems
378	Leadtek Research Inc.
2739	Matrox Graphics Inc.
1431	PixelFusion
3621	Real 3D
3321	Scientific Placement Inc.
1947	STB Systems, Inc./Symmetric
841	Sun Microsystems, Inc.
249	Tri-Star Computer
2131	Videonics, Inc.

Graphics standard software
Programas de normas gráficas
Software per grafici standard
그래픽 표준화 소프트웨어
Graphik-Standard-Software
Logiciel de normes graphiques
グラフィック - スタンダード ソフトウエア
Software padronizado de gráficos

Booth	
129	Adobe Systems
2301	Advanstar Digital Media Group
364	AutoMedia Ltd.
1379	Avid Technology, Inc.
1107	BIG MAC/W.C.N.
3715	Bordeaux Region Development Agency (BRA)
1223	Caligari Corporation
1343	Compaq Computer Corporation
272	Dot C Software, Inc.
2009	Fujitsu Microelectronics, Inc.
2327	Maxon/3D Gear
529	MetaCreations Corporation
1244	Numerical Algorithms Group, Inc.
3321	Scientific Placement Inc.
841	Sun Microsystems, Inc.
3629	TechImage, Ltd.
2619	TGS, Inc.
249	Tri-Star Computer
3432	Volume Graphics GmbH

Hardcopy devices; photographs/ slides
Aparatos de impresión; forografías/diapositivas
Didpositivi per documenti stampati; fotografie/ diapositive
복사장치: 사진/슬라이드
Hardcopygeräte; Fotografien/ Dias Teprograhes; photograhies/ diapositives
ハードコピー装置：写真／スライド
Dispositivos de cópia: fotos/diapsitivos

Booth	
1107	BIG MAC/W.C.N.
1218	CELCO
3429	Upgrade Technology

Hardcopy devices; printers/plotters
Aparatos de impresión; impresores trazadores
Didpositivi per documenti stampati;Stamponti/diagram matori
복사장치: 프린터/플로터
Hardcopygeräte; Druker/ Planzeichner, -schreiber
Reprographes; imprimantes, traceurs
ハードコピー装置：プリンター／プロッター
Dispositivos de cópia: impressoras/ traçadoras

Booth	
1107	BIG MAC/W.C.N.
329	Roland DGA Corporation
841	Sun Microsystems, Inc.
3309	Tektronix, Inc.
249	Tri-Star Computer

HDTV
HDTV
HDTV
고화질 텔레비젼
HDTV
HDTV
HDTV
HDTV

Booth	
2201	Amazon/Interactive Effects
1411	Artbeats
1379	Avid Technology, Inc.
873	Chromatek Inc.
1233	Chyron Corporation
2430	Communications Specialties, Inc.
2727	Discreet Logic
2538	DVS Digital Video Systems
2900	Folsom Research Inc.
2204	Leitch
879	Miranda Technologies
2439	MMS Multi Media Systems
1141	Oxberry LLC
2908	PC Video Conversion
1431	PixelFusion
647	Sony Electronics Inc.
2901	Storage Concepts
841	Sun Microsystems, Inc.
374	Videomedia Inc.
2131	Videonics, Inc.
2121	Virtual Research Systems/Sense 8 Corporation

High performance graphics processors
Procesadores gráficos de alto rendimiento
Elaboratori grafici a high performance
고성능 그래픽 연산자
Hochleistungsprozessor für Graphiken
Processeurs graphiques á haute performance
高パーフォーマンス - グラフィック プロセッサ
Processadores de gráficos de alto desempenho

Booth	
1165/ 1265	3Dlabs, Inc.
2445	Advanced Rendering Technology
3715	Bordeaux Region Development Agency (BRA)
1343	Compaq Computer Corporation
2227	Computer Graphics World
371	Diamond Multimedia
2401	Dynamic Pictures, Inc.
2009	Fujitsu Microelectronics, Inc.
1041	Hewlett-Packard Company
965	IBM Corporation
979	Intel Corporation
665	Intergraph Computer Systems
529	MetaCreations Corporation
2809	Minicomputer Exchange, Inc.
1431	PixelFusion
2637	Quantel Inc.
3808	Raycer Graphics
841	Sun Microsystems, Inc.
249	Tri-Star Computer
3501	Workstation Users Alliance, Inc.

High-resolution graphic display systems
Sistemas de muestra gráfica de alta resolución
Sistemi di display grafici ad alta definizione
고화소 그래픽 디스플레이 시스템
Graphische Darstellungssysteme mit hoher Auflösung
Systèmes d´affichages graphiques à haute résolution
高解像度グラフィック - ディスプレーシステム
Sistemas de sidplay gráde alta resoluçao

Booth	
1379	Avid Technology, Inc.
1107	BIG MAC/W.C.N.
1343	Compaq Computer Corporation
2009	Fujitsu Microelectronics, Inc.
1041	Hewlett-Packard Company
665	Intergraph Computer Systems
2105	Lightwave Communications, Inc.
2809	Minicomputer Exchange, Inc.
2247	n-Vision, Inc.
3401	Proxima/ASK
2839	Pyramid Systems, Inc.
144	Research Systems
647	Sony Electronics Inc.
1947	STB Systems, Inc./Symmetric
841	Sun Microsystems, Inc.
1847	Trimension Systems
2121	Virtual Research Systems/Sense 8 Corporation
2904	Voxar
3512	Western Micro Technology

Image processing
Procesamiento de imágenes
Elaboratori di figure
이미지 프로세싱
Bildübersetzung
Traitement d´image
イメージ - プロセッシング
Processamento de imagem

Booth	
2434	3D Construction Company
2827	5D Ltd.
2747	Adaptive Optics Associates (AOA)
335	aii/DCS
370	Alien Skin Software
364	AutoMedia Ltd.
571	Autometric, Inc.
3715	Bordeaux Region Development Agency (BRA)
134	Chroma Graphics
873	Chromatek Inc.
1343	Compaq Computer Corporation
3418	DigiEffects
2805	Elsevier Science
1841	Equilibrium
258	ganymedia
2406	Harlequin Inc.
665	Intergraph Computer Systems
2109	Media4 Productions Inc.
1257	Nichimen Graphics, Inc.
1244	Numerical Algorithms Group, Inc.
2017	Polhemus, Incorporated
262	PRAJA inc.
2637	Quantel Inc.
2833	REALiZ
1417	REM Infografica, SA
144	Research Systems
3321	Scientific Placement Inc.
2317	Silicon Grail
1133	Springer-Verlag
841	Sun Microsystems, Inc.
3708	Sven Technologies
3629	TechImage, Ltd.
3504	TerraSim, Inc.
1600	Texas Memory Systems
3432	Volume Graphics GmbH
3512	Western Micro Technology

Industrial design
Diseno industrial
Progetti industriali
산업디자인
Industrial Design
Conception industrielle
工業デザイン
Desenho industrial

Booth	
2434	3D Construction Company
341	auto.des.sys, Inc.
3715	Bordeaux Region Development Agency (BRA)
873	Chromatek Inc.
1311	Cyberware
371	Diamond Multimedia
2727	Discreet Logic
2805	Elsevier Science
140	Haptic Technologies Inc.
1209	Immersion Corporation
3514	In-Harmony Technology Corporation
665	Intergraph Computer Systems
2332	Journey Education Marketing
740	LightWork Design
2327	Maxon/3D Gear
2247	n-Vision, Inc.
1212	NVision, Inc.
268/ 3500	Raindrop Geomagic
3821	Robert McNeel & Associates
2127	Safework inc.
1331	Side Effects Software
1609/ 1627	Silicon Graphics, Inc.
3723	Solid Modeling Solutions
841	Sun Microsystems, Inc.
3708	Sven Technologies
249	Tri-Star Computer
1250	University of Advancing Computer Technology
2121	Virtual Research Systems/Sense 8 Corporation

Input devices
Aparatos para entrada de datos
Dispositivi per input
입력장치
Eingabegeräte
Unités d´éntrée
入力装置
Dispositivos de entrada

Booth	
2747	Adaptive Optics Associates (AOA)
2846	AJA Video
1801	Alias I Wavefront
3001	Ascension Technology Corporation
1311	Cyberware
3201	Ensemble Designs Inc.
3415	FTG Data Systems
258	ganymedia
140	Haptic Technologies Inc.
1209	Immersion Corporation
3514	In-Harmony Technology Corporation
2147	InSpeck inc.
1317	InterSense, Inc.
2902	ITU Research
2241	LEGASYS International
1489	Logitech Inc.
2247	n-Vision, Inc.
1141	Oxberry LLC
2017	Polhemus, Incorporated
429	Puppet Works
3621	Real 3D
329	Roland DGA Corporation
2200	SBS Bit 3 Operations
841	Sun Microsystems, Inc.
3601	Virtual Technologies, Inc.
2217	Waccom Technology Corporation

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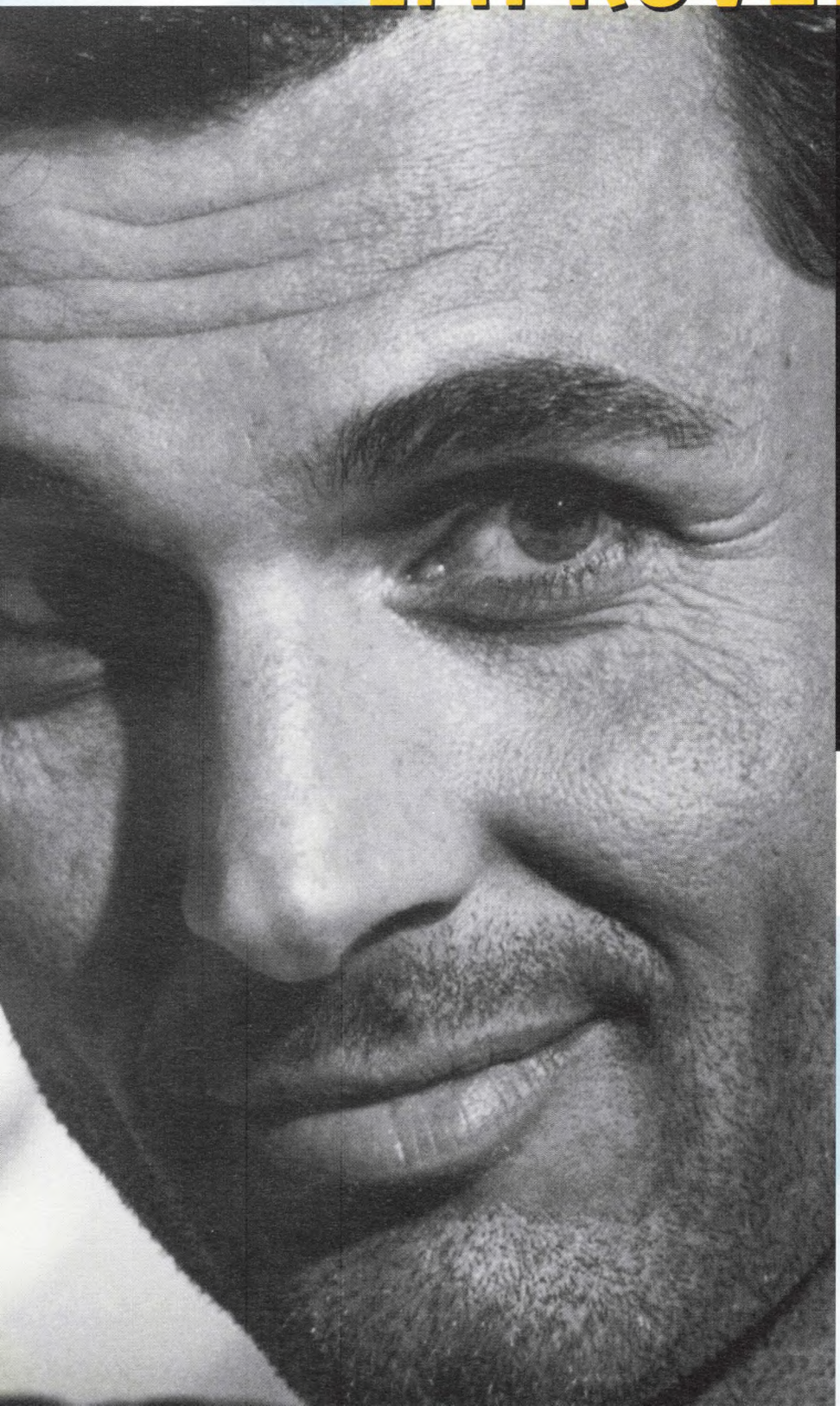

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Medizinische Abbildungssoftware
Logicieldéimagerie médicale
メディカル - イメジング ソフトウエア
Software para imagem na indústria médica

Booth	
2434	3D Construction Company
357	Advanced Visual Systems
3717	Applied Science Laboratories
3715	Bordeaux Region Development Agency (BRA)
873	Chromatek Inc.
2227	Computer Graphics World
140	Haptic Technologies Inc.
665	Intergraph Computer Systems
2327	Maxon/3D Gear
1244	Numerical Algorithms Group Inc.
1505	Peak Performance Technologies
2017	Polhemus, Incorporated
268/3500	Raindrop Geomagic
3616	Realax Software AG
144	Research Systems
3321	Scientific Placement Inc.
841	Sun Microsystems, Inc.
3708	Sven Technologies
2121	Virtual Research Systems/Sense 8 Corporation
2341	Visible Productions
3432	Volume Graphics GmbH
2904	Voxar
3512	Western Micro Technology
3501	Workstation Users Alliance, Inc.

Monitors and displays
Monitores y pantallas
Monitors e displays
모니터 및 디스플레이
Monitoren und Displays
Monituers et écrans
モニター及びディスプレー
Monitores e displays

Booth	
434	Appian Graphics
3717	Applied Science Laboratories
1509	B & H Photo-Video-Pro-Audio
1107	BIG MAC/W.C.N.
3514	Dredsen University of Technology
2415	Evans & Sutherland Computer Corporation
1041	Hewlett-Packard Company
665	Intergraph Computer Systems
2105	Lightwave Communications, Inc.
2809	Minicomputer Exchange, Inc.
2247	n-Vision, Inc.
2839	Pyramid Systems, Inc.
2801	Sharp Electronics Corporation
647	Sony Electronics Inc.
841	Sun Microsystems, Inc.
1222	TNT Technologies
1847	Trimension Systems
249	Tri-Star Computer
2242	ViewSonic Corporation
2121	Virtual Research Systems/Sense 8 Corporation
3512	Western Micro Technology
3501	Workstation Users Alliance, Inc.

Multimedia/hypermedia
Multimedios/hipermedios
Multimedia/ipermedia
다중매체/하이퍼미디어
Multimedia/Hypermedia
Multimédia/hypermédia
マルチメディア／ハイパーメディア
Multimédia/hipermédia

Booth	
2434	3D Construction Company
151	The 3D Shop
1208	3NAME3D
129	Adobe Systems
2445	Advanced Rendering Technology
2301	Advanstar Digital Media Group
3301	AIST/Omni Q Inc.
629	AlphaPowered - Samsung and Digital Equipment
3317	AnimaTek International Inc.
3213	Artel Software Inc./Boris FX
364	AutoMedia Ltd.
571	Autometric, Inc.
1379	Avid Technology, Inc.
3715	Bordeaux Region Development Agency (BRA)
3521	Bulldog
1223	Caligari Corporation
528	Centre NAD Center
1105	Charles River Media
873	Chromatek Inc.
2227	Computer Graphics World
371	Diamond Multimedia
2426	Diaquest
3418	DigiEffects
1241	Digimation
687	Digital Stock
2727	Discreet Logic
272	Dot C Software, Inc.
3201	Ensemble Designs Inc.
1841	Equilibrium
2900	Folsom Research Inc.
2009	Fujitsu Microelectronics, Inc.
258	ganymedia
3714	GenTech
140	Haptic Technologies Inc.
2406	Harlequin Inc.
965	IBM Corporation
2147	InSpeck inc.
979	Intel Corporation
665	Intergraph Computer Systems
2332	Journey Education Marketing
1601	Kinetix, Inc.
740	LightWork Design
1283	Live Picture, Inc.
2739	Matrox Video Products Group
2327	Maxon/3D Gear
2001	Media 100 Inc.
449	MediaPegs
3207	The Motion Factory
1027	NewTek
2912	Odyssey Productions
3700	Okino Computer Graphics, Inc.
2438	Onyx Computing, Inc.
1141	Oxberry LLC
2908	PC VIdeo Conversion
1431	PixelFusion
2017	Polhemus, Incorporated
262	PRAJA inc.
268/3500	Raindrop Geomagic
1133	Springer-Verlag
1947	STB Systems, Inc./Symmetric
841	Sun Microsystems, Inc.
3708	Sven Technologies
3629	TechImage, Ltd.
2619	TGS, Inc.
1501	Trinity Animation, Inc.
249	Tri-Star Computer
1250	University of Advancing Computer Technology
2813	Vancouver Film School
257	Vicon Motion Systems
2131	Videonics, Inc.
2121	Virtual Research Systems/Sense 8 Corporation
2341	Visible Productions
2904	Voxar
3512	Western Micro Technology

Networking; hardware/software/services
Red de comunicaciones; hardware/programas/servicios
Networking; hardware/software/servizi
통신: 하드웨어/소프트웨어/서어비스
Rechnerverbund; Hardware/Software/Dienstleistungen
Mise en réseau; matériel/logiciel/services
ネットワーキング：ハードウエア／ソフトウエア／サービス
Networking; hardware/software/serviços

Booth	
335	aii/DCS
3421	ANDATACO
1107	BIG MAC/W.C.N.
873	Chromatek Inc.
3406	The Coriolis Group
1647	DataDirect Networks, Inc.
1145	Dataram Corporation
2727	Discreet Logic
3201	Ensemble Designs Inc.
965	IBM Corporation
665	Intergraph Computer Systems
2339	LambSoft, Inc.
2105	Lightwave Communications, Inc.
1283	Live Picture, Inc.
2809	Minicomputer Exchange, Inc.
1532	Reality by Design
3321	Scientific Placement Inc.
1609/1627	Silicon Graphics, Inc.
2339	StorageTek
841	Sun Microsystems, Inc.
1222	TNT Technologies
3219	Transoft
885	UMAX Technologies, Inc.
2121	Virtual Research Systems/Sense 8 Corporation
3512	Western Micro Technology

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Componentes OEM
Componenti OEM
OEM 부품
OEM-Komponente
Composants OEM
OEM コンポーネント
Componentes de OEM

Booth	
1165	3Dlabs, Inc.
1265	
151	The 3D Shop
2747	Adaptive Optics Associates (AOA)
629	AlphaPowered - Samsung and Digital Equipment
3421	ANDATACO
434	Appian Graphics
3717	Applied Science Laboratories
3001	Ascension Technology Corporation
1107	BIG MAC/W.C.N.
3715	Bordeaux Region Development Agency (BRA)
873	Chromatek Inc.
2430	Communications Specialties, Inc.
1145	Dataram Corporation
371	Diamond Multimedia
2426	Diaquest
2538	DVS Digital Video Systems
140	Haptic Technologies Inc.
2009	Fujitsu Microelectronics, Inc.
965	IBM Corporation
3514	In-Harmony Technology Corporation
979	Intel Corporation
665	Intergraph Computer Systems
1317	InterSense, Inc.
740	LightWork Design
2109	Media4 Productions Inc.
879	Miranda Technologies
2439	MMS Multi Media Systems
2247	n-Vision, Inc.
2908	PC Video Conversion
1431	PixelFusion
2017	Polhemus, Incorporated
268/ 3500	Raindrop Geomagic
2200	SBS Bit 3 Operations
2440	Silicon Gear Corporation
647	Sony Electronics Inc.
841	Sun Microsystems, Inc.
549	Viewpoint DataLabs
3432	Volume Graphics GmbH
2904	Voxar
2217	Wacom Technology Corporation
3512	Western Micro Technology

Paint systems
Sistemas de pintura
Sistemi di pittura
도장(칠하기)시스템
Farbsysteme
Systèmes de coloriage
ペイント - システム
Sistemas de pintura

Booth	
3704	4DVISION
2201	Amazon/Interactive Effects
1379	Avid Technology, Inc.
1056	Cambridge Animation
1233	Chyron Corporation
1123	Coast to Coast Partners
2227	Computer Graphics World
2727	Discreet Logic
140	Haptic Technologies Inc.
965	IBM Corporation
2739	Matrox Video Products Group
449	MediaPegs
529	MetaCreations Corporation
1027	NewTek
1257	Nichimen Graphics, Inc
1051	Play Incorporated
149	Post Digital Software
1019	Puffin Designs
2637	Quantel Inc.
647	Sony Electronics Inc.
841	Sun Microsystems, Inc.
3708	Sven Technologies

PC add-on products
Productos que se agregan a la computadora PC
Prodotti add-on per PC
PC 확장용 기기
PC-Anbauteile
Produits additionels de PC
PC アッド - オン プロダクト
Produtos adicionais para PC

Booth	
1165/ 1265	3Dlabs, Inc.
151	The 3D Shop
2445	Advanced Rendering Technology
2846	AJA Video
434	Appian Graphics
873	Chromatek Inc.
2430	Communications Specialties, Inc.
371	Diamond Multimedia
2426	Diaquest
272	Dot C Software, Inc.
3514	Dresden University of Technology
2538	DVS Digital Video Systems
2401	Dynamic Pictures, Inc.
2009	Fujitsu Microelectronics, Inc.
3415	FTG Data Systems
140	Haptic Technologies Inc.
665	Intergraph Computer Systems
457	Kingston Technology Company
2439	MMS Multi Media Systems
2908	PC Video Conversion
1431	PixelFusion
329	Roland DGA Corporation
647	Sony Electronics Inc.
1947	STB Systems, Inc./Symmetric
1222	TNT Technologies
249	Tri-Star Computer
374	Videomedia Inc.
2121	Virtual Research Systems/Sense 8 Corporation
3601	Virtual Technologies, Inc.
3512	Western Micro Technology

PC-based systems
Sistmas basados en la computadora PC
Sistemi basati su PC
PC 용 시스템
PC-Systeme
Systèmes basés sur PC
PC 用システム
Sistemas para PC

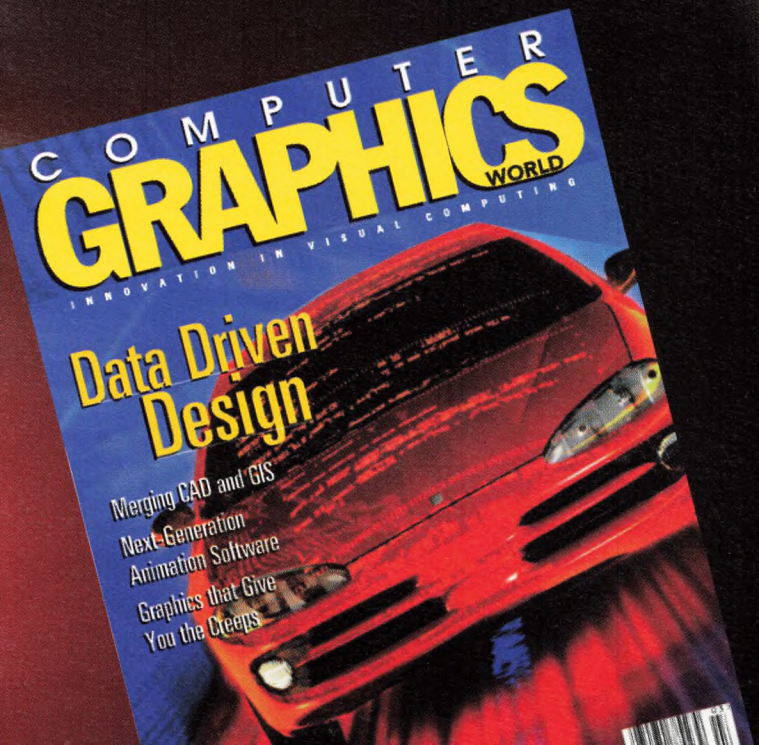
Booth	
629	AlphaPowered - Samsung and Digital Equipment
1379	Avid Technology, Inc.
3715	Bordeaux Region Development Agency (BRA)
1056	Cambridge Animation
1233	Chyron Corporation
1123	Coast to Coast Partners
138	Computer Graphics Systems Development Corporation
371	Diamond Multimedia
2727	Discreet Logic
258	ganymedia
140	Haptic Technologies Inc.
965	IBM Corporation
979	Intel Corporation
665	Intergraph Computer Systems
3509	ISLIP Media, Inc.
2339	LambSoft, Inc.
2739	Matrox Video Products Group
1051	Play Incorporated
1431	PixelFusion
2017	Polhemus, Incorporated
1532	Reality by Design
2200	SBS Bit 3 Operations
647	Sony Electronics Inc.
3629	TechImage, Ltd.
2619	TGS, Inc.
1222	TNT Technologies
249	Tri-Star Computer
885	UMAX Technologies, Inc.
257	Vicon Motion Systems
374	Videomedia Inc.
3601	Virtual Technologies, Inc.
2904	Voxar
3512	Western Micro Technology

Unbeatable

The referee has stopped the contest. The scorecards have been turned in. We have a winner.

CGW Magazine!

The 12-time undisputed champion, has again been voted "Best Read Magazine" by SIGGRAPH attendees.* CGW is the place to turn for the most reliable, up-to-date information on CAD, animation and visualization. But don't take our word for it. Ask the people who know. SIGGRAPH did.



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* Source: SIGGRAPH Audience Survey 1997, Exhibit Surveys, Inc., Red Bank, NJ

Personal digital applications (PDAs)
Aplicaciones personales digitales (PDAs)
Applicazionis personali digitali (PDAs)
개인 전자 응용 분야 (PDAs)
Personal-digitale Anwendung (PDAs)
Applications digitales personnelles
パーソナル - デジタル アプリケーション **(PDAs)**
Aplicaciones personales digitales (PDAs)

Booth

272 Dot C Software, Inc.
3321 Scientific Placement Inc.

Portable products
Productos portátiles
Prodotti portatili
휴대용 장치
Tragbare Produkte/Geräte
Produits protables
ポータブル プロダクト
Produtos portáteis

Booth

1107 BIG MAC/W.C.N.
272 Dot C Software, Inc.
3201 Ensemble Designs Inc.
665 Intergraph Computer Systems
3321 Scientific Placement Inc.
2121 Virtual Research Systems/Sense 8 Corporation

Projectors; video, HDTV
Proyectores; video, HDTV
Proiecttori; video, HDTV
프로젝터: 비디오, 고화질 텔레비전
Projektoren; Video, HDTV
Projecteurs; vidéo, HDTV
プロジェクター：ビデオ、**HDTV**
Projectores; videos, HDTV

Booth

1509 B & H Photo-Video-Pro-Audio
3715 Bordeaux Region Development Agency (BRA)
873 Chromatek Inc.
2426 Diaquest
2900 Folsom Research Inc.
2839 Pyramid Systems, Inc.
2801 Sharp Electronics Corporation
647 Sony Electronics Inc.
1847 Trimension Systems
2121 Virtual Research Systems/Sense 8 Corporation

Publications
Publicaciones
Pubblicazioni
출판
Veröffentlichugen
Publications
出版物
Publicaçoes

Booth

1127 Academic Press
1101 Addison Wesley Longman
2111 Advanced Imaging Magazine
2301 Advanstar Digital Media Group
1254 AK Peters, Ltd.
2336 American Cinematographer Magazine
2307 Animation Magazine
1129 AP PROFESSIONAL
1256 AV Video Multimedia Producer
390 Cambridge University Press
2343 CGI Europe
1105 Charles River Media
873 Chromatek Inc.
138 Computer Graphics Systems Development Corporation
2227 Computer Graphics World
3406 The Coriolis Group
2208 Desktop Engineering Magazine
2805 Elsevier Science
1256 Film & Video Magazine
1219 Hollywood Reporter
2309 I.D. Magazine
1157 IEEE Computer Society
2117 Intertec Publishing (Video Systems Magazine)
1256 Knowledge Industry Publications
1437 Markee
541 Miller Freeman, Inc.
2101 Morgan Kaufmann Publishers, Inc.
3822 Nikkei Computer Graphics
2912 Odyssey Productions
3533 PCI-Silicon Graphics World
1232 Post Magazine
1248 Produccion & Distribucion Corporation
3532 Screen Magazine
1149 SMPTE
3814 SunExpert Magazine
2901 Storage Concepts
3721 Sys-Con Publications
3609 Upside Media
3420 Variety
2117 Video Systems Magazine
1119 John Wiley & Sons

Rendering & image synthesis software
Programas de síntesis de imagen y ejecución gráfica
Software per resa e sintesi de figure
화상 변형/합성 소프트웨어
Software für Wiedergabe und Bildsynthese
Logiciel de reproduction et de synthèse d´image
レンダリング及びイメージ合成ソフトウエア
Software de interpretaçao e síntese de imagem

Booth

2434 3D Construction Company
3704 4DVISION
129 Adobe Systems
2445 Advanced Rendering Technology
3301 AIST/Omni Q Inc.
1801 Alias | Wavefront
3317 AnimaTek International Inc.
1435 ArchSoft, Inc.
341 auto.des.sys, Inc.
1379 Avid Technology, Inc.
3715 Bordeaux Region Development Agency (BRA)
1223 Caligari Corporation
1056 Cambridge Animation
873 Chromatek Inc.
2236 CIRAD
1343 Compaq Computer Corporation
138 Computer Graphics Systems Development Corporation
2227 Computer Graphics World
3418 DigiEffects
272 Dot C Software, Inc.
2401 Dynamic Pictures, Inc.
2415 Evans & Sutherland Computer Corporation
3714 GenTech
2406 Harlequin Inc.
965 IBM Corporation
140 Haptic Technologies Inc.
1827/3412 Imageware Corporation
365 IMAGICA Corporation of America
665 Intergraph Computer Systems
3409 Kaydara Inc.
740 LightWork Design
2327 Maxon/3D Gear
3820 Martian Tools
529 MetaCreations Corporation
3207 The Motion Factory
1257 Nichimen Graphics, Inc.
1244 Numerical Algorithms Group Inc.
3700 Okino Computer Graphics, Inc.
565 Pixar
1051 Play Incorporated
2017 Polhemus, Incorporated
1019 Puffin Designs
146 Questar Productions
3616 Realax Software AG
1532 Reality by Design
144 Research Systems
3321 Scientific Placement Inc.
1331 Side Effects Software
841 Sun Microsystems, Inc.
3708 Sven Technologies
2619 TGS, Inc.
2143 Toyobo Co., Ltd.
1501 Trinity Animation, Inc.
2131 Videonics, Inc.
2341 Visible Productions
3432 Volume Graphics GmbH
2904 Voxar

3D ANIMATION TOOLS

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flexibility

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TEL (416) 504-9876 FAX (416) 504-6648

Scanners/digitizing cameras; scan converters
Aparatos de barrido de imagen/ cámaras digitalizadoras; convertidores de barrido de imagen
Analizzatori/macchine digitalizatrici; convertitori per analizzatori
스캐너/디지타이징 카메라/스캔 변환기
Scanner/digitalisierende Kameras; Abtastumformer
Scanners/caméras de digitalisatíon; convertisserus de scanage
スキャナー/デジタル - カメラ : スキャン - コンバーター
Escanadoras/câmaras digitais: convertoras de escandadoras

Booth

2747 Adaptive Optics Associates (AOA)
2301 Advanstar Digital Media Group
1509 B & H Photo-Video-Pro-Audio
2430 Communications Specialties, Inc.
2227 Computer Graphics World
1311 Cyberware
2900 Folsom Research Inc.
965 IBM Corporation
365 IMAGICA Corporation of America
1209 Immersion Corporation
3514 In-Harmony Technology Corporation
2147 InSpeck inc.
2241 LEGASYS International
435 Minolta Corporation
1212 NVision, Inc.
1141 Oxberry LLC
2908 PC Video Conversion
2017 Polhemus, Incorporated
268/ 3500 Raindrop Geomagic
3621 Real 3D
2220 RGB Spectrum
329 Roland DGA Corporation
3321 Scientific Placement Inc.
647 Sony Electronics Inc.
841 Sun Microsystems, Inc.
1222 TNT Technologies
249 Tri-Star Computer
2410 TV One Multimedia Solutions
885 UMAX Technologies, Inc.
270 Visual Interface, Inc.

Simulation
Simulación
Simulazione
Simulation
시뮬레이션
Simulation
シミュレーション
Simulaçao

Booth

2747 Adaptive Optics Associates (AOA)
3317 AnimaTek International Inc.
428 Animation Science
3717 Applied Science Laboratories
341 auto.des.sys, Inc.
571 Autometric, Inc.
3715 Bordeaux Region Development Agency (BRA)
1223 Caligari Corporation
873 Chromatek Inc.
2236 CIRAD
138 Computer Graphics Systems Development Corporation
3428 Cybelius Software
1311 Cyberware
371 Diamond Multimedia
272 Dot C Software, Inc.
1281 DreamTeam Ltd.
2805 Elsevier Science
2415 Evans & Sutherland Computer Corporation
140 Haptic Technologies Inc.
965 IBM Corporation
665 Intergraph Computer Systems
1317 InterSense, Inc.
3409 Kaydara Inc.
2339 LambSoft, Inc.
2327 Maxon/3D Gear
1257 Nichimen Graphics, Inc.
1244 Numerical Algorithms Group Inc.
2247 n-Vision, Inc.
2438 Onyx Computing, Inc.
1505 Peak Performance Technologies
1431 PixelFusion
2017 Polhemus, Incorporated
2839 Pyramid Systems, Inc.
146 Questar Productions
3621 Real 3D
3616 Realax Software AG
1532 Reality by Design
144 Research Systems
329 Roland DGA Corporation
2127 Safework inc.
3321 Scientific Placement Inc.
1609/ 1627 Silicon Graphics, Inc.
1133 Springer-Verlag
841 Sun Microsystems, Inc.
3708 Sven Technologies
3504 TerraSim, Inc.
1600 Texas Memory Systems
2619 TGS, Inc.
2143 Toyobo Co., Ltd.
1847 Trimension Systems
249 Tri-Star Computer
549 Viewpoint DataLabs
2121 Virtual Research Systems/Sense 8 Corporation
3601 Virtual Technologies, Inc.
2904 Voxar
3501 Workstation Users Alliance, Inc.
1251 StorageTek
2619 TGS, Inc.
779 Toonboom Technologies Inc.
3219 Transoft
1501 Trinity Animation, Inc.
1250 University of Advancing Computer Technology
2121 Virtual Research Systems/Sense 8 Corporation
2904 Voxar
1119 John Wiley & Sons

Software (other)
Programas (otro tipo)
Software (altri)
소프트웨어(기타)
Software (anderes)
Logiciel (autre)
ソフトウエア（その他）
Software (outro)

Booth

2434 3D Construction Company
2827 5D Ltd.
2747 Adaptive Optics Associates (AOA)
129 Adobe Systems
357 Advanced Visual Systems
3301 AIST/Omni Q Inc.
3421 ANDATACO
1411 Artbeats
3213 Artel Software Inc./Boris FX
364 AutoMedia Ltd.
1379 Avid Technology, Inc.
3521 Bulldog
1105 Charles River Media
1233 Chyron Corporation
1123 Coast to Coast Partners
2426 Diaquest
3418 DigiEffects
1241 Digimation
687 Digital Stock
272 Dot C Software, Inc.
1841 Equilibrium
258 ganymedia
3409 Kaydara Inc.
2339 LambSoft, Inc.
530 MacAcademy/Windows Academy
449 MediaPegs
3207 The Motion Factory
1244 Numerical Algorithms Group Inc.
1523 Photron USA
2017 Polhemus, Incorporated
149 Post Digital Software
262 PRAJA inc.
268/ 3500 Raindrop Geomagic
3616 Realax Software AG
144 Research Systems
2127 Safework inc.
3321 Scientific Placement Inc.
2317 Silicon Grail
1827 SOFTIMAGE
3723 Solid Modeling Solutions

Storage devices; tape/disk/ CD-ROM
Aparatos de almacenamiento; cinta/disco/CD-ROM
Dispositivi per immagazzinaggio; nastro/disco/CD-ROM
저장 장치: 테이프/디스크/ CD-ROM
Speichereinrichtugen; Tonband/Diskette/CD-ROM
Dispositifs à mémoire; cassette/ disque/DOC
保管装置：テープ／ディスク／CD-ROM
Dispositivos de memória: fita/ disco/CD-ROM

Booth

1325 Accom Inc.
2210 Ampex Corporation
3421 ANDATACO
3313 Baydel Ltd.
1107 BIG MAC/W.C.N.
3529 Catalogic
1741 Ciprico Inc.
1343 Compaq Computer Corporation
1647 DataDirect Networks, Inc.
1145 Dataram Corporation
2248 DISC, Incorporated
2727 Discreet Logic
2538 DVS Digital Video Systems
3201 Ensemble Designs Inc.
965 IBM Corporation
457 Kingston Technology Company
2241 LEGASYS International
2204 Leitch
857 MAXSTRAT Corporation
2432 Microboards Technology, Inc.
2211 MicroNet Technology, Inc.
2809 Minicomputer Exchange, Inc.
2439 MMS Multi Media Systems
1941 nStor Corporation
2440 Silicon Gear Corporation
647 Sony Electronics Inc.
2901 Storage Concepts
1251 StorageTek
841 Sun Microsystems, Inc.
1600 Texas Memory Systems
1222 TNT Technologies
3219 Transoft
249 Tri-Star Computer
3512 Western Micro Technology
3501 Workstation Users Alliance, Inc.

Systems integrators
Integradores de sistemas
Sistemi integratori
시스템 구성
Systemintegratoren
Intégrateurs de systémes
システム - インテグレーター
Sistemas integradores

Booth

2747 Adaptive Optics Associates (AOA)
3421 ANDATACO
571 Autometric, Inc.
1521 CADCrafts
1123 Coast to Coast Partners
138 Computer Graphics Systems Development Corporation
371 Diamond Multimedia
2415 Evans & Sutherland Computer Corporation
2241 LEGASYS International
2809 Minicomputer Exchange, Inc.
1532 Reality by Design
647 Sony Electronics Inc.
1251 StorageTek
841 Sun Microsystems, Inc.
3219 Transoft
1847 Trimension Systems
249 Tri-Star Computer
2121 Virtual Research Systems/Sense 8 Corporation
3512 Western Micro Technology

Teleconferencing/collaborative products
Productos para teleconferencias/ colaboración
Prodotti per tele congerenze/ collaboratori
원격 회의/합작 제품
Telefonkonferenzen/Produkte zur Zusammenarbeit
Produits de téléconférence et de collaboration
テレコンファレンシング／コラボレーティブ - プロダクト
Productos para teleconferências/ colaborativos

Booth

3717 Applied Science Laboratories
2430 Communications Specialties, Inc.
2805 Elsevier Science
140 Haptic Technologies Inc.
965 IBM Corporation
262 PRAJA inc.
647 Sony Electronics Inc.
841 Sun Microsystems, Inc.
3629 TechImage, Ltd.
1847 Trimension Systems

Terminals
Terminales
터미널
Terminali
Datenstationen
Terminaux
端末装置
Terminais

Booth

2105 Lightwave Communications, Inc.
1222 TNT Technologies

Turnkey systems
Sistemas intergrales
Sistemi compleri (turnkey)
턴키(Turnkey)시스템
Schlüsselferitge Systeme
Systémes clé en main
ターンキー - システム
Sistemas de inícui de produçao

Booth

2747 Adaptive Optics Associates (AOA)
2445 Advanced Rendering Technology
3809 Blossom Technologies
3715 Bordeaux Region Development Agency (BRA)
1521 CADCrafts
1123 Coast to Coast Partners
138 Computer Graphics Systems Development Corporation
2727 Discreet Logic
2415 Evans & Sutherland Computer Corporation
965 IBM Corporation
665 Intergraph Computer Systems
2809 Minicomputer Exchange, Inc.
2637 Quantel Inc.
1532 Reality by Design
647 Sony Electronics Inc.
841 Sun Microsystems, Inc.
779 Toonboom Technologies Inc.
1847 Trimension Systems
249 Tri-Star Computer
2904 Voxar
3512 Western Micro Technology

User interface
Interconectores de usuario
Interfacce per utenti
사용사 인터페이스
Benutzeranschlußstelle
Interface d´útilisateur
ユーザーインターフェース
Interaçao com usuário

Booth

3717 Applied Science Laboratories
3001 Ascension Technology
873 Chromatek Inc.
3415 FTG Data Systems
140 Haptic Technologies Inc.
1317 InterSense, Inc.
2200 SBS Bit 3 Operations
1133 Springer-Verlag
841 Sun Microsystems, Inc.
2121 Virtual Research Systems/Sense 8 Corporation
3601 Virtual Technologies, Inc.
1119 John Wiley & Sons

Video technology
Tecnología de video
Tecnologia per video
비디오 기술
Terminali
Technologie de vidéo
ビデオ　テクノロジー
Tecnologia de video

Booth	
2434	3D Construction Company
1165	3Dlabs, Inc.
1265	
151	The 3D Shop
2747	Adaptive Optics Associates (AOA)
129	Adobe Systems
1325	Accom Inc.
2846	AJA Video
1801	Alias | Wavefront
2210	Ampex Corporation
434	Appian Graphics
3717	Applied Science Laboratories
364	AutoMedia Ltd.
1379	Avid Technology, Inc.
3809	Blossom Technologies
3715	Bordeaux Region Development Agency (BRA)
873	Chromatek Inc.
2430	Communications Specialties, Inc.
1343	Compaq Computer Corporation
2426	Diaquest
3418	DigiEffects
2727	Discreet Logic
465	DPS (Digital Processing Systems)
3201	Ensemble Designs Inc.
2900	Folsom Research Inc.
965	IBM Corporation
979	Intel Corporation
665	Intergraph Computer Systems
3509	ISLIP Media, Inc.
2204	Leitch
2105	Lightwave Communications, Inc.
2739	Matrox Video Products Group
2001	Media 100 Inc.
879	Miranda Technologies
1027	NewTek
2908	PC Video Conversion
1051	Play Incorporated
149	Post Digital Software
2839	Pyramid Systems, Inc.
2220	RGB Spectrum
3321	Scientific Placement Inc.
1234	Sigma Electronics
1827	SOFTIMAGE
647	Sony Electronics Inc.
1947	STB Systems, Inc./Symmetric
841	Sun Microsystems, Inc.
3219	Transoft
374	Videomedia Inc.

Virtual reality
Realidad virtual
Realitá virtuale
가상현실
Virtuelle Realität
Réalité virtuelle
仮想現実
Realidade virtual

Booth	
2434	3D Construction Company
1208	3NAME3D
2747	Adaptive Optics Associates (AOA)
3317	AnimaTek International, Inc.
3717	Applied Science Laboratories
3001	Ascension Technology Corporation
571	Autometric, Inc.
3715	Bordeaux Region Development Agency (BRA)
873	Chromatek Inc.
138	Computer Graphics Systems Development Corporation
2227	Computer Graphics World
3428	Cybelius Software
1311	Cyberware
371	Diamond Multimedia
2727	Discreet Logic
272	Dot C Software, Inc.
1281	DreamTeam Ltd.
3514	Dredsen University of Technology
2805	Elsevier Science
2415	Evans & Sutherland Computer Corporation
3515	Fakespace
2009	Fujitsu Microelectronics, Inc.
258	ganymedia
3714	GenTech
140	Haptic Technologies Inc.
1209	Immersion Corporation
3514	In-Harmony Technology Corporation
2147	InSpeck inc.
665	Intergraph Computer Systems
1317	InterSense, Inc.
3409	Kaydara Inc.
2339	LambSoft, Inc.
1283	Live Picture, Inc.
1489	Logitech Inc.
2327	Maxon/3D Gear
1257	Nichimen Graphics, Inc.
1531	Northern Digital Inc. (NDI)
2247	n-Vision, Inc.
1431	PixelFusion
1051	Play Incorporated
2017	Polhemus, Incorporated
2839	Pyramid Systems, Inc.
3616	Realax Software AG
1532	Reality by Design
1417	REM Infografica, SA
2127	Safework inc.
1609/ 1627	Silicon Graphics, Inc.
1133	Springer-Verlag
841	Sun Microsystems, Inc.
3708	Sven Technologies
3629	TechImage, Ltd.
2619	TGS, Inc.
1222	TNT Technologies
2143	Toyobo Co., Ltd.
1847	Trimension Systems
1250	University of Advancing Computer Technology
2121	Virtual Research Systems/Sense 8 Corporation
3601	Virtual Technologies, Inc.
2341	Visible Productions
3432	Volume Graphics GmbH
2904	Voxar

Visualization software
Programas de visualización
Software per visualizzazione
시각화 소프트웨어
Visualisierende Software
Logiciel de visualisation
ビジュアリゼーション　ソフトウエア
Software de visualizaçao

Booth	
2434	3D Construction Company
2747	Adaptive Optics Associates (AOA)
357	Advanced Visual Systems
3317	AnimaTek International Inc.
428	Animation Science
1435	ArchSoft, Inc.
571	Autometric, Inc.
1379	Avid Technology, Inc.
3715	Bordeaux Region Development Agency (BRA)
1521	CADCrafts
1223	Caligari Corporation
873	Chromatek Inc.
2236	CIRAD
1343	Compaq Computer Corporation
138	Computer Graphics Systems Development Corporation
2227	Computer Graphics World
371	Diamond Multimedia
687	Digital Stock
2727	Discreet Logic
3514	Dredsen University of Technology
2805	Elsevier Science
1827/ 3412	Imageware Corporation
665	Intergraph Computer Systems
3409	Kaydara Inc.
1601	Kinetix, Inc.
2339	LambSoft, Inc.
740	LightWork Design
254	ModelVision Inc.
1257	Nichimen Graphics, Inc.
1244	Numerical Algorithms Group Inc.
1431	PixelFusion
2017	Polhemus, Incorporated
262	PRAJA inc.
146	Questar Productions
268/ 3500	Raindrop Geomagic
3616	Realax Software AG
1532	Reality by Design
1417	REM Infografica, SA
144	Research Systems
1417	REM Infografica, SA
2127	Safework inc.
3321	Scientific Placement Inc.
1331	Side Effects Software
1609/ 1627	Silicon Graphics, Inc.
1827	SOFTIMAGE
841	Sun Microsystems, Inc.
3708	Sven Technologies
3629	TechImage, Ltd.
2619	TGS, Inc.
2143	Toyobo Co., Ltd.
1250	University of Advancing Computer Technology
2121	Virtual Research Systems/Sense 8 Corporation
3601	Virtual Technologies, Inc.
2341	Visible Productions
3432	Volume Graphics GmbH
2904	Voxar

Workstations
Estaciones de trabajo
Workstations
워크스테이션
Arbeitsstationen/-plätze
Postes de travail
ワークステーション
Workstations

Booth

1107 BIG MAC/W.C.N.
3715 Bordeaux Region Development Agency (BRA)
1521 CADCrafts
873 Chromatek Inc.
1343 Compaq Computer Corporation
1145 Dataram Corporation
371 Diamond Multimedia
2401 Dynamic Pictures, Inc.
2009 Fujitsu Microelectronics, Inc.
2501 Gateway Inc.
1041 Hewlett-Packard Company
965 IBM Corporation
979 Intel Corporation
665 Intergraph Computer Systems
2241 LEGASYS International
2809 Minicomputer Exchange, Inc.
1431 PixelFusion
2017 Polhemus, Incorporated
1609/1627 Silicon Graphics, Inc.
647 Sony Electronics Inc.
841 Sun Microsystems, Inc.
1222 TNT Technologies
3219 Transoft
249 Tri-Star Computer
885 UMAX Technologies, Inc.
3512 Western Micro Technology
3501 Workstation Users Alliance, Inc.

Miscellaneous
Misceláneos
Varie
기타
Verschiendenes
Divers
その他
Outros

3D
435 Minolta Corporation

3D anatomical modes & imaging
2341 Visible Productions

3D animation
1241 Digimation

3D authoring tools
3207 The Motion Factory

3D custom services
1208 3NAME3D

3D digitizers
1209 Immersion Corporation

3D Java tools
2619 TGS, Inc.

3D modeling
3821 Robert McNeel & Associates

3D rendering appliances
2445 Advanced Rendering Technology

3D plotters/milling machines
329 Roland DGA Corporation

16 x 9 Video
3201 Ensemble Designs Inc.

Academic software discounts
2332 Journey Education Marketing

Association (multimedia content)
1224 MMC

Automated graphics processing
1841 Equilibrium

Autostereoscopic 3D desplay
3514 Dredsen University of Technology

Camcorders; VCRs
1509 B & H Photo-Video-Pro-Audio

CG game development & animation
2601 Square USA Inc.

Character animation
3629 TechImage, Ltd.

Clip art/stock photos
3816 Dynamic Graphics, Inc.

Compositing
3301 AIST/Omni Q Inc.
2201 Amazon/Interactive Effects

Compositing/editing/effects software
2016 Jaleo North America

Compositing software
2317 Silicon Grail

Computer application training
530 MacAcademy/Windows Academy

Computer furniture
1113 Anthro Corporation

Data conversion
3700 Okino Computer Graphics, Inc.

Desktop photogrammetry; 3D models from photos
2434 3D Construction Company

Digital film recorders
1218 CELCO
757 Management Graphics, Inc.

Digital video asset management
3509 ISLIP Media, Inc.

Digital video compositing and editing solution
2131 Videonics, Inc.

Digitizing tablets
3415 FTG Data Systems

Disk recorders
2538 DVS Digital Video Systems

DVD
3529 Catalogic

DVD mastering systems
3809 Blossom Technologies

Education
2333 Advanced Media Production
1155 The Art Institutes International
1109 Desktop Images

Editing
1051 Play Incorporated

Effects & editing systems
2637 Quantel Inc.

Equipment leasing & financing
1151 Balboa Capital

Exhibition
2139 Imagina

Fibre channel RAID disk arrays
2901 Storage Concepts

Film/TV
1379 Avid Technology, Inc.

Furniture
1240 Winsted Corporation

Game production S/W
1257 Nichimen Graphics, Inc.

Gesture recognition
3601 Virtual Technologies, Inc.

Graphics and Computer Science Books
1101 Addison Wesley Longman

Head mount display
2121 Virtual Research Systems/Sense 8 Corporation

Immersive imaging
1283 Live Picture, Inc.

Landscape visualization
146 Questar Productions

Laser cinema recorder
335 aii/DCS

Media management
3521 Bulldog

Motion capture
1529 B & L Engineering
679 Digits 'n Art Software Inc.
3409 Kaydara Inc.
2339 LambSoft, Inc.
2017 Polhemus, Incorporated
429 Puppet Works

Motion capture software
2339 LambSoft, Inc.

Motion capture systems
1505 Peak Performance Technologies

Multimedia projectors
3401 Proxima/ASK

Multiple monitors video cards
434 Appian Graphics

Multi-windowing systems
879 Miranda Technologies

New media training
2813 Vancouver Film School

Nonlinear editing systems
1123 Coast to Coast Partners

Numerical Libraries
1244 Numerical Algorithms Group Inc.

Optical motion capture systems
257 Vicon Motion Systems

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SIGGRAPH: the organization

Stop by these SIGGRAPH booths in Hall C Lobby.

SIGGRAPH: The Organization

SIGGRAPH is the Special Interest Group on Computer Graphics and Interactive Techniques. In the span of 30 years, SIGGRAPH has grown from a handful of computer graphics enthusiasts to a diverse membership including artists, engineers, animators, filmmakers, software and hardware developers, scientists, mathematicians, and other professionals in the field of computer graphics. In addition to its own annual conference, SIGGRAPH serves the worldwide graphics community with the sponsorship of focused conferences, professional chapters, awards, grants, educational resources, online resources, public policy, and the SIGGRAPH Video Review. SIGGRAPH offers additional benefits to its members including its quarterly newsletter, Computer Graphics and discounts on registration and publications for the annual and other conferences. For general information on SIGGRAPH, contact:

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www.siggraph.org

The SIGGRAPH Executive Committee will hold the annual open business meeting on Tuesday 21 July 5:30 - 6:30 pm in Room 240 AB.

SIGGRAPH Education Committee

SIGGRAPH supports both computer graphics education and the use of computer graphics in education through its Education Committee. The committee's activities include curriculum studies, a quarterly newsletter for educators, and educational projects. The Education Committee booth features SPACE, a juried exhibition of student animations and posters, and a display of student slides submitted by faculty from around the world and SPICE, a juried exhibition of student interactive projects. For more information contact:

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SIGGRAPH Professional Chapters

Professional Chapters of ACM SIGGRAPH exist in 35 cities in 12 countries around the world. They form an international multicultural network of like-minded people who develop, continue, and extend the work and achievements presented at the annual ACM SIGGRAPH Conference. Each chapter includes members involved in education, the arts, research, development, industry, and entertainment who are interested in the development of computer graphics and its related technologies and applications. Here is your opportunity to continue your SIGGRAPH experience by joining a professional chapter. If there is no professional chapter in your area, inquire at the SIGGRAPH Professional Chapters Booth about how to form one. For more information contact:

Scott Lang
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www.siggraph.org/chapters

SIGGRAPH One More Time

SIGGRAPH offers the opportunity at SIGGRAPH 98 to purchase conference proceedings, CD-ROMs, and slide sets from previous SIGGRAPH annual conferences as well as from other SIGGRAPH-sponsored conferences and workshops. Many items are in very limited quantities. For more information contact:

Stephen Spencer
SIGGRAPH Director for Publications
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SIGGRAPH Video Review

SIGGRAPH Video Review is the world's most widely circulated video-based publication. Since 1979, SIGGRAPH Video Review has illustrated the latest concepts in computer graphics and interactive techniques/technologies. Over 125 issues provide an unequaled opportunity to study advanced computer graphics theory and applications. SIGGRAPH Video Review tapes are available at SIGGRAPH 98 in NTSC VHS and PAL VHS. For more information contact:

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how to get involved

ACM SIGGRAPH is dedicated to the advancement of computer graphics and interactive techniques through activities that foster the exchange of information among graphics professionals of all kinds. The organization has a long tradition of bringing together a wide variety of people (users, researchers, teachers, product developers) in an exciting exchange of ideas that benefits our entire community.

The heart of SIGGRAPH is its active, talented core of volunteers, and we are always looking for new people with new ideas to keep SIGGRAPH vibrant. It's easy to find SIGGRAPH volunteers at SIGGRAPH 98. Many very involved volunteers will be in the SIGGRAPH organization's booth in the Hall C Lobby. You can also meet us at our joint open house with the SIGGRAPH 99 committee.

SIGGRAPH Get Involved
Tuesday 21 July, 5 - 6:30 pm
Room 330 Lobby, Orange County Convention Center

Membership

SIGGRAPH is the world's largest professional society for persons working in computer graphics and interactive techniques. It has members all over the world and in every facet of the computer graphics field. Being a member of SIGGRAPH demonstrates your involvement in the computer graphics community and your support for SIGGRAPH's goals and activities. The strength of SIGGRAPH's voice on issues important to our field depends on its activities and on the number and quality of our membership.

As a SIGGRAPH member, you receive the Computer Graphics newsletter, the Conference Proceedings and CD-ROM, Conference Abstracts & Applications and CD-ROM, Electronic Art & Animation Catalog and CD-ROM. You may also choose a less expensive "Lite" membership that includes only the newsletter. All members enjoy discounts on SIGGRAPH conferences and publications, and have the opportunity to subscribe to the proceedings of other computer-graphics-related conferences through the Member Plus program.

You can join SIGGRAPH at the ACM booth in Hall C Lobby of the Orange County Convention Center, or look for membership information at: www.siggraph.org/

SIGGRAPH Activities

In addition to sponsoring the annual conference, SIGGRAPH has many activities that go on throughout the year and around the world. Many of the activity areas mentioned below have open meetings during SIGGRAPH 98.

Publications

SIGGRAPH's Publications Committee is responsible for all of SIGGRAPH's publications in print, on CD-ROM, on video, and online. The committee is made up of people with skills in editing, writing, and producing various media, and is a great place for someone skilled in these areas to help others learn about computer graphics and interactive techniques. For information, contact Stephen Spencer, SIGGRAPH Director for Publications.

Other Conferences

SIGGRAPH sponsors or has formal cooperation with about a dozen other conferences each year. These include such events as the Interactive 3D Graphics Workshop, the Computational Geometry Conference, the ACM Multimedia Conference, the Volume Visualization Symposium, UIST: User Interface Software and Technology Conference, and the Solid Modeling Conference. SIGGRAPH works with the organizers of SIGGRAPH-sponsored conferences and coordinates relationships with other conferences, For information, contact Nick England, SIGGRAPH Director at Large.

Public Policy

SIGGRAPH's Public Policy Committee provides information on relevant external activities, such as proposed legislation, to SIGGRAPH members and others of the technical community. It also provides education on the implications of technology to the non-technical community. For information. contact Bob Ellis or Judy Brown, Co-Chairs of the Public Policy Committee.

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SIGGRAPH Business Meeting

Tuesday 21 July 5:30 - 6:30 pm
Room 240 AB, Orange County Convention Center

SIGGRAPH Professional Chapters' Annual Business Meeting

Wednesday 22 July 10 - 11:30 am
Room 204 B, Orange County Convention Center

SIGGRAPH Education Committee

Wednesday 22 July 2 - 3 pm
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Breakout - Art

Wednesday 22 July 3 - 4 pm
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Breakout - Computer Science

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SIGGRAPH Public Policy

Thursday 23 July 1 - 3 pm
Room 225 A, Orange County Convention Center

SIGGRAPH Executive Committee Meeting

Saturday 25 July 9 am - 5 pm
Orlando III, Peabody Orlando

How to Contact SIGGRAPH

You can send email to SIGGRAPH people by addressing them as:
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The directors whose names appear here are also members of the Executive Committee. Their contact information is listed on the inside front cover of the Conference Proceedings and in all issues of the Computer Graphics newsletter.

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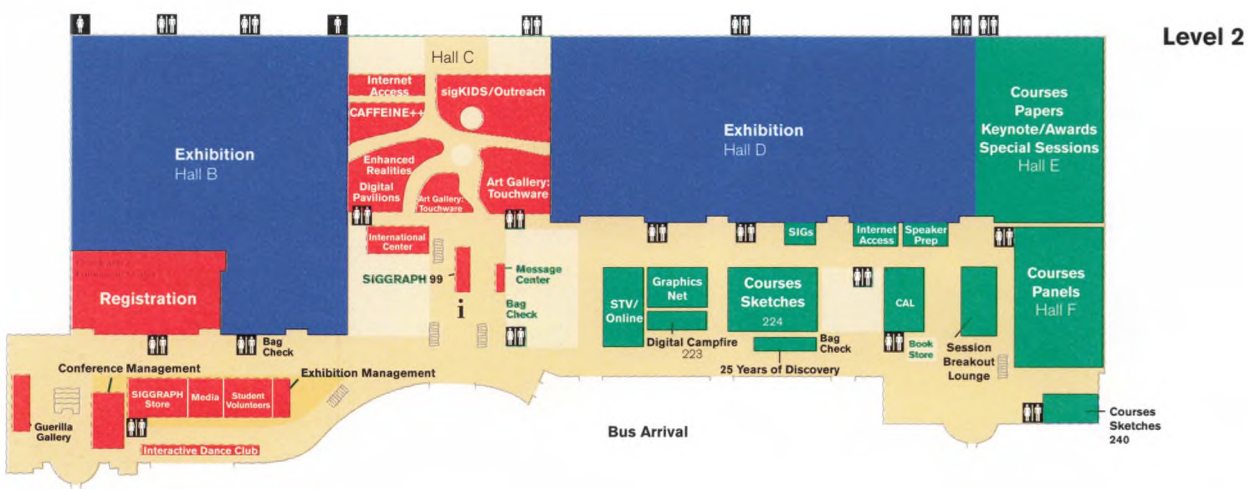

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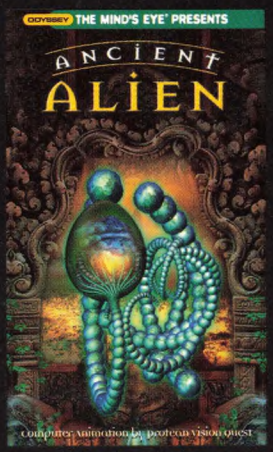

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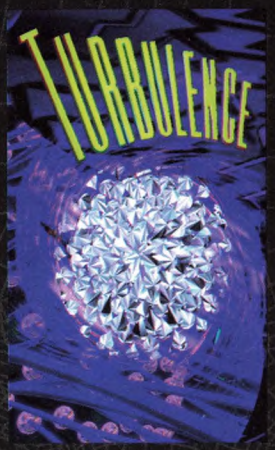

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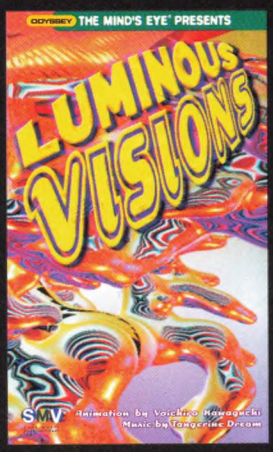

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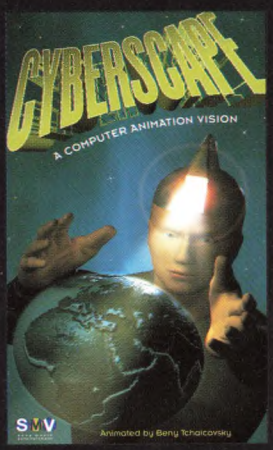

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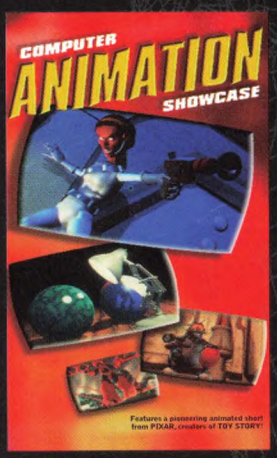

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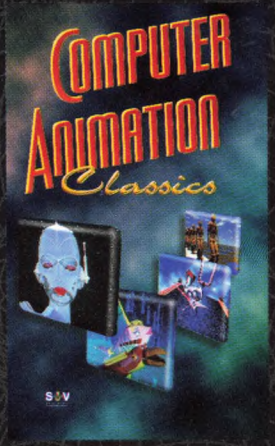

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