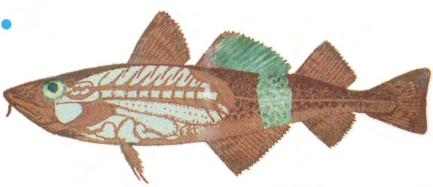
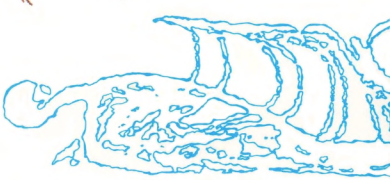
FINAL PROGRAM





ACM SIGGRAPH **89**

16th Annual Conference
on Computer Graphics
and Interactive Techniques
Boston, Massachusetts
31 July—4 August 1989

Sponsored by the Association for Computing Machinery's Special Interest Group on Computer Graphics in cooperation with the IEEE Technical Committee on Computer Graphics


ACM SIGGRAPH
89

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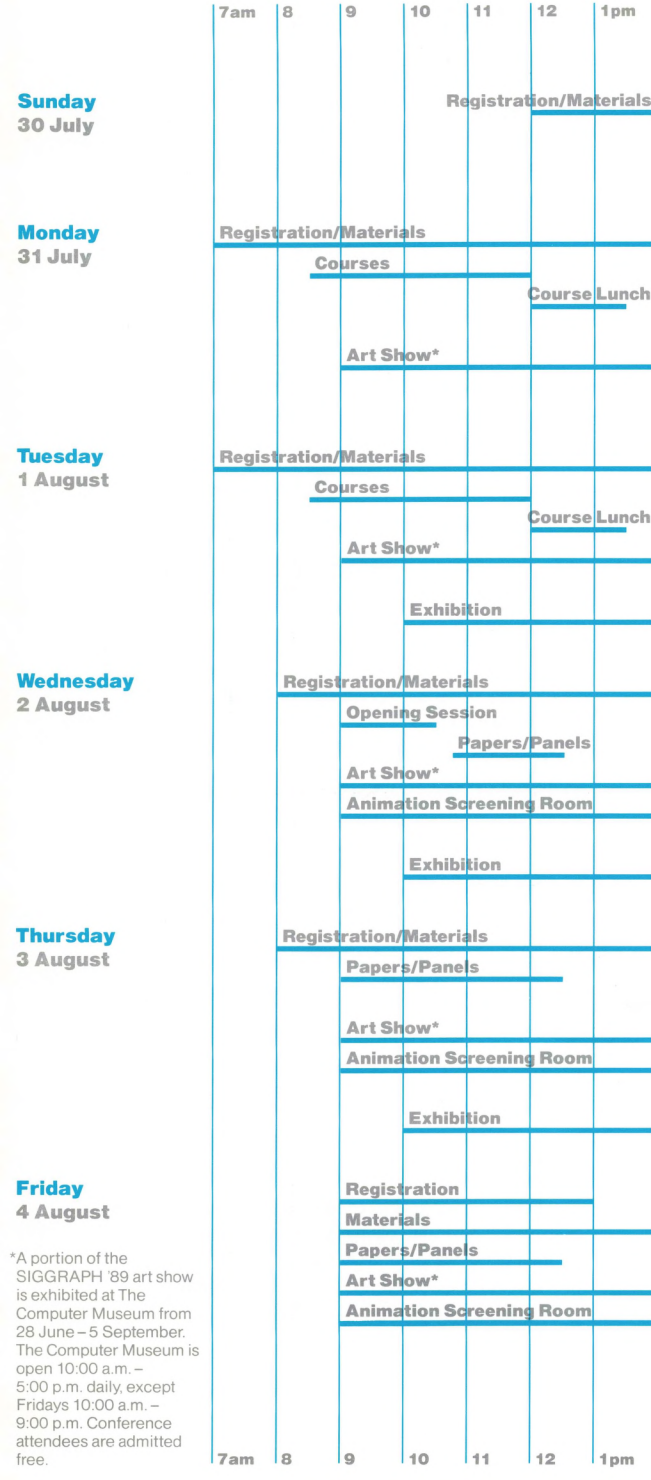
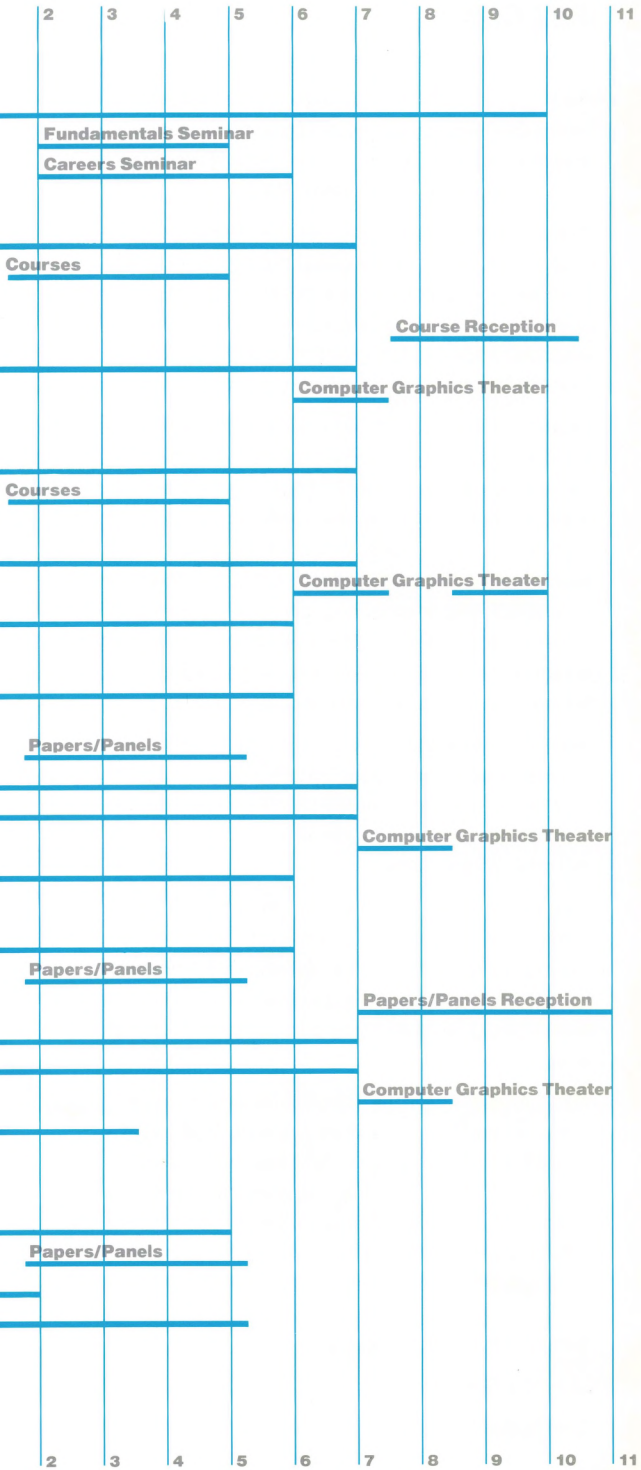


*A portion of the SIGGRAPH '89 art show is exhibited at The Computer Museum from 28 June – 5 September. The Computer Museum is open 10:00 a.m. – 5:00 p.m. daily, except Fridays 10:00 a.m. – 9:00 p.m. Conference attendees are admitted free.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WELCOME

For 16 years, SIGGRAPH conferences have offered unparalleled opportunities for engineers, researchers, scientists, practitioners, artists, and enthusiasts to gather, share ideas, and develop creative solutions.

From the technical program—which includes courses, papers, and panels—to the creative art show, visually stimulating computer graphics theater, and state-of-the-art exhibition, you'll enjoy a multitude of opportunities to be educated, entertained, and enlightened. Undoubtedly, SIGGRAPH offers something for everyone.

SIGGRAPH has always been the place where the newest technology first emerges. Visualization, which was once a new buzzword at SIGGRAPH, is now an established part of the program. Human interface, which was in the spotlight years ago, is coming back with renewed vigor. New this year is a computer graphics careers seminar for educators, counselors, and those looking to change careers and a computer graphics history panel which provides personal perspectives of the problems, excitement, and breakthroughs in the early days of computer graphics.

Take time to immerse yourself in the cutting-edge technology that's happening around you and take advantage of the eclectic mix of personalities. Look for new trends in synthetic imaging, algorithms, multi-media, art, animation, and other timely topics.

We'd like to extend a big thank you to all the volunteers and professionals who have worked so hard to give vitality and depth to SIGGRAPH '89. We've been fortunate to have so many exceptional individuals collaborating as a team—giving us, as co-chairs, a tremendous source of energy.

Throughout the year, the international farewell in the computer graphics community has been "See you at SIGGRAPH." Now that we're here together for SIGGRAPH '89, we'd like to pass on the energy and excitement that's been building all year. We hope to give you fresh ideas that will stimulate you in the upcoming year to continue developing one of the world's most dynamic industries.

SIGGRAPH '89 Co-chairs

Branko J. Gerovac

Christopher F. Herot

BEHIND-THE-SCENES AT SIGGRAPH

SIGGRAPH: The Organization

SIGGRAPH is the Association for Computing Machinery's Special Interest Group on Computer Graphics. Started in 1967, SIGGRAPH has grown from a handful of computer graphics enthusiasts to a diverse membership of over 12,000, including artists and planners, engineers, animators, and filmmakers; software and hardware developers and manufacturers; scientists and mathematicians; and many other professionals in the fields of computer graphics theory, design, implementation, and interactive techniques.

In addition to the annual conference—regarded as the world's premier computer graphics forum—SIGGRAPH co-sponsors symposiums, workshops, and other conferences. To keep the exchange of information flowing on the local level, SIGGRAPH has established local chapters across the United States, including: Chicago, Dallas, Denver/Boulder, Los Angeles, Minneapolis/St. Paul, New England, New York, Princeton, Rio Grande, Rochester, Syracuse, and Washington, D.C., and overseas in Paris, Lisbon, London, and Milan.

Membership dues are $20 for ACM members and associate members, $12 for ACM student members, and $47 for non-ACM members. Membership includes a subscription to *Computer Graphics,* SIGGRAPH's publication; the conference proceedings; and discounts on registration fees for the annual conference.

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Christine Schöpf
ARS Electronica, Linz, Austria

Dorothy Spencer
Read/Write Press

Art Show Committee

Rachel Carpenter
Cinematrix

Phil Getto
Rensselaer Polytechnic Institute

Copper Giloth
University of Massachusetts Institute

Kathy Huffman
Institute of Contemporary Art, Boston

Oliver Strimpel
The Computer Museum

Jane Veeder
San Francisco State University

GENERAL INFORMATION

Airline Information

The official SIGGRAPH '89 travel agency, Heritage Meetings & Incentives, Inc. (HMI), is available to assist you with your travel plans. However, due to industry regulations, tickets issued by travel agencies other than HMI, or by the carrier directly, cannot be reissued by HMI. The HMI desk is located on the First Level, Services Area Desk of the Hynes Convention Center and is open during registration hours.

Audio/Visual Services

A/V Office

The A/V office is located in Gardner A of the Sheraton Boston Hotel and Towers. Questions about audio/visual needs should be directed to this office during the following hours: 9:00 a.m. to 9:00 p.m. Sunday, and 8:30 a.m. to 5:00 p.m., Monday-Friday. For more information, call 617-236-6187.

Computer Graphics Theater and Animation Screening Room Office

This office is located in Room 201 on the Second Level of the Hynes Convention Center. Contributors can gather to exchange ideas, leave messages, or handle concerns. The office is open Monday-Friday, 10:00 a.m.-5:00 p.m.

Speaker Slide-Making Room

Speakers with last-minute slide changes can make alterations in the speaker prep room, Fairfax A & B of the Sheraton Boston Hotel and Towers. The slide-making service is available: noon to 5:00 p.m. Sunday, and 8:30 a.m. to 5:00 p.m. Monday-Thursday. This service is donated by Codd Barrett Associates. For more information, call 617-236-6185.

Speaker Prep Room

Speakers' slides and videotapes may be previewed in the speaker prep room, Fairfax A & B of the Sheraton Boston Hotel and Towers. All speakers are encouraged to check in during speaker prep room hours: 9:00 a.m. to 9:00 p.m. Sunday, 7:00 a.m. to 10:00 p.m. Monday-Thursday, and 7:00 a.m. to 5:00 p.m. Friday.

Child Care

Child care services are offered by most SIGGRAPH '89 hotels. Contact the concierge desk or guest services department of your hotel to find out what services are provided.

Conference Information Office

Attendees with general questions about the conference may request help in Room 104 on the First Level of the Hynes Convention Center. You may either visit the office or reach them by phoning 617-954-2622.

Exhibition Management Office

If you have questions regarding the exhibition, personnel are on hand to assist you in Room 101 on the First Level of the Hynes Convention Center. You may either visit the office or reach them by phoning 617-954-2637.

First Aid Office

A registered nurse or paramedic is on duty in the First Level Medical Room, located across the corridor from the dining area of the Hynes Convention Center. This office is open during registration hours. The first aid telephone number is 617-954-2240.

Hotels

The following hotels offer special rates to SIGGRAPH '89 attendees and are easily accessible to the Hynes Convention Center. Shuttle bus service is provided at no charge between most SIGGRAPH '89 hotels and the Hynes Convention Center. Check for posted schedules in your hotel lobby.

***Back Bay Hilton**
40 Dalton Street
Boston, MA 02115
617-236-1100

Boston Park Plaza Hotel and Towers
50 Park Plaza at Arlington Street
Boston, MA 02117
617-426-2000

***The Colonnade**
120 Huntington Avenue
Boston, MA 02116
617-424-7000

Copley Plaza
138 St. James Avenue
Boston, MA 02116
617-267-5300

Copley Square Hotel
47 Huntington Avenue at Copley Plaza
Boston, MA 02116
617-536-9000

57 Park Plaza
200 Stuart Street
Boston, MA 02116
617-482-1800

Guest Quarters
400 Soldiers Field Road
Boston, MA 02134
617-783-0090

Hyatt Regency Cambridge
575 Memorial Drive
Cambridge, MA 02139
617-492-1234

Lafayette Hotel
One Avenue de Lafayette
Boston, MA 02111
617-451-2600

Lenox Hotel
710 Boylston Street
Boston, MA 02116
617-536-5300

Marriott Cambridge
Two Cambridge Center
Boston, MA 02142
617-494-6600

****Marriott Copley Place**
110 Huntington Avenue
Boston, MA 02116
617-236-5800

Midtown Hotel
220 Huntington Avenue
Boston, MA 02115
617-262-1000

Omni Parker House
60 School Street
Boston, MA 02108
617-227-8600

Quality Inn Downtown
275 Tremont Street
Boston, MA 02116
617-426-1400

Royal Sonesta
5 Cambridge Parkway
Cambridge, MA 02142
617-491-3600

***Sheraton Boston Hotel and Towers**
Headquarters Hotel
Prudential Center
Boston, MA 02199
617-236-2000

***Westin Hotel Copley Place**
10 Huntington Avenue
Boston, MA 02110
617-262-9600

*These hotels are within walking distance of the Hynes Convention Center, therefore buses are not provided.

**Limited bus service is available Wednesday-Friday to and from the Hynes Convention Center for the paper/panel sessions only.

Housing Assistance

A representative from the Boston Housing Bureau is available at the housing desk located on the First Level in the main lobby of the Hynes Convention Center. This person is available during registration hours on Sunday, Monday, and Tuesday. The housing desk telephone number is 617-954-2625. Persons requiring assistance on Wednesday, Thursday, or Friday may call the Boston Housing Bureau at 617-536-9028.

Information Booths

The information booths are located in the Boylston Street Hall on the Second and Third Levels of the Hynes Convention Center. Personnel are available to handle questions beginning at noon on Sunday and thereafter during registration hours.

International Center

The International Center is a quiet place for international attendees to gather and meet each other. Located in Room 313 on the Third Level of the Hynes Convention Center, the room also provides a place for you to make registration inquiries, locate translators, and handle other concerns. In addition to telephones and a FAX machine, the international center is providing information on currency exchange, local consulate services, and restaurants to suit your taste. Translators are available to assist you Sunday through Wednesday, 30 July—2 August during registration hours.

Luggage Check

For your convenience during registration hours, a luggage check is located in the corridor of the First Level adjacent to the dining area of the Hynes Convention Center.

Materials

Conference participants interested in purchasing SIGGRAPH '89 course notes, proceedings, slide sets, polo and t-shirts, visors, baseball caps, mouse pads, calendars, mugs, local group patches, and art show and computer graphics theater catalogs must pick them up in Room 312 on the Third Level of the Hynes Convention Center. In addition, participants can purchase SIGGRAPH video reviews.

Please be aware that one computer graphics theater and one art show catalog are included with papers/panels and courses registration. Additional copies may be purchased through the on-site registration desk.

The materials desk is located in Room 312 of the Hynes Convention Center and is open during registration hours, except Friday from 9:00 a.m.-5:00 p.m.

As a convenience to attendees who don't wish to stand in a registration line to buy a SIGGRAPH souvenir, a SIGGRAPH boutique will be open for the first time. The boutique will have available for purchase calendars, polo and t-shirts, mugs, baseball caps and visors, mouse pads, and local groups patches. Cash and checks are the only accepted form of payment in the boutique.

The boutique is located on the First Level in the main lobby and is open Thursday and Friday from 8:00 a.m.-5:30 p.m.

After the conference, proceedings, slide sets, and video reviews may be ordered from the ACM Order Department by calling toll free 800-342-6626; or when calling from Maryland, Alaska, Hawaii, or outside the United States call 301-528-4261. You also can write to: ACM Order Dept., P.O. Box 64145, Baltimore, MD 21264.

Message Center

The message center for SIGGRAPH '89 conference participants is located on the First Level in the main lobby of the Hynes Convention Center. The message center is open during registration hours.

In addition, conference participants may use the message center to leave messages for other conference participants. The message center telephone number is 617-954-2611.

Press Briefing

Highlights of SIGGRAPH '89 are presented to members of the press on Tuesday, 1 August, from 8:00 a.m. to 9:00 a.m. in Room 103 on the First Level of the Hynes Convention Center. The briefing features several leading authorities from various computer graphics disciplines—art, animation, multi-media, and scientific visualization. They'll highlight what's exciting in this year's program and what's ahead in the industry's future. At the end of the hour, key spokespeople are available to answer questions.

A private, guided press tour of the exhibition is offered from 9:00 a.m. to 10:00 a.m. immediately following the question-and-answer session. This tour is provided for members of the press one hour before its official opening.

Press Rooms

The press office, Room 102 on the First Level of the Hynes Convention Center, serves as a general information center for members of the press. Press should come directly to this room to register and pick up press badges. Telephones, conference course notes, proceedings, a message board, and exhibitor press kits are available in this room. In addition, a list of suggested SIGGRAPH '89 photo opportunity locations is posted here.

Room 103 of the Hynes Convention Center is reserved for conducting press interviews. The press interview room has telephones and IBM-compatible personal computers for use by press members.

An alternate location for the working media, Room 106, is equipped with podiums, microphones, and seating arrangements for conducting and filming live interviews. Scheduling for use of this room is coordinated through the press office (Room 102).

Press attendance at SIGGRAPH '89 courses is limited to a one-hour visit per course. Members of the press are asked to take seats only after all registrants have been seated.

The press room hours are:

Sunday, 30 July	2:00 p.m. to 6:00 p.m.
Monday, 31 July	8:00 a.m. to 6:00 p.m.
Tuesday, 1 August	8:00 a.m. to 6:00 p.m.
Wednesday, 2 August	8:00 a.m. to 6:00 p.m.
Thursday, 3 August	8:00 a.m. to 6:00 p.m.
Friday, 4 August	8:00 a.m. to noon

Registration

On-site registration for SIGGRAPH '89 activities is in Rooms 302, 304, and 306 on the Third Level of the Hynes Convention Center during the following times:

Sunday, 30 July	noon to 10:00 p.m.
Monday, 31 July	7:00 a.m. to 7:00 p.m.
Tuesday, 1 August	7:00 a.m. to 7:00 p.m.
Wednesday, 2 August	8:00 a.m. to 6:00 p.m.
Thursday, 3 August	8:00 a.m. to 6:00 p.m.
Friday, 4 August	9:00 a.m. to 1:00 p.m.

Restaurant Information

A restaurant information desk, located on the First Level in the main lobby of the Hynes Convention Center, provides SIGGRAPH '89 attendees with menus from local restaurants. Personnel can assist conference participants with selecting restaurants and making reservations. This desk is open during registration hours.

Shipping Desk

A shipping desk is located in Room 312 on the Third Level of the Hynes Convention Center and is open during registration hours. UPS provides ground service in the United States and parts of Canada and may take up to five days. Next-day air and second-day air service is available to the United States, Canada, and overseas at a slightly higher cost.

SIGGRAPH Local Groups

Information concerning local SIGGRAPH groups can be obtained in the Local Groups booth on the First Level in the main lobby of the Hynes Convention Center.

Slide Sets

SIGGRAPH '89 technical, art show, and stereoscopic 3D slide sets ordered before the conference must be picked up at the Conference Materials Desk in Room 312 on the Third Level of the Hynes Convention Center. After the conference, slides are available from the ACM Order Department. See the materials listing on page 23 for details.

Smoking Policy

Smoking is not permitted in conference locations.

Social Functions

The excitement of SIGGRAPH does not end once the sun goes down, for SIGGRAPH's evening receptions offer attendees additional time to socialize, mingle, and exchange ideas.

Course registrants are invited to a reception at The Computer and Children's Museums on Monday evening from 7:30 p.m. to 10:30 p.m. These adjacent galleries are situated on downtown Boston's waterfront and provide a stimulating atmosphere for lively conversation. Also home to a portion of the SIGGRAPH '89 art show, The Computer Museum offers numerous hands-on exhibits capturing significant accomplishments in the computer and information systems industry. Round-trip buses are available to transport participants to the museums. Buses will begin departing from the Hynes Convention Center at 7:00 p.m.

An equally engaging event is planned for papers/panels registrants Thursday evening at the Museum of Science. As with previous receptions, this gathering presents an opportunity for colleagues to interact with industry experts, program speakers, and each other while munching on a pleasant variety of ethnic hors d'oeuvres. This affair is held from 7:00 p.m. to 11:00 p.m. Buses will begin departing from the Hynes Convention Center at 6:30 p.m.

Telephone Numbers

A/V Office	617-236-6187
Boston Housing Bureau	617-536-9028
Computer Graphics Theater Office	617-954-2621
Conference Information Office	617-954-2622
Emergencies (ambulance, fire, police)	911
Exhibition Management Office	617-954-2637
First Aid Office	617-954-2240
Housing Assistance	617-954-2625
Message Center	617-954-2611
Press Office	617-954-2630
Registration	617-954-2626
Speaker Slide-Making Room	617-236-6185

Transportation

Frequent shuttle bus service is provided at no charge between most SIGGRAPH '89 hotels and the Hynes Convention Center. Shuttle buses are provided for all conference activities. Also, information on public transportation is available at the Information Center.

FUNDAMENTALS SEMINAR

Terminology and First Principles of Computer Graphics

Marriott Copley Place, Ballrooms A-E
Sunday, 2:00 p.m.-5:00 p.m.

Chair

Dick Phillips, Los Alamos National Laboratory

Lecturer

Dick Phillips, Los Alamos National Laboratory

Topics

- Graphics applications overview
- Introduction to graphics hardware
- Introduction to graphics software
- Graphical human-computer interaction

CAREERS SEMINAR

Careers in Computer Graphics

Marriott Copley Place, Ballrooms G-K
Sunday, 2:00 p.m.-6:00 p.m.

Chair

Stephan R. Keith
Sun Microsystems, Inc.

Lecturers

Judith R. Brown
University of Iowa

Del Coates
San Jose State University

Steve Cunningham
California State University, Stanislaus

Carol Stenborg
Minneapolis College of Art and Design

Topics

- Introduction/Keith
- Computer graphics community overview/Cunningham
- Overview and report on SIGGRAPH careers questionnaire/Keith
- Educational requirements for computer graphics/Cunningham
- Career profiles for:
  - Art, animation/Stenborg
  - Industrial design, CAD/Coates
  - Education—as a career/Brown
  - Scientific visualization/Keith

TECHNICAL PROGRAM

The technical program forms the nucleus of the annual SIGGRAPH conference and is referred to as "the technical engine that drives the computer graphics industry." The technical program is comprised of:

- courses
- papers
- panels

Details and descriptions for the courses and papers/panels are found on page 34 to 91.

Courses

Industry experts with first-hand experience in a variety of areas present the most up-to-date industry findings, offering full-day, in-depth course sessions on a wide range of topics associated with computer graphics and interactive techniques. Course notes are included with each session.

Each SIGGRAPH '89 course ranks under one of three levels to best meet attendee needs and interests:

Introductory

Introductory courses require no prerequisites. However, overall interest, general background (computing, graphics, math applications), and, possibly, a prior short course or "survey" may be beneficial.

Intermediate

In mid-level courses, students should have a significant working knowledge of the area attained through introductory courses, reading, and practical experience.

These courses often organize existing knowledge into a coherent whole supplying a model or other structure for the discipline. They also supply substantial technical content and depth. Most courses cover many specific topics in detail, such as algorithms, techniques, and architectures.

Advanced

Advanced courses generally consider a narrow topic in substantial technical depth. The attendee should be well-informed in the general topic area through previous courses, reading, and significant years' computer graphics experience. Advanced courses generally require intermediate courses and other advanced courses as prerequisites.

The courses are held in various hotels from 8:30 a.m. to noon and 1:30 p.m. to 5:00 p.m. on Monday, 31 July and Tuesday, 1 August. The course locations are listed in the convention locator in your registration packet and are posted on a kiosk in the registration area. Lunches are served to course attendees at the various hotels.

Course notes are available for pick up at the materials desk located in Room 312 in the Hynes Convention Center.

Course registrants are invited to a reception at The Computer and Children's Museums on Monday evening from 7:30 p.m. to 10:30 p.m. (See social functions on page 26 for details.)

Courses-at-a-Glance

	No.		Course Title
Beginning	1	New	Perceptual Discrepancies in Color Production Technology
	2	New	Artists' and Designers' Introduction to Computer Graphics
	3	New	Desktop Computer Animation
	4		3D Character Animation by Computer
	5		Fundamentals and Overview of Computer Graphics
	6		Applications Programming for the X-Window System
	7	New	Experiential Computer Art
	8	New	Emerging User-Interface Media: Potentials and Challenges
	9		Introduction to Computer Animation
	10	New	Introduction to Practical Issues in Color Reproduction and Selection
	11		Introduction to Window Management
	13	New	2D and 3D Visualization Workshop
	15		Usability Testing and Design Guidelines for Graphical User Interfaces
	17	New	Introduction to Visual Programming Environments
Intermediate	12		An Introduction to Ray Tracing
	14		Contemporary Approaches to Geometry for Computer Graphics and Computer-Aided Design
	16	New	Parallel Processing and Advanced Architectures in Computer Graphics
	18	New	Radiosity
	19		Curve and Surface Design: From Geometry to Applications
	20		Solid Modeling: Architectures, Mathematics, and Algorithms
	21		Fractals: Analysis and Modeling
	22	New	State of the Art in Facial Animation
	23	New	Math for SIGGRAPH
	24		Stereographics
	25		The Computer Graphics Interface—The Next International Graphics Standard
	26	New	X3D-PEX (PEX): 3D Graphics in a Distributed Window System
	27		The PostScript Page Description Language
Advanced	28	New	State of the Art in Data Visualization
	29	New	Implementing and Interacting with Real-Time Microworlds
	30		Topics in Physically-Based Modeling

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1

Perceptual Discrepancies in Color Production Technology

Monday—Beginning

Chair

Sonya Haferkorn, Pratt Institute

Lecturers

Mary S. Gruber, Colortec Graphic Production, Inc.
Sonya Haferkorn, Pratt Institute
Jodi L. Slater, Manhattan Graphics Corporation
Stephen M. Uzzo, NYIT

Topics

- Introduction/Haferkorn
- Color selection and perceptual color spaces/Slater
  - Color attributes and terminology
  - Color in art education
  - Color systems in the visual arts
  - Color models in computer graphics
  - Mathematical vs. perceptual color models
  - User interfaces
  - Color selection tools
- Manipulation of color illusions/Haferkorn
  - Colored light and human perception
  - The illusory behavior of color
  - Fundamental color illusions
  - Color identity illusions
  - Color interval illusions
  - Complex spatial illusions
  - Solutions to color problems
- Color output technology/Uzzo
  - The computed image
  - The RGB signal
  - Display technology/Video encoding
  - Magnetic recording techniques
  - Image compositing
  - High-definition television and film
- Computer color and print/Gruber
  - Color separation systems
  - The input of print images
  - High-resolution scanning
  - Limited color output devices
  - Film recorders
  - The Scitex process
  - High-end color proofing
  - Computer-based color correction

2

Artists' and Designers' Introduction to Computer Graphics

Tuesday—Beginning

Chair

Maria Palazzi, Rutgers University

Lecturers

John C. Donkin, The Ohio State University
Richard Lucas, Bowling Green State University
Maria Palazzi, Rutgers University
Anne Seidman, Moore College of Art and Design

Topics

- Overview of computer graphics and animation/Lucas
  - Why would you use it?
  - When would you use it?
  - 2D vs. 3D graphics
  - System setups and buzzwords
  - Visual examples
- The storyboarding process/Lucas
  - Materials and methods
  - Does it communicate?
  - Can it be done?
- Image processing/Seidman
  - Digital input
  - Image manipulation
  - Paint systems
  - 2D animation
  - Computer graphics output and print process
- 3D graphics/Palazzi
  - 3D space
  - Object creation
  - Surface attributes and lighting
- Motion/Palazzi, Donkin
  - 3D in motion
  - Keyframes vs. motion splines
  - Motion hierarchies
- Character animation/Donkin
  - Conventional principles applied
  - Character development
  - Realistic limitations
- Summary and review/Lucas, Seidman, Palazzi, Donkin

3

Desktop Computer Animation

Monday—Beginning

Co-Chairs

Patricia Harrison, School of the Art Institute of Chicago
Daniel Sadowski, MacroMind, Inc.

Lecturers

Thomas A. DeFanti, University of Illinois at Chicago
Patricia Harrison, School of the Art Institute of Chicago
Daniel Sadowski, MacroMind, Inc.
Daniel Sandin, University of Illinois at Chicago
John Schlag, MacroMind, Inc.
Stuart Sharpe, MacroMind, Inc.

Topics

- Techniques of animation/Harrison
  - Spatial definition—the design
  - Temporal definition—the motion
  - Presentation—the display
- Technology of animation/Sadowski
  - Survey of current hardware and software systems
  - Design and development of animation software
  - Multi-media and interactivity
- 2D animation/Sharpe
  - Process of computer animation
  - Storyboard/Editing/Sound
  - Simulation and visualization tools
- 3D animation/Schlag
  - Components of 3D graphics
  - Types of 3D animation
  - Interfaces to animation data
- Desktop video/Sandin
  - Video technology
  - Real-time recording vs. single-frame recording
  - Compliance with NTSC standards
- Future trends/DeFanti
  - Real-time interactive systems
  - Parallel processors for ray tracing and rendering
  - Networks and graphics servers

4

3D Character Animation by Computer

Tuesday—Beginning

Chair

Bill Kroyer, Kroyer Films, Inc.

Lecturers

Brad Bird, Independent Consultant
Roger L. Gould, Pacific Data Images
Bill Kroyer, Kroyer Films, Inc.
John Lasseter, Pixar
Graham Walters, Pacific Data Images

Topics

- Fundamentals of computer animation production/Kroyer
  - Evaluating the task
  - Planning production
  - Case studies
- The CG process: Friend and foe/Gould
  - What can CG do effectively?
  - How does the computer influence the animation?
  - How do we apply the lessons of traditional animation?
  - What techniques are important?
  - What are the big wins—and the big problems?
- Of puppets and dynamics/Walters
  - The history of Waldo, a CG interactive Muppet
  - Technical advances achieved making Waldo
  - A live demonstration of Waldo
  - Comparison of puppetry and animation
- Staging and storytelling in film and animation/Bird
  - What is staging?
  - How storypoints are made and lost by staging
  - How animated movement affects staging
  - Why staging is crucial to stating the themes of the film
- Very, very basic themes of animated motion/Lasseter
  - The basic principles of animated motion described by Norman McClaren applied to 3D computer animation

5

Fundamentals and Overview of Computer Graphics

Monday—Beginning

Chair

Olin Lathrop, Cognivision, Inc.

Lecturers

Norman Badler, University of Pennsylvania
Rich Fichera, Independent Consultant
Olin Lathrop, Cognivision, Inc.
Carl Machover, Machover Associates

Topics

- Introduction to computer graphics/Fichera
  - History
  - Display technologies
  - Fundamental concepts
  - Basic hardware architectures
  - The current market
- Modeling (how to explain objects to a computer)/Badler
  - What is 3D modeling?
  - Operations performed on models
  - Surface and boundary models
  - Volume and CSG models
  - Where do models come from?
- Rendering (making pictures from models)/Lathrop
  - Wire frame, depth buffer, ray tracing methods
  - What color is the object at *this* pixel?
  - Compositing
  - Aliasing (jaggies and how to deal with them)
  - Dithering
- The user's view/Machover
  - The software environment
    - General block diagram
    - Different types of programs and packages
    - The role of standards
  - The output environment
    - Forming the picture
    - Hardcopy/softcopy
  - The input environment
  - The system environment
- Demos: How to watch them and what to look for/Fichera, Machover
  - What you see may not be what you get
  - Some representative products at the exhibition

6
Applications Programming for the X Window System

Tuesday—Beginning

Chair

Oliver Jones, Apollo Computer

Lecturers

Kate Erf, Apollo Computer
Oliver Jones, Apollo Computer
Doug Young, Hewlett-Packard Company

Topics

- Architecture of the X Window System/Jones
  - Goals
  - Client-server model
  - Vendor and network independence
- Hello, world!/Jones
  - A trivial example in Xlib, illustrating basic event handling
- Memo/Young
  - A simple toolkit program for displaying text illustrates basic toolkit concepts
- Xlogo/Young
  - A simple toolkit program for displaying a bitmap
- Graphics/Jones
  - How to use Xgraphics requests
- Draw/Young
  - A simple draw program based on the Xtoolkit
- Drawlogo/Jones
  - A simple custom widget
- Open dialogue/Erf
  - An extensible object-oriented user interface management system, layered on XExamples of open dialogues used in building OSF/Motif-style human interfaces is shown

7

Experiential Computer Art

Monday—Beginning

Chair

Lucy Petrovich, University of Wisconsin

Lecturers

Thomas A. DeFanti, University of Illinois at Chicago
Myron W. Krueger, Artificial Reality Corporation
Lucy Petrovich, University of Wisconsin
Alan Rath, Independent Consultant
David Rokeby, Independent Consultant
Daniel Sandin, University of Illinois at Chicago

Topics

- Introduction/Petrovich
- Introduction to very nervous system/Rokeby
- In-depth look at the language (IntAct)/Rokeby
- Design constraints for systems/DeFanti
- Systems artist-programmers can deal with/DeFanti
- Interactive image/Sandin
- Complex images from simple rules: Fractals/Sandin
- Information systems/Rath
- From physical to virtual/Rath
- Interactive environments/Krueger
- Artificial reality/Krueger
- Video Place/Krueger

8

Emerging User Interface Media: Potentials and Challenges

Tuesday—Beginning

Chair

Chris Schmandt, MIT Media Lab

Lecturers

Walter Bender, MIT Media Lab
Robert J.K. Jacob, Naval Research Laboratory
Scott Fisher, NASA Ames Research Center
Chris Schmandt, MIT Media Lab

Topics

- Voice I/O/Schmandt
  - Speech synthesis
  - Perceptual issues, prosodics
  - Speech recognition, language understanding
  - Speech coding
  - Dialogue systems, examples
- Eye-tracking/Jacob
  - Methods for measuring eye movements
  - Characteristics of eye movements
  - Designing interaction techniques
  - Examples and experience
- Display technologies/Bender
  - High-resolution systems
  - Alternative displays
  - Grayscale and color
  - Motion video
- Interactive stereoscopic systems/Fisher
  - Stereoscopic perception overview
  - Stereoscopic display techniques
  - Computer-based stereoscopy
- Spatial input and feedback/Fisher
  - 3D digitizers
  - Pressure-sensitive displays
  - Exoskeletons and DataGloves
  - Tactile feedback and force-reflection

9

Introduction to Computer Animation

Monday—Beginning

Chair

Judson Rosebush, Rosebush Visions Corporation

Lecturers

Matt Elson, Symbolics
Pierre Jasmin, Pyrate Communications
Judson Rosebush, Rosebush Visions Corporation
Jerry Weil, Optomystic

Topics

- Foundations/Rosebush
  - Basics of computer animation production
  - Abstract procedural approaches and 3D
  - Scientific visualization
- Introduction to concepts concerning action
  - Motion scripting and kinematics
  - Dynamics and physical modeling
- The production of computer animation/Elson
  - Overview of the production process
    - Animation studio organization
    - Scheduling and budgeting
- The animator's workstation and craft
  - Object and action construction
  - Lighting and rendering
  - A case study
- Scripting and action/Weil
  - The scripting of kinematic action
    - Classical exposure sheet
    - Command-driven 3D and menu approaches
- Dynamic action and physically modeling cloth
    - Physical models and dynamic modeling
    - Defining forces and physical parameters
- Static and dynamic approaches to modeling hair
- Character animation and artificial life/Jasmin
  - Treatment and animation of the body and face
    - Modeling the structure and motion of the body
    - Kinematic vs. dynamic approaches to action
    - Animating facial expressions and lip sync
    - Approaches to modeling the head
- Growth simulations: Plants and animals

10

Introduction to Practical Issues in Color Reproduction and Selection

Tuesday—Beginning

Chair

Gary Meyer, University of Oregon

Lecturers

William B. Cowan, University of Waterloo
Gary Meyer, University of Oregon
Maureen C. Stone, Xerox PARC
Brian A. Wandell, Stanford University

Topics

- Color perception/Wandell
  - Nature of the stimulus: Lights and surfaces
  - The color-matching experiment
  - The representation of color in the visual pathways
- Color measurement/Stone
  - The trichromatic generalization
  - Photometry and colorimetry
  - Color spaces and color space transformations
- Objectives of color reproduction/Stone
- Additive systems: Color television/Meyer
  - Color television colorimetry
  - Basic monitor calibration
- Subtractive systems: Film and printing/Stone
  - Introduction to printing technology
  - Introduction to film technology
  - Subtractive calibration
- Monitor-to-print color transformations/Stone
- Color synthesis in realistic imaging/Meyer
  - Causes of color in the natural world
  - Synthesis of spectral energy distributions
  - Realistic color and the limitations of spectral synthesis
- Color selection for user interfaces/Cowan
  - Color appearance
  - When is color useful?
  - Controlling color

11
Introduction to Window Management

Monday—Beginning

Chair

Jonathan E. Steinhart, Independent Consultant

Lecturers

Mark Callow, Silicon Graphics
Richard J. Greco, Tektronix, Inc.
David A. LaVallee, Sun Microsystems, Inc.
Jonathan E. Steinhart, Independent Consultant

Topics

- Introduction/Steinhart
- Window system models
  - Window management operating systems/Steinhart
  - Application program interface considerations/Greco
- Kernel topics
  - Area management/Steinhart
  - Device drivers for monochrome frame buffer devices/Greco
  - Device drivers for color frame buffer devices/Greco
  - Device drivers for frame buffer devices with graphics accelerators/Callow
  - Input distribution/Steinhart
  - Task management and scheduling/Steinhart
- User topics
  - User space overview/Steinhart
  - Toolkits/Callow
  - Object-oriented programming for toolkits/LaVallee
  - Toolkit survey/Callow
  - Window managers/Callow
  - User interface standards/LaVallee
  - User toolkits/LaVallee
  - Writing windowed applications/LaVallee
- Future directions and trends/Steinhart

12
An Introduction to Ray Tracing

Tuesday—Intermediate

Chair

Andrew S. Glassner, Xerox PARC

Lecturers

Jim Arvo, Apollo Computer
Robert L. Cook, Light Source
Andrew S. Glassner, Xerox PARC
Eric A. Haines, 3D/Eye, Inc.
Pat Hanrahan, Pixar
Paul Heckbert, University of California, Berkeley

Topics

- An overview of ray tracing/Glassner
- Essential ray tracing algorithms/Haines
- A survey of ray-surface intersection algorithms/Hanrahan
- Surface physics for ray tracing/Glassner
- Stochastic sampling and distributed ray tracing/Cook
- A survey of ray tracing acceleration techniques/Arvo
- Writing a ray tracer/Heckbert
- Research topics

13
2D and 3D Visualization Workshop

Monday—Beginning

Chair

Craig Upson, Stellar Computer, Inc.

Lecturers

David Kerlick, NASA Ames Research Center
Craig Upson, Stellar Computer, Inc.
Richard Weinberg, University of Southern California, Los Angeles
Robert Wolff, Apple Computer

Topics

- Introduction to visualization/Upson
  - Data mapping transformations
  - Filtering data into geometric primitives
  - Rendering primitives into images
  - Image display
- The suite of geometric representations/Upson
- 2D visualization techniques/Wolff
  - Representation forms for 2D data
  - Color transfer functions and pseudo-coloring
  - The role of qualitative techniques
- 3D visualization techniques/Upson
  - Volumetric data: Its sources and formats
  - Geometric forms and rendering algorithms using:
    - Point primitives
    - Vector primitives
    - Surface primitives
    - Volumetric primitives
- Hands-on workshop on volumetric visualization/Upson, Wolff
- Film and video compilation/Weinberg
  - The historical context of scientific visualization

14

Contemporary Approaches to Geometry for Computer Graphics and Computer-Aided Design

Tuesday—Intermediate

Chair

Ron Goldman, University of Waterloo

Lecturers

Brian Barsky, University of California, Berkeley
Tony D. DeRose, University of Washington, Seattle
Ron Goldman, University of Waterloo
Tom Sederberg, Brigham Young University

Topics

- Affine geometry/DeRose
  - Fundamentals of affine geometry
  - Affine transformations
  - Abstract data types
  - Robust programming techniques
  - Applications to computer graphics
- Recursive curve and surface schemes/Goldman
  - Recursive evaluation algorithms
    - DeCasteljau algorithm for Bézier curves and surfaces
    - DeBoor algorithm for B-splines
    - Neville algorithm for Lagrange polynomials
  - Blossoming
    - Dual functionals
    - Knot insertion algorithms
    - Transformation techniques
  - Probabilistic interpretations
- Geometric continuity/Barsky
  - Parametric vs. geometric continuity
  - Geometric continuity for Piecewise Bézier curves
  - Integral and rational beta splines
  - Beta constraints
  - Shape parameters
- Cubic algebraic patches/Sederberg
  - Construction methods
  - Parametrization techniques
  - Shape control
  - Smoothness
  - Applications to computer-aided design

15

Usability Testing and Design Guidelines for Graphical User Interfaces

Monday—Beginning

Chair

Arlene F. Aucella, AFA Design Consultants

Lecturers

Arlene F. Aucella, AFA Design Consultants
Joy Mountford, Apple Computer
Judy Ramey, University of Washington, Seattle

Topics

- Introduction/Aucella
  - Defining ease-of-use and setting usability criteria
  - Cost/benefit analysis
  - User interface standards and guidelines
  - Objects, actions, and tasks
- Overview of usability testing/Aucella
  - Prototyping and simulations
  - Thinking aloud protocols
  - Behavioral benchmarking
  - Field observations
- Case study—Apple Computer/Mountford
  - Philosophy behind user interface at Apple
  - Example: Icon design and navigational prompts
- Case study—University of Washington/Ramey
  - Common constraints in user testing
  - Training and documentation issues
  - Example: Desktop publishing
- Windows/Aucella
  - Window borders: Icons, scroll bars
  - Class exercise: Navigation between windows
  - Mouse vs. keyboard manipulation
- Icons and menus/Aucella
  - Examples and types
  - Mapping to objects, actions, and applications
  - Labeling and selection
- Input devices and selection techniques/Aucella
  - Mouse design
  - Performance measures for keyboards, mice, tablets, trackballs, etc.
  - Dragging vs. multiple clicks
- Summary/Aucella

16

Parallel Processing and Advanced Architectures in Computer Graphics

Tuesday—Intermediate

Chair

Scott Whitman, The Ohio State University

Lecturers

Frank Crow, Xerox PARC
Henry Fuchs, University of North Carolina at Chapel Hill
Nader Gharachorloo, IBM T.J. Watson Research Center
Scott Whitman, The Ohio State University

Topics

- Introduction and course overview/Whitman
- Parallel processing for high-end graphics/Crow
  - Need for speed
  - Granularity in parallel approaches to image synthesis
  - Parallelizing the rendering pipeline
- Graphics display algorithms for parallel processors/Whitman
  - Constraints on displaying images in parallel
  - Potential parallelism in image synthesis techniques
  - Issues in developing a software parallel graphics algorithm and example software parallel solutions
- Introduction to rasterization problem/Fuchs
  - Front-end calculations
  - Back-end pixel calculations
  - Frame buffer, Z-buffer, Gouraud shading
  - History of research proposals
- Scanline-based architectures/Gharachorloo
  - Polygon-to-scanline conversion
  - Systolic array graphics engine (SAGE)
  - Virutal buffers
  - Characterization of 10 rasterization techniques
- Architecture of Pixel Planes 5 System/Fuchs
  - Old and new pixel planes
  - Higher function (shadows, spheres, textures...)
- Future directions and trends in parallel graphics/Crow
  - Machines on the drawing boards
  - Far-out machines of the future
  - Nanotechnology, etc., ultimate limits?
  - Ultra-brute-force techniques (physical simulation)
  - Managing complexity
- Discussion on future of high-performance graphics systems/All

17

Introduction to Visual Programming Environments

Monday—Beginning

Chair

Ephraim P. Glinert, Rensselaer Polytechnic Institute

Lecturers

Marc H. Brown, DEC Systems Research Center
Ephraim P. Glinert, Rensselaer Polytechnic Institute
Brad A. Myers, Carnegie Mellon University

Topics

- Introduction/Myers
  - Definitions and classification of visual environments
  - Advantages and disadvantages of using graphics
  - Taxonomies for programming systems
- Graphical representations for programs/Glinert
  - A survey of well-known and obscure representations for programs in a variety of paradigms
- Issues and systems for program visualization/Brown
  - Static and dynamic code displays
  - Static and dynamic data displays
  - Survey of three generations of systems for algorithm animation
  - Taxonomy and techniques for PV displays
- An in-depth look at selected visual systems/Glinert
  - PICT, SunPict, PC-TILES and C/SQUARED
- An in-depth look at selected visual systems/Myers
  - PERIDOT and MacGnome
- An in-depth look at the Zeus algorithm animation system/Brown
  - The user model
  - The programmer model
  - The system implementation
- Graphics in the working environment—key issues/Glinert
  - Effective system-level design
  - Effective interface design
  - Effective icon design
- Outstanding issues in visual programming/Myers
  - Can the approach scale up?
  - Can color be used effectively?
  - What the future may hold

18
Radiosity

Tuesday—Intermediate

Chair

Donald P. Greenberg, Cornell University

Lecturers

Michael F. Cohen, University of Utah, Salt Lake City
Donald P. Greenberg, Cornell University
Roy A. Hall, Cornell University
Holly E. Rushmeier, Georgia Institute of Technology
John R. Wallace, 3D/Eye, Inc.

Topics

- Introduction/Greenberg
- Global illumination algorithms/Hall
- Basic radiosity formulation/Cohen
  - Simple environments
  - Occluded environments
  - Adaptive sampling
- Comparison to real experiments/Rushmeier
- Progressive refinement solutions/Greenberg
- Radiosity extensions/Wallace, Rushmeier
  - Specular reflections
  - Scattering/participating media
  - Dynamic environments
- Limitations of radiosity methods/Wallace, Rushmeier
  - Sampling and form-factor computations
  - Algorithmic improvements
- Future directions and conclusions/Greenberg

19

Curve and Surface Design: From Geometry to Applications

Monday—Intermediate

Chair

Gerald Farin, Arizona State University

Lecturers

Robert E. Barnhill, Arizona State University
Gerald Farin, Arizona State University
Thomas Foley, Arizona State University
Gregory M. Nielson, Arizona State University

Topics

- Bézier curves/Farin
- Curve interpolation/Barnhill
- B-splines, NURBS/Farin
- Tensor product surfaces/Foley
- Triangular patches/Nielson
- Coons and Gordon surfaces/Barnhill
- Selected topics/Foley
- Geometric continuity/Nielson
- Scattered data interpolation/Foley
- Geometry processing/Barnhill
- Selected topics/Nielson
- Summary and comparison of methods/Farin

20

Solid Modeling: Architectures, Mathematics, and Algorithms

Tuesday—Intermediate

Chair

James R. Miller, University of Kansas

Lecturers

George Allen, McDonnell Douglas
James R. Miller, University of Kansas
Kevin J. Weiler, Ardent Computer
Peter R. Wilson, General Electric Company

Topics

- Introduction/Miller
- Architectures/Miller
  - Multiple representation architectures
  - Software architectures
- Boundary evaluation/Miller
  - Definitions and concepts
  - A boundary evaluation algorithm
  - What can go wrong?
- Curves and surfaces/Allen
  - Representation schemes (conics/quadrics and free-form)
  - Common operations (e.g., intersections)
- Boundary representation data structures/Weiler
  - Issues such as sufficiency and efficiency
  - Comparisons of various representation schemes
  - Non-manifold boundary representations
- Features in solid modeling/Wilson
  - Basic definitions and concepts
  - Feature recognition
  - Designing with features

21

Fractals: Analysis and Modeling

Monday—Intermediate

Chair

Dietmar Saupe, Universität Bremen, West Germany

Lecturers

Heinz-Otto Peitgen, University of California, Santa Cruz and Universität Bremen, West Germany

Przemyslaw Prusinkiewicz, University of Regina, Saskatchewan

Dietmar Saupe, Universität Bremen, West Germany

Richard F. Voss, IBM T.J. Watson Research Center

Topics

- Random fractals/Saupe, Voss
  - Fractal dimension
  - Statistical vs. exact self-similarity
  - Fractional Brownian motion
  - Representation in the time and spectral domain
  - Construction by random successive additions
  - Lacunarity
  - Data analysis
  - Recent development of new algorithms
- Dynamical systems and fractals/Peitgen
  - Turbo algorithm for Mandelbrot and Julia sets
  - L-Systems
  - Iterated function systems
  - Animation of deterministic fractals
- Modeling/Prusinkiewicz, Saupe
  - L-Systems and biologically-based modeling
  - Developmental plant models with animation
  - Models of cell layers
  - Random fractal cloud models in space and time
  - Solid textures via fractal perturbations

22

State of the Art in Facial Animation

Tuesday—Intermediate

Chair

Frederic I. Parke, NYIT Computer Graphics Laboratory

Lecturers

Brad DeGraf, DeGraf/Wahrman
Steve DiPaola, NYIT Computer Graphics Laboratory
Jeff Kleiser, Kleiser-Walczak Construction Company
Frederic I. Parke, NYIT Computer Graphics Laboratory
Steve Pieper, MIT Media Lab
Keith Waters, Schlumberger Laboratory of Computer Science
Brian Wyvill, University of Calgary, Alberta

Topics

- Historical perspective/Parke
- Sources of facial data/DeGraf, Kleiser, Parke
  - 3D digitizers/Laser systems
  - Photogrammetric, etc.
- Facial modeling approaches/DiPaola, Kleiser, Parke
  - Stochastic processes; range of facial types
  - Capturing likeness—individual diversity
  - Hair/Empathetic characterizations
- Facial animation techniques/All
- Parameterized models/DiPaola, Parke
  - Expression, speech, and conformation parameters
- Speech-synchronized animation/Parke, Wyvill
  - Automated recognition and matching
  - Phoneme-driven synthesis—speech by rule
- Physical modeling and simulation of facial tissue/Pieper, Waters
  - Anatomy and mechanics of facial tissue
  - Dynamic muscle model approaches
- Production systems/DiPaola, Kleiser
- Real-time performance systems/DeGraf, Wyvill
- Interactive demonstrations, animations, and examples/All
- Outstanding research problems and future developments/All

23
Math for SIGGRAPH

Monday—Intermediate

Chair

Ken Shoemake, Xerox PARC

Lecturers

Tony D. DeRose, University of Washington, Seattle
James T. Kajiya, California Institute of Technology
John C. Platt, California Institute of Technology
Ken Shoemake, Xerox PARC

Topics

- Digital signal processing/Shoemake
  - Signals as vectors—fournier transform
  - Signals as polynomials—Z transform
  - Signals as filters—filter implementation
- Affine, euclidean, and perspective geometry/DeRose
  - Affine geometry
  - Euclidean geometry
  - Abstract data types for geometry
  - Implementation notes
- Characterizing parametric cubics/DeRose
  - Canonical affine form
  - Classification regions
  - Implementation
- Differential geometry/Kajiya
  - Manifolds
  - Vector fields and bundles
  - Differential forms
  - Graphics applications
- Quaternion calculus/Shoemake
  - Orientation
  - Quaternion multiplication
  - Rotation
  - Interpolation
  - Differentiation
- Nasty numerical problems/Platt
  - The great chain of being for numerical analysis
  - Solving stiff differential equations
  - Solving large non-linear systems
  - Solving large linear systems
- Rate-controlled constraints/Platt
  - Discussion of current research

24

Stereographics

Tuesday—Intermediate

Chair

Larry F. Hodges, Georgia Institute of Technology

Lecturers

Robert J. Beaton, Virginia Tech
Larry F. Hodges, Georgia Institute of Technology
Phil Johnson, Tektronix, Inc.
Shaun Love, North Carolina State University
David F. McAllister, North Carolina State University

Topics

- Overview of 3D display/Hodges
- Human factor issues/Beaton
- Stereographic display hardware/Johnson
- Computing stereographic views/Hodges
- 3D hardcopy techniques/Love
- Other 3D techniques/McAllister
  - Varifocal mirrors
  - Alternating pairs
  - Moving slit
  - Chromstereoscopic
- Demonstrations of 3D display technologies

25

The Computer Graphics Interface—The Next International Graphics Standard

Monday—Intermediate

Chair

Theodore N. Reed, Los Alamos National Laboratory

Lecturers

Janet S. Chin, Chin Associates
Theodore N. Reed, Los Alamos National Laboratory
Karla Steinbrugge Chauveau, Metheus Corporation

Topics

- Overview of graphics standards/Chin
- CGI architecture/Reed
- Control functions/Reed
- Graphic object pipeline/Chauveau
- Graphic objects/Chauveau
- Compound primitives/Chin
- Segments/Chauveau
- Input functions/Chin
- Raster functions/Reed

26

X3D-PEX (PEX): 3D Graphics in a Distributed Window System

Tuesday—Intermediate

Chair

Marty Hess, Sun Microsystems, Inc.

Lecturers

Ken Garnett, Unicad, Inc.
Marty Hess, Sun Microsystems, Inc.
Eileen McGinnis, Sun Microsystems, Inc.
Dave Plunkett, Solbourne Computer, Inc.
David Rosenthal, Sun Microsystems, Inc.
Randi Rost, Digital Equipment Corporation

Topics

- Introduction/Hess
  - Goals, PEX terms
- Technical overview
  - PHIGS/concepts and architecture/McGinnis
  - The X-Window System concepts and architecture/ Rosenthal
  - PEX overview/Hess
    - Ramifications of diverse goals (X vs. PHIGS)
    - PEX resources; What's distributed where?
- Architectural examination of PEX
  - Protocol considerations/Rosenthal, Rost
  - Relationship to Core X; Flexibility
  - Client's/application's-eye view/McGinnis, Garnett
    - PHIGS/Application Programming Interface; (API)
    - Consideration of window environment on API
  - Server's-Eye View/Plunkett, Rost, Hess
    - Server architecture; Relationship to Core X
    - Relationship to PHIGS/Internal interfaces
  - Implementation considerations/Hess, Plunkett
    - Device range of implementations
    - Hardware acceleration
- Application programmer's considerations/Garnett
  - Invisible/Visible PEX
  - General application considerations for PEX
- Live PEX demonstrations
- Current status of PEX
- PEX architectural panel

27

The PostScript Page Description Language

Monday—Intermediate

Chair

Leo Hourvitz, NeXT, Inc.

Lecturers

Ken Anderson, Adobe Systems Inc.
Linda Gass, Adobe Systems Inc.
Leo Hourvitz, NeXT, Inc.

Topics

- Introduction/Hourvitz
  - What problems does the PostScript language address?
- Demo/Hourvitz
- Imaging model/Gass
  - Stencil through paint model
  - Path construction
  - Coordinate systems and transforms
  - Graphics state
  - Painting—Color models/Halftoning
- Stacks and dictionaries/Anderson
  - Language facilities
  - Save/restore
  - Server loop
- Memory management/Anderson
  - Types
  - Save/restore
  - PostScript VM
- Fonts/Gass
  - Character-drawing operators
  - Font dictionaries
  - User-defined fonts
  - How does the show operator work?
- Scanned images/Gass
  - The image operator
  - Masks
  - Transfer functions
- Display PostScript/Hourvitz
- EPSF format/Hourvitz
- PostScript examples and techniques/All

28

State of the Art in Data Visualization

Tuesday—Advance

Chair

Olin Lathrop, Cognivision, Inc.

Lecturers

Maxine D. Brown, University of Illinois at Chicago
Olin Lathrop, Cognivision, Inc.
Steve Legensky, Intelligent Light
Mark E. Smith, Cognivision, Inc.
Lloyd E. Treinish, NASA Goddard Space Flight Center
Tim VanHook, Sun Microsystems, Inc.
Velvin (Val) Watson, NASA Ames Research Center

Topics

- Discipline-independent visualization software/Treinish
  - Visualization pipeline/primitives
- Visualization techniques/Smith
  - Orthogonality
  - Various hacks, tricks, and rules of thumb
- Visualization experience at NASA Ames/Watson
  - Current tools capability
  - Potential for improvements
  - Current research status
  - Future recommendations
- Visualization of volumetric data/Lathrop
  - Useful results with 2D techniques
  - Current research with octree methods
- Computational hierarchies for fluid dynamics visualization/Legensky
  - Computational requirements for interactive simulation
  - Filtering techniques for graphics representations
  - Interactive graphics requirements
  - Heterogeneous machine environment
- Televisualization/Brown
  - Distributed graphics computing
  - The Array Tracer
- Visual computing/VanHook
  - Volume display techniques
  - Common algorithms and techniques
  - System and hardware considerations

29

Implementing and Interacting with Real-Time Microworlds

Monday—Advanced

Chair

David Zeltzer, MIT Media Lab

Lecturers

Frederick P. Brooks, University of North Carolina at Chapel Hill
Rod Deyo, Evans & Sutherland
Scott Fisher, NASA Ames Research Center
David Sturman, MIT Media Lab
David Zeltzer, MIT Media Lab

Topics

- Virtual environments: History and survey/Zeltzer
- Exploring virtual buildings/Brooks
  - Achieving real-time update
  - Intuitive interfaces and image realism
  - Model building and real applications
- Virtual environments, personal simulation and telepresence/Fisher
  - The Ames Virtual Environment Workstation
  - Human factors requirements
  - Head-mounted stereoscopic displays
  - Computer-generated and remote camera imagery
  - 3D auditory displays
  - Requirements for real-time interaction
  - Position and gesture tracking technologies
  - Tactile input and feedback and voice I/O
- Real-time vehicle simulation/Deyo
  - Rigid body kinematics and dynamics
  - Real-time dynamics algorithms
  - Physiology of motion perception
  - Designing effective motion systems
  - Simulated vehicle controls
  - Combining dynamics, visuals, and motion
- Graphical simulation for task-level animation/Zeltzer, Sturman
  - Task-level animation
  - The bolio graphical simulation environment
  - Whole-hand interaction
  - Core tools for simulation
  - Behavior modeling tools
  - Interfacing to applications

30

Topics in Physically-Based Modeling

Tuesday—Advanced

Chairs

Alan H. Barr, California Institute of Technology
Andrew P. Witkin, Carnegie Mellon University

Lecturers

Alan H. Barr, California Institute of Technology
Gavin Miller, Apple Computer
John Platt, California Institute of Technology
Marc Raibert, MIT
Karl Sims, Optomystic
Andrew P. Witkin, Carnegie Mellon University

Topics

- Introduction to physically-based modeling/Barr, Witkin
- Physically-based locomotion/Raibert
- Legged robots/Raibert
- Legless robots/Miller
- Rate-controlled constraint methods/Platt
- Physically-based particle systems/Sims
- Producing optimal motion/Witkin
- Developments in physically-based modeling/Barr
- Physically-based animation

Papers/Panels-at-a-Glance

	Date/Time	Hynes Convention Center Auditorium
Wednesday	9:00—10:30	Opening Session
	10:45—12:30	Papers—Natural Models
	1:45— 3:15	Papers—Hardware
	3:30— 5:15	Papers—Rendering
Thursday	9:00—10:30	Papers—Graphics Interfaces
	10:45—12:30	Papers—Geometric Modeling
	1:45— 3:15	Papers—Visualization
	3:30— 5:15	Papers—Animation
Friday	9:00—10:30	Papers—3D Textures
	10:45—12:30	Papers—Ray Tracing
	1:45— 3:15	Papers—Radiosity
	3:30— 5:15	Papers—Graphics Algorithms

Marriott Copley Place Ballrooms E-G	Sheraton Boston Hotel and Towers Grand/Independence Ballrooms
	Panel—Virtual Environments and Interactivity: Windows to the Future
Panel—Digital Canvas: Artists and Designers in the 2D/3D Marketplace	Special Session—Retrospectives: The Early Years in Computer Graphics at MIT, Lincoln Lab, and Harvard
Panel—The Multi-Media Workstation	Special Session—Retrospectives (continued)
Panel—Effective Software Systems for Scientific Data Visualization	Panel—Physically-Based Modeling: Past, Present, and Future
Panel—Hardware/Software Solutions for Scientific Visualization at Large Scientific Research Laboratories	Special Session—Computer Art—An Oxymoron? Views from the Mainstream
Panel—Speech and Audio in Window Systems: When Will They Happen?	Special Session—Bloopers, Outtakes, and Horror Stories of SIGGRAPH Films
Panel—HDTV (Hi-Vision) Computer Graphics	
Panel—Future Directions in Desktop Video	
Panel—Distributed Graphics: Where to Draw the Lines?	
Panel—Operating Systems and Graphic User Interfaces	
Panel—Preparing for the Future	

Papers

SIGGRAPH is widely regarded as the preeminent forum for scholarly papers on computer graphics. Each year, papers presented at SIGGRAPH serve to keep members of the industry informed about the state of the art in computer graphics, including developments in hardware, software, and theory. The wide variety of papers presented offers techniques and tools for attendees in all areas of computer graphics.

In 1989, more than 190 paper proposals were submitted for consideration. From those entries, the papers jury assembled an exciting docket of current industry topics, including rendering algorithms, computer animation, geometric modeling, and the computational complexity of graphics algorithms. Three to four papers will be presented during each paper session, focusing on one particular aspect of the topic—offering a well rounded, wide range of perspectives for participants. Papers selected for presentation are published in the conference proceedings, as an issue of *Computer Graphics*.

Paper sessions are held Wednesday through Friday, 2–4 August, in the Hynes Convention Center Auditorium.

Refreshments are served during the morning and afternoon coffee breaks of the papers, panels, and special sessions.

Also, papers/panels registrants are invited to a Thursday evening reception at the Museum of Science from 7:00 p.m. to 11:00 p.m. (See social functions on page 26 for details.)

Panels

Panel sessions are held concurrently with paper sessions and offer attendees an alternate format for exchanging ideas on timely topics in an informal atmosphere. Panelists share their opinions on techniques and applications in a lively forum, enabling the audience to gain new insights and contrasting viewpoints. Topics include current controversies in computer graphics, emerging concepts in hardware and software, and new applications in science and industry. All sessions are recorded and transcribed for distribution after the conference.

The panels are held Wednesday through Friday, 2-4 August at the Sheraton Boston Hotel and Towers and Marriott Copley Place.

Special Sessions

Specifically for 1989, a series of special sessions will offer an opportunity for attendees to explore the history of computer graphics, art concepts, and on the lighter side, the bloopers and outtakes from past SIGGRAPH films.

Computer Graphics History

Scheduled for two consecutive sessions on Wednesday afternoon, panelists will offer a glimpse of major milestones in computer graphics at Boston/Cambridge research centers during the 1950s and '60s. The retrospectives focus on specific segments of computer graphics history.

Art Concepts

How is computer art viewed from the mainstream of the art world? Curators, gallery owners, and artists assemble to discuss the evolution of computer-generated art from a novel, new technology to an accepted medium for artistic expression.

SIGGRAPH Filmmaking

Recent Academy Award recipients John Lasseter and Bill Reeves, Pixar, and other filmmakers present a behind-the-scenes view of creating SIGGRAPH films. Combining humor with informative ideas, speakers briefly present their experiences and show bloopers, outtakes, and horror stories of the better-known SIGGRAPH films.

Special sessions are held Wednesday through Thursday, 2-3 August at the Sheraton Boston Hotel and Towers.

Wednesday 9:00 a.m.-10:30 a.m.

Opening Session

Hynes Convention Center Auditorium

SIGGRAPH '89 Welcome

Branko J. Gerovac
Christopher F. Herot

SIGGRAPH Report

SIGGRAPH Chair
James J. Thomas

1989 SIGGRAPH Awards

Presented by Bertram Herzog

Computer Graphics Achievement Award

Recipient: John Warnock

Steven A. Coons Award

Recipient: David C. Evans

Guest Speaker

Martin Newell
President, Ashlar Inc.
Why the Teapot?

Keynote Speaker

Nicholas Negroponte
Professor of Media Technology and Director of the MIT Media Lab
From Bezel to Proscenium
The Human-Computer Interface 25 Years Hence and Beyond the Desktop Metaphor

Wednesday, 10:45 a.m.-12:30 p.m.

Papers

Natural Models

Hynes Convention Center Auditorium

Chair

Alain Fournier, University of Toronto, Ontario

Simulation of Object and Human Skin Deformations in a Grasping Task
Daniel Thalmann, Swiss Federal Institute of Technology
Nadia Magnenat-Thalmann, University of Geneva
Jean-Paul Gourret, MIRALab

Combinatorial Analysis of Ramified Patterns and Computer Imagery of Trees
Xavier Gérard Viennot, Université de Bordeaux
Georges Eyrolles, Université de Bordeaux
Nicolas Janey, Université de Franche-Comté
Didier Arques, Université de Franche-Comté

The Synthesis and Rendering of Eroded Fractal Terrains
F. Kenton Musgrave, Yale University
Craig E. Kolb, Yale University
Robert S. Mace, Silicon Graphics

From Splines to Fractals
Richard Szeliski, Digital Equipment Corporation
Demetri Terzopoulos, Schlumberger Technologies

Computer Graphics Visualization for Acoustic Simulation
Donald P. Greenberg, Cornell University
Adam Stettner, Cornell University

Three Dimensional Terrain Modeling and Display for Environmental Assessment
Kazufumi Kaneda, Hiroshima University
Fujiwa Kato, Hiroshima University
Eihachiro Nakamae, Hiroshima University
Tomoyuki Nishita, Fukuyama University
Hideo Tanaka, Tokyo Electric Power Co., Inc.
Takao Noguchi, Tokyo Electric Power Co., Inc.

Wednesday, 10:45 a.m.-12:30 p.m.

Panel

Virtual Environments and Interactivity: Windows to the Future

Sheraton Boston Hotel and Towers, Grand/Independence Ballrooms

Chair

Coco Conn, Homer and Associates

Computer-generated virtual environments are the product of human imagination. And as user interfaces become more sophisticated, computer researchers and visionaries are investigating the unexplored realm of virtual environments.

Several projects have recently made progress in integrating force display technology and the use of human sensory simulations into computing-based environments. These projects partake of the spirit of creating virtual worlds, fantasy, or simulation environments that combine the emotional power of touch interfaces with new computational powers of abstraction.

Live demonstrations and videotaped sequences feature the use of head-mounted displays, computer clothing, force feedback joysticks, body motion, tactile environments, and the use of touch sensation.

In this virtual environment panel, people can meet each other, take any form they wish, and experience anything that can be imagined.

Panelists

Jaron Lanier, VPL Research
Margaret Minsky, University of North Carolina at Chapel Hill/MIT Media Lab
Scott Fisher, NASA Ames Research Center
Allison Druin, Tell Tale Technologies

Wednesday, 1:45 p.m.-3:15 p.m.

Papers

Hardware

Hynes Convention Center Auditorium

Chair

Nick England, Sun Microsystems, Inc.

Hardware Acceleration for Window Systems
Chris Wilcox, Hewlett-Packard Company
Desi Rhoden, Hewlett-Packard Company

The Pixel Machine: A Parallel Image Computer
Michael Potmesil, AT&T Bell Laboratories
Eric M. Hoffert, AT&T Bell Laboratories

Pixel-Planes 5: A Heterogeneous Multiprocessor Graphics System Using Processor-Enhanced Memories
Henry Fuchs, University of North Carolina at Chapel Hill
John Poulton, University of North Carolina at Chapel Hill
John Eyles, University of North Carolina at Chapel Hill
Trey Greer, University of North Carolina at Chapel Hill
Jack Goldfeather, Carleton College
David Ellsworth, University of North Carolina at Chapel Hill
Steve Molnar, University of North Carolina at Chapel Hill
Greg Turk, University of North Carolina at Chapel Hill
Brice Tebbs, University of North Carolina at Chapel Hill
Laura Israel, University of North Carolina at Chapel Hill

Panel

Digital Canvas: Artists and Designers in the 2D/3D Marketplace

Marriott Copley Place, Ballrooms E-G

Chair

Rachel Carpenter, Cinematrix

With the aid of live computers, slides, and tapes, panelists discuss issues concerning job areas, hardware, creative freedom and compromise, and the merger of art and science leading to new applications. Specifically, the panel focuses on: prepress, the new designer, and today's job market; user interface, creativity, economics and design; animation, broadcast, film and hardware issues; 3D stereoscopic images, music, short films; and future developments.

Wednesday, 1:45 p.m.-3:15 p.m.

Panelists

Claire Barry, SuperMac Technology
Peter Conn, Homer and Associates
John Derry, Chromaset
Vibeke Sorensen, California Institute of the Arts

Special Session

Retrospectives: The Early Years in Computer Graphics at MIT, Lincoln Lab, and Harvard

Sheraton Boston Hotel and Towers, Grand/Independence Ballrooms

Chair

E. Jan Hurst, EJH Associates

In 1988, the SIGGRAPH executive committee funded a project to document major milestones in computer graphics history.

Panelists will concentrate on work pursued in the academic environments of the Boston/Cambridge area during the 1950s and '60s at MIT, Lincoln Lab, and Harvard. Background information sets the stage for panelist comments and enables attendees to understand the environments of that time.

The sessions provide personal perspectives of the problems, excitement, and breakthroughs in the early days of: SAGE, APT, Project MAC, TX-O, TX-2, hidden lines removed, Sketchpad, and curves and surfaces. These sessions are divided into two parts. The second session is in the same location from 3:30 p.m.-5:15 p.m.

Panelists

Michael S. Mahoney, Princeton University
Norman H. Taylor, Independent Consultant
Douglas T. Ross, Softech, Inc.
Robert M. Fano, MIT

Wednesday, 3:30 p.m.-5:15 p.m.

Papers

Rendering

Hynes Convention Center Auditorium

Chair

Loren Carpenter, Pixar

Illumination Networks: Fast Realistic Rendering with General Reflectance Functions
Chris Buckalew, University of Texas, Austin
Donald Fussell, University of Texas, Austin

Near Real-Time Shadow Generation Using BSP Trees
Norman Chin, Columbia University, New York
Steven Feiner, Columbia University, New York

Real-Time Rendering of Trimmed Surfaces
Alyn Rockwood, Silicon Graphics
Kurt Heaton, Silicon Graphics
Tom Davis, Silicon Graphics

Panel

The Multi-Media Workstation

Marriott Copley Place, Ballrooms E-G

Chair

Dick Phillips, Los Alamos National Laboratory

Workstations now offer more than just text and graphics communication capabilities; video and sound channels are available as well. It is possible, for example, to display a live video window on a workstation screen. Thus, researchers at Los Alamos National Laboratory display supercomputer simulations in a video format and students at MIT are tutored in language study with the aid of videodisk-based lecture fragments.

Wednesday, 3:30 p.m.-5:15 p.m.

If equipped with suitable hardware, a workstation can play back voice messages embedded in a conventional document. The NeXT computer has such a capability. The Olivetti Research Center is developing a workstation conferencing system, where text, graphics, and sound can be transmitted in real time among conferees.

This panel explores all of these new multi-media capabilities and how they affect the way workstations are used.

Panelists

Martin Levy, Parallax Graphics, Inc.
Keith Lantz, Olivetti Research Center
Paul Vais, NeXT Computer, Inc.
Steve Perlman, Apple Computer

Special Session

Retrospectives: The Early Years in Computer Graphics at MIT, Lincoln Lab, and Harvard

Sheraton Boston Hotel and Towers, Grand/Independence Ballrooms

Chair

E. Jan Hurst, EJH Associates

This session is a continuation of the Retrospectives special beginning at 1:45 p.m. Refer to description on page 73 for more information.

Panelists

Jack Gilmore, Digital Equipment Corporation
Lawrence G. Roberts, NetExpress, Inc.
A. Robin Forrest, University of East Anglia, U.K.
Mike Mahoney, Princeton University

Thursday, 9:00 a.m.-10:30 a.m.

Papers

Graphics Interfaces

Hynes Convention Center Auditorium

Chair

Richard J. Beach, Xerox PARC

Accurate Color Reproduction for Computer Graphics Applications
Bruce J. Lindbloom, Crosfield Dicomed, Inc.

Metamouse: Specifying Graphical Procedures by Example
David L. Maulsby, University of Calgary
Ian H. Witten, University of Calgary
Kenneth A. Kittiltz, University of Calgary

A Two-View Approach to Constructing User Interfaces
Gideon Avrahami, Digital Equipment Corporation
Kenneth P. Brooks, Digital Equipment Corporation
Marc H. Brown, Digital Equipment Corporation

Panel

Effective Software Systems for Scientific Data Visualization

Marriott Copley Place, Ballrooms E-G

Chair

Lloyd A. Treinish, NASA Goddard Space Flight Center

Despite advancements, significant problems still exist in bringing today's technology into the hands of the typical scientist. Given the demands of modern research, a scientist rarely has time to learn graphics protocols and standards, data structures, device-specific peculiarities and rendering algorithms. Most technology does not permit straightforward application without expert assistance.

This panel discusses issues associated with building systems for scientists to "visualize," current endeavors, and solutions for solving problems practically.

Panelists

Robert B. Haber, NCSA University of Illinois at Champaign-Urbana
James D. Foley, George Washington University
William J. Campbell, NASA Goddard Space Flight Center
Robert F. Gurwitz, Stellar Computer, Inc.

Thursday, 9:00 a.m.-10:30 a.m.

Panel

Physically-Based Modeling: Past, Present, and Future

Sheraton Boston Hotel and Towers, Grand/Independence Ballrooms

Chairs

Demetri Terzopoulos, Schlumberger Technologies
John Platt, California Institute of Technology

Physically-based modeling is an exciting paradigm which made its debut in computer graphics less than five years ago. This paradigm facilitates the creation of complex shapes and realistic motions—once the sole province of highly trained modelers and animators.

In addition, physically-based modeling adds new levels of representation to graphics objects; embodies physical laws which govern its behavior and control systems to produce desired animation; and synthesizes complex motions automatically, making them responsive to one another and the simulated physical worlds they inhabit.

This panel surveys past results, examines present challenges, and envisions the future of physically-based modeling and its potential impact on related fields. Panelists present video demonstrations of several novel techniques such as deformable models, dynamic constraints, teleological modeling, spacetime control, and physically-based procedural animation.

Panelists

Alan H. Barr, California Institute of Technology
Andrew Witkin, Carnegie Mellon University
David Zeltzer, MIT Media Lab
James Blinn, California Institute of Technology

Thursday, 10:45 a.m.-12:30 p.m.

Papers

Geometric Modeling

Hynes Convention Center Auditorium

Chair

Tony D. DeRose, University of Washington, Seattle

Scanline Display of Algebraic Surfaces
Thomas W. Sederberg, Brigham Young University
Alan K. Zundel, Brigham Young University

Rendering Cubic Curves and Surfaces with Integer Adaptive Forward Differencing
Sheue-Ling Chang, Sun Microsystems, Inc.
Michael Shantz, Sun Microsystems, Inc.
Robert Rocchetti, Sun Microsystems, Inc.

Curve-to-Curve Associations in Spline-Based Inbetweening and Sweeping
Richard H. Bartels, University of Waterloo
Ronald T. Hardock, University of Waterloo

Voxel Space Automata: Modeling with Stochastic Growth Processes in Voxel Space
Ned Greene, NYIT

Panel

Hardware/Software Solutions for Scientific Visualization at Large Scientific Research Laboratories

Marriott Copley Place, Ballrooms E-G

Chair

Linnea Cook, Lawrence Livermore National Laboratory

The emergence of various affordable, high-performance hardware and standardized software for scientific visualization are the most exciting developments in the area of computer graphics today. Many large scientific laboratories are actively pursuing and refuting which graphics hardware to use. Graphics workstations, graphics terminals, frame buffers driven by supercomputers, and distributed graphics are all solutions—but which solution is best?

This panel focuses on what five scientific laboratories are doing with this hardware. What requirements do these laboratories have in the area of scientific visualization? What strategies are they pursuing to meet these needs?

Thursday, 10:45 a.m.-12:30 p.m.

Which hardware/software solutions are they using or exploring? Why is their particular solution the best? Why are other solutions not as good or unworkable?

Panelists will present the merits and drawbacks of each approach, resulting in a lively, informative discussion.

Panelists

Gordon Bancroft, NASA Ames Research Center
Kevin Hussey, Jet Propulsion Laboratory
John Dragon, Los Alamos National Laboratory
William Johnston, Lawrence Berkeley National Laboratory

Special Session

Computer Art—An Oxymoron? Views from the Mainstream

Sheraton Boston Hotel and Towers, Grand/Independence Ballrooms

Chair

Dorothy Spencer, Read/Write Press

The evolution of a novel, new technology to an accepted medium for artistic expression has always been a slow, cautious process. During this special session, museum curators, gallery owners, and artists will discuss the current state of the evolution of computer art as a means for artistic expression from mainstream art world points of view.

Panelists

Mark Resch, Rensselaer Polytechnic Institute
Bob Riley, San Francisco Museum of Modern Art
Harry Rand, National Museum of Art
Phillip Pearlstein, Internationally-known Painter
Diane Brown, Diane Brown Gallery
Kathy Huffman, Institute of Contemporary Art

Thursday, 1:45 p.m.-3:15 p.m.

Papers

Visualization

Hynes Convention Center Auditorium

Chair

Ingrid Carlbom, Digital Equipment Corporation

An Efficient 3D Visualization Technique for Finite Element Models and Other Coarse Volumes
Richard S. Gallagher, Hibbitt, Karlsson & Sorenson Inc.
Joop C. Nagtegaal, Hibbitt, Karlsson & Sorenson Inc.

Computer Graphics Visualization for Acoustic Simulation
Donald P. Greenberg, Cornell University
Adam Stettner, Cornell University

Three Dimensional Terrain Modeling and Display for Environmental Assessment
Kazufumi Kaneda, Hiroshima University
Fujiwa Kato, Hiroshima University
Eihachiro Nakamae, Hiroshima University
Tomoyuki Nishita, Fukuyama University
Hideo Tanaka, Tokyo Electric Power Co., Inc.
Takao Noguchi, Tokyo Electric Power Co., Inc.

Panel

Speech and Audio in Window Systems: When Will They Happen?

Marriott Copley Place, Ballrooms E-G

Chairs

Barry Arons, Olivetti Research Center
Chris Schmandt, MIT Media Lab

Although multi-media systems are in vogue, the last decade has seen many failed attempts at user interfaces to speech and audio systems. An architecture for sharing audio resources between applications or for integrating audio into graphical interfaces does not yet exist, despite semiconductor advances which have provided low-cost signal processing and audio input/output.

Many applications have been suggested: listening typewriters, voice annotation, computer conferencing, voice mail, speech substitutes for mouse and keyboard, and auditory icons. How should these technologies be managed by programmers and users? Will speech be accepted

as a command channel and a standard data type? Will voice replace or coexist with the graphical interfaces of today?

Panelists will discuss their different points of view on architectural and audio management issues, convey their beliefs on the power of speech and audio for communication, and debate the utility of various speech and audio technologies.

Panelists

Michael Hawley, NeXT Computer, Inc.
Lester Ludwig, Bellcore
Polle Zellweger, Xerox PARC

Special Session

Bloopers, Outtakes, and Horror Stories of SIGGRAPH Films

Sheraton Boston Hotel and Towers, Grand/Independence Ballrooms

Chairs

John Lasseter, Pixar
Bill Reeves, Pixar

This special session presents the little-known stories about behind-the-scenes production of the better-known SIGGRAPH films. This session combines fun with informative ideas concerning the tremendous effort required to create films for SIGGRAPH.

Speakers share lessons learned in a storytelling forum, with each having five to 10 minutes for telling a "horror story" and/or show outtakes. Members of the audience are encouraged to add presonal experiences, share stories, and ask questions.

Panelists

Philippe Bergeron, Independent Consultant
Eben Ostby, Pixar
Chris Wedge, Blue Sky Promotions
Bill Kroyer, Kroyer Films
Jim Blinn, California Institute of Technology
Craig Reynolds, Symbolics
Loren Carpenter, Pixar

Thursday, 3:30 p.m.-5:15 p.m.

Papers

Animation

Hynes Convention Center Auditorium

Chair

Jane Wilhelms, University of California, Santa Cruz

Good Vibrations: Modal Dynamics for Graphics and Animation
Alex Pentland, MIT
John Williams, MIT

Analytical Methods for Dynamic Simulation of Non-Penetrating Rigid Bodies
David Baraff, Cornell University

Goal-Directed, Dynamic Animation of Human Walking
Armin Bruderlin, Simon Fraser University
Thomas W. Calvert, Simon Fraser University

Layered Construction for Deformable Animated Characters
John E. Chadwick, The Ohio State University
David R. Haumann, The Ohio State University
Richard E. Parent, The Ohio State University

Thursday, 3:30 p.m.-5:15 p.m.

Panel

HDTV (Hi-Vision) Computer Graphics

Marriott Copley Place, Ballrooms E-G

Chair

Hideichi Tamegaya, Japan Broadcasting Corporation (NHK)

Recent hardware developments—with increasingly stronger computational power and higher-resolution display—enable us to use workstations for computer graphics output. However, images must be recorded and transferred properly to preserve their quality. Since HDTV (Hi-Vision) has picture quality comparable to 35mm film, it enables computer graphics to be used for high-quality media such as film, art, publishing, and broadcasting.

Panelists discuss computer graphics applications on HDTV and their impact on the industry. They reveal experiences using computer graphics with various media and discuss issues of quality, expression, and interchangeability.

Panelists

Ryou Mochizuki, New Video System Research Association
Yoichiro Kawaguchi, Nippon Electronics College
Koichi Omura, Osaka Municipal University
Don Miscowich, Symbolics

Friday, 9:00 a.m.-10:30 a.m.

Papers

3D Textures

Hynes Convention Center Auditorium

Chair

Robert L. Cook, Light Source

Hypertexture
Ken Perlin, New York University, New York, NY
Eric M. Hoffert, AT&T Pixel Machines

Algorithms for Solid Noise Synthesis
J.P. Lewis, NYIT

Rendering Fun With Three Dimensional Textures
James T. Kajiya, California Institute of Technology
Timothy L. Kay, California Institute of Technology

Friday, 9:00 a.m.-10:30 a.m.

Panel

Future Directions in Desktop Video

Marriott Copley Place, Ballrooms E-G

Chair

Tim Heidmann, Silicon Graphics

The lowering cost of video equipment and the availability of low-cost personal graphics computers create the possibility of a complete desktop video production system. As desktop publishing is today, some feel this market is the next rage, while others believe the poor quality and complexity of inexpensive video production will prevent widespread practical application.

This panel defines what is happening in the area of low-cost computer graphics and video and discusses the opportunities and shortcomings of those developments. It benefits these people most: hardware manufacturers, who need to respond to upcoming developments in video peripherals; software developers, who must understand the nature and needs of new markets; and, perhaps, nearly all computer users who want to know the practical possibilities and how that changes the way they do business.

Panelists

Michael MacKay, Diaquest
Gregory MacNichol, *Computer Graphics World*
Floyd Wray, BYTE-by-BYTE

Friday, 10:45 a.m.-12:30 p.m.

Papers

Ray Tracing

Hynes Convention Center Auditorium

Chair

Forest Baskett, Silicon Graphics

Anti-Aliased Ray Tracing by Adaptive Progressive Refinement
James Painter, University of Washington, Seattle
Kenneth Sloan, University of Washington, Seattle

Ray Tracing Deterministic 3D Fractals
John C. Hart, University of Illinois at Chicago
Daniel J. Sandin, University of Illinois at Chicago
Louis H. Kauffman, University of Illinois at Chicago

Guaranteed Ray Intersections with Implicit Surfaces
Devendra Kalra, California Institute of Technology
Alan H. Barr, California Institute of Technology

Parameterized Ray Tracing
Carlo H. Séquin, University of California, Berkeley
Eliot K. Smyrl, University of California, Berkeley

Friday, 10:45 a.m.-12:30 p.m.

Panel

Distributed Graphics: Where to Draw the Lines?

Marriott Copley Place, Ballrooms E-G

Chair

Dick Phillips, Los Alamos National Laboratory

There are currently several approaches to producing graphical representations of data developed on supercomputers or other compute engines. In one extreme, all data, simulation, and graphics can be developed on a compute engine with the results shown on a vector-oriented "dumb terminal." In another extreme, all work is performed on a compute engine but displayed on a workstation in video format. And, in between, workstations handle various amounts of processing. There are standard workstations equipped with graphics accelerators, 3D workstations, and graphics supercomputers. In addition, there are approaches that use coarse-grained parallelism, where several powerful workstations join forces to solve a complex display problem.

This panel explores many of the approaches to graphics-based distributed computing. Panelists illustrate their contentions with a specific problem, discussing such issues as data volume, data flow bandwidth, and interactivity.

Panelists

Jay Torborg, Alliant Computer Systems
Cleve Moler, Ardent Computer
Michael Pique, Scripps Clinic and Research Foundation
Donald P. Greenberg, Cornell University

Friday, 1:45 p.m.-3:15 p.m.

Papers

Radiosity

Hynes Convention Center Auditorium

Chair

Donald P. Greenberg, Cornell University

A Ray Tracing Algorithm for Progressive Radiosity
John R. Wallace, 3D/Eye, Inc.
Kells A. Elmquist, 3D/Eye, Inc.
Eric A. Haines, 3D/Eye, Inc.

Improving Radiosity Solutions Through the Use of Analytically Determined Form-Factors
Daniel R. Baum, Silicon Graphics
Holly E. Rushmeier, Georgia Institute of Technology
James M. Winget, Silicon Graphics

A General Two-Pass Method Integrating Specular and Diffuse Reflection
Francois Sillion, Laboratoire d'Informatique de l'Ecole Normale Supérieure
Claude Puech, Laboratoire d'Informatique de l'Ecole Normale Supérieure

Friday, 1:45 p.m.-3:15 p.m.

Panel

Operating Systems and Graphic User Interfaces

Marriott Copley Place, Ballrooms E-G

Chair

J. Paul Grayson, Micrografx

Microcomputers have tremendously impacted the computer graphics industry. The next generation of personal computers, with their advanced operating systems and graphic user interfaces, promises to accelerate this trend.

Similarly, desktop computers have rapidly become the platform of choice for both users and vendors of advanced graphics solutions. MS-DOS with Windows and Apple Multifinder are the standards newcomers seek to dethrone: IBM launched OS/2 with Presentation Manager; Apple promised new versions of Multifinder, adding multitasking and advanced graphics tools; NeXT captured the industry's attention with a combination of UNIX, Display PostScript, CD-ROM, and object-oriented, end-user programming.

Panelists from IBM, Apple, NeXT, and Microsoft address their offerings and seek to justify their technology as the standard that developers and users should embrace as the next generation of computer graphics products.

Panelists

T.D. Steele, IBM
Martin Dunsmuir, Microsoft
Dan'l Lewin, NeXT Computer, Inc.
Larry Tesler, Apple Computer

Friday, 3:30 p.m.-5:15 p.m.

Papers

Graphics Algorithms

Hynes Convention Center Auditorium

Chair

A. Robin Forrest, University of East Anglia, U.K.

Incremental Computation of Planar Maps
Michel Gangnet, Digital Equipment Corporation
Jean-Claude Hervé, Digital Equipment Corporation
Thierry Pudet, Digital Equipment Corporation
Jean-Manuel Van Thong, Digital Equipment Corporation

A Characterization of 10 Rasterization Techniques
Nader Gharachorloo, IBM T.J. Watson Research Center
Satish Gupta, IBM T.J. Watson Research Center
Robert F. Sproull, Sutherland, Sproull and Associates
Ivan E. Sutherland, Sutherland, Sproull and Associates

Separable Image Warping with Spatial Lookup Tables
George Wolberg, Columbia University
Terrance E. Boult, Columbia University

An Efficient Algorithm for Hidden Surface Removal
Ketan Mulmuley, University of Chicago at Chicago

Friday, 3:30 p.m.-5:15 p.m.

Panel

Preparing for the Future

Marriott Copley Place, Ballrooms E-G

Chair

Maria Palazzi, Rutgers University

The field of computer graphics education, as no other, combines the disciplines of science and art and in this sense presents computer graphics instructors, in both art and science, with some unique problems not faced by their counterparts in other fields. As computer graphics courses become a standard addition in art and science curriculums, the way we prepare students for this evolutionary field is changing. This panel explores the methods of establishing computer graphics curriculum and maintaining these programs.

With most programs and courses in their infancy, the focus of this panel will be how a program is established from the ground up. Panel members will share experiences pertaining to curriculum developments and goals, integrating with existing courses, planned growth, raising monetary resources, hardware and software purchasing and other educational issues. Problems, solutions and insights will be addressed. This panel will be helpful for: experienced instructors, who will find they are not alone with their problems; new instructors, who frequently are not prepared for this challenging position; and for students interested in selecting computer graphics programs that serve their goals.

Panelists

Wayne Carlson, The Ohio State University
Richard Lucas, Bowling Green State University
Marla Schweppe, School of the Art Institute of Chicago
Mehmet Yanilmaz, Northwestern University

CONFERENCE EVENTS

Special Interest Groups

To encourage the flow of information at SIGGRAPH '89, the conference committee has invited all groups which wish to discuss any topic of common interest to meet during the conference. In the midst of such a large gathering of folks interested in computer graphics, many groups have taken advantage of the opportunity to assemble.

You will find meetings scheduled to discuss relatively general subjects, as well as those which convene around a topic concerning a specific vendor. And once the conference has begun, the list of meetings will grow even larger as people take advantage of the accommodation for last-minute ideas—the birds-of-a-feather program. If you want to use this mechanism to bring together your own impromptu meeting, simply use the sign-up board in the registration area.

The following special interest groups are convening during SIGGRAPH '89. For each, the person listed can provide you with additional information. Late additions and revisions to the schedule are posted on a kiosk in the area designated "On-Site Registration" on the Third Level of the Hynes Convention Center.

Saturday, 29 July

- Cubicomp Users Group
  8:30 a.m.-6:00 p.m.
  Westin Hotel Copley Place, Essex South
  Stephen P. Davidson 919-546-6665
- ANSI X3H3.6 Window Management Systems Standards
  9:00 a.m.-6:00 p.m.
  Sheraton Boston Hotel and Towers, Berkeley A & B
  Georges Grinstein 508-452-5000, Ext. 2681
- Cubicomp Users Group Lunch
  noon-1:30 p.m.
  Westin Hotel Copley Place, Staffordshire Room
  Stephen P. Davidson 919-546-6665
- Cubicomp Users Group Dinner
  7:30 p.m.-9:00 p.m.
  Westin Hotel Copley Place, Staffordshire Room
  Stephen P. Davidson 919-546-6665

- Cubicomp Users Group Third Party Vendor Presentation
  9:00 p.m.-11:00 p.m.
  Westin Hotel Copley Place, Essex South
  Stephen P. Davidson 919-546-6665

Sunday, 30 July

- Cubicomp Users Group
  8:30 a.m.-5:30 p.m.
  Westin Hotel Copley Place, Essex North
  Stephen P. Davidson 919-546-6665
- ANSI X3H3.6 Window Management Systems Standards
  9:00 a.m.-6:00 p.m.
  Sheraton Boston Hotel and Towers, Berkeley A & B
  Georges Grinstein 508-452-5000, Ext. 2681
- SIGGRAPH Local Groups and Local Groups Steering Committee
  10:00 a.m.-2:00 p.m.
  Westin Hotel Copley Place, St. George
  Lou Katz 415-530-8870
- Cubicomp Users Group Lunch
  11:30 a.m.-1:00 p.m.
  Westin Hotel Copley Place, Staffordshire Room
  Stephen P. Davidson 919-546-6665
- Cubicomp Users Group Video Gala
  6:30 p.m.-11:30 p.m.
  Westin Hotel Copley Place, Staffordshire Room
  Stephen P. Davidson 919-546-6665

Monday, 31 July

- ANSI X3H3.6 Window Management Systems Standards
  9:00 a.m.-6:00 p.m.
  Sheraton Boston Hotel and Towers, Berkeley A & B
  Georges Grinstein 508-452-5000, Ext. 2681
- After-Hours SIG
  11:00 p.m.-4:00 a.m.
  Sheraton Boston Hotel and Towers, Kent Room

Tuesday, 1 August

- Open Software Foundation
  9:00 a.m.-10:00 a.m.
  Hynes Convention Center, Room 204
  Paula Slotkin 617-621-8868

- AIAA Technical Committee on Interactive Computer Graphics
  9:00 a.m.-4:00 p.m.
  Sheraton Boston Hotel and Towers, Jefferson Room
  Gerald A. Thompson 714-732-5504

- Microsoft Windows and Presentation Manager Directions
  10:00 a.m.-11:00 a.m.
  Hynes Convention Center, Room 301
  Basil W. Maloney, Jr. 214-234-8857

- UNIX International
  1:00 p.m.-2:00 p.m.
  Hynes Convention Center, Room 202
  Roger Fraumann 201-263-8400

- Microsoft Windows and Presentation Manager Developer Roundtable
  2:00 p.m.-3:00 p.m.
  Hynes Convention Center, Room 204
  Basil W. Maloney, Jr. 214-234-8857

- Adage Users Group
  5:00 p.m.-6:30 p.m.
  Hynes Convention Center, Room 205
  Garret Dunn 919-362-7043

- NeWS Users Group
  5:00 p.m.-7:00 p.m.
  Sheraton Boston Hotel and Towers, Hampton A & B
  Scott Manville 212-979-5337

- MOVIE.BYU
  5:15 p.m.-6:30 p.m.
  Sheraton Boston Hotel and Towers, Beacon F
  Tami M. Cromar or Hank Christiansen 801-378-2812

- Ex-Evans & Sutherland Employees
  6:00 p.m.-8:00 p.m.
  Sheraton Boston Hotel and Towers, Kent Room
  Scott R. Nelson 415-336-3106

- After-Hours SIG
  11:00 p.m.-4:00 a.m.
  Sheraton Boston Hotel and Towers, Kent Room

Wednesday, 2 August

- Pixar User's Group
  8:00 a.m.-noon
  Hynes Convention Center, Room 301
  Joy Folla 415-258-8100, Ext. 8142

- Team Aztek
  9:00 a.m.-10:30 a.m.
  Hynes Convention Center, Room 205
  Catherine Revell 714-770-8406

- Computers in the Arts
  noon-1:30 p.m.
  Hynes Convention Center, Room 204
  Dick Moberg 215-923-3299

- Computer Graphics Education
  1:00 p.m.-2:00 p.m.
  Sheraton Boston Hotel and Towers, Hampton A & B
  Steve Cunningham 209-667-3176

- RenderMan Special Interest Group
  1:30 p.m.-5:30 p.m.
  Hynes Convention Center, Room 301
  Joy Folla 415-258-8100, Ext. 8142

- Computer Graphics Education in the Arts
  2:00 p.m.-3:00 p.m.
  Sheraton Boston Hotel and Towers, Hampton A & B
  Barbara Mones-Hattal 703-323-2076

- Molecular Graphics
  2:00 p.m.-3:30 p.m.
  Back Bay Hilton, Salon B
  Michael Pique 619-554-9775

- Technical Interest Group for Performance Evaluation (TIGPE) and Graphics Performance Characterization
  2:00 p.m.-3:30 p.m.
  Hynes Convention Center, Room 106
  Brian Croll 415-336-6612 and Bob Willis 703-698-9600

- Engineering Graphics Education
  3:00 p.m.-4:00 p.m.
  Sheraton Boston Hotel and Towers, Jefferson Room
  Michael B. McGrath 303-273-3434

- Alias Users Group
  4:00 p.m.-8:00 p.m.
  Hynes Convention Center, Room 205
  Keith Raymond 416-362-9181

- PEX Interest Group
  4:30 p.m.-5:30 p.m.
  Hynes Convention Center, Room 204
  Randi Rost 415-853-6721

- Volume Rendering Interest Group
  5:00 p.m.-6:30 p.m.
  Hynes Convention Center, Room 106
  Nick England 919-469-8300

- Users of Graphics Compatibility System (UGCS)
  6:00 p.m.-6:45 p.m.
  Sheraton Boston Hotel and Towers, Kent Room
  Deborah F. Dent 601-634-3455

- Symbolics Graphics Users Group
  6:00 p.m.-8:00 p.m.
  Hynes Convention Center, Room 206
  Don Miskowich 213-478-0681

- The Computer Graphics Pioneers
  6:00 p.m.-9:00 p.m.
  The Computer Museum
  Bert Herzog 313-763-7479

- Cadkey Software User's Group
  East Coast Affiliates
  6:30 p.m.-8:30 p.m.
  Hynes Convention Center, Room 202
  Danielle Provencio 203-647-0220, Ext. 7150

- After-Hours SIG
  11:00 p.m.-4:00 a.m.
  Sheraton Boston Hotel and Towers, Kent Room

Thursday, 3 August

- Computer Graphics Education in Computer Science
  10:00 a.m.-11:00 a.m.
  Sheraton Boston Hotel and Towers, Beacon A
  Jeff McConnell 716-888-2434

- Doré Users Group
  10:00 a.m.-11:30 a.m.
  Hynes Convention Center, Room 206
  Kevin Weiler 408-732-0400

- Self-Assessment in Computer Graphics
  1:00 p.m.-2:00 p.m.
  Sheraton Boston Hotel and Towers, Beacon A
  G. Scott Owen 404-658-2245

- Computer Graphics Education: Animation
  1:00 p.m.-2:30 p.m.
  Hynes Convention Center, Room 301
  William J. Joel 914-471-3240, Ext. 614

- Inter Society for Electronic Art (ISEA)
  1:45 p.m.-3:45 p.m.
  Sheraton Boston Hotel and Towers, Commonwealth Room
  Mark Resch 518-276-6274

- Representation of a Human Figure in Motion: Choreography and Computer Graphics
  3:00 p.m.-5:00 p.m.
  Sheraton Boston Hotel and Towers, Beacon A
  Nathalie van Bockstaele 415-654-3902

- Multi-Media Communications Systems
  3:30 p.m.-5:15 p.m.
  Sheraton Boston Hotel and Towers, Grand/Independence Ballrooms

- After-Hours SIG
  11:00 p.m.-4:00 a.m.
  Sheraton Boston Hotel and Towers, Kent Room

Friday, 4 August

- X-11 Video Extension
  1:30 p.m.-3:00 p.m.
  Hynes Convention Center, Room 206
  Wendy E. Mackay 617-666-8838 and Todd Brunhoff 503-627-1121

Art Show

The SIGGRAPH '89 art show is an international exhibition of computer art, featuring works that represent a broad range of artistic styles and techniques. The show includes two-dimensional works, sculptures, and installations. Animations and other works on videotape are shown in the animation screening room in cooperation with the computer graphics theater. The art show is a forum for artists to share their aesthetic research and to communicate with scientists, designers, engineers, educators, and researchers from around the world.

For the first time in SIGGRAPH history, the art show catalog is being co-published with *Leonardo,* the Journal of the International Society for the Arts, Sciences, and Technology. Its title is *Computer Art in Context: The 1989 SIGGRAPH Art Show Catalog.* The catalog includes high-quality color reproductions of the works included in the art show and several essays about the social, political, and art-critical contexts of computer art.

The SIGGRAPH '89 art show is held simultaneously in two locations—on the Third Level of the Hynes Convention Center and The Computer Museum. The Hynes Convention Center displays works Monday through Thursday, 31 July—3 August from 9:00 a.m. to 7:00 p.m. On Friday, 4 August, the art show will close at the Hynes Convention Center at 2:00 p.m. The portion of the SIGGRAPH '89 art show which is exhibited at The Computer Museum will open 28 June and close 5 September. The Computer Museum is open during its normal summer schedule: 10:00 a.m. to 5:00 p.m. daily, except Fridays. Friday hours are from 10:00 a.m. to 9:00 p.m.

Admission to the art show and one copy of the art show catalog is included with courses or papers/panels registration. Exhibits-only registrants are also admitted to the art show, but will not receive a copy of the art show catalog. Catalogs can be purchased on the Third Level in the registration area. Conference attendees are admitted free to The Computer Museum from 31 July—6 August by displaying their SIGGRAPH '89 registration badge.

Computer Graphics Theater

Internationally acclaimed for its creative and technical excellence, the computer graphics theater is a moving aural and visual experience showcasing the year's best efforts in computer animation and interactive techniques, including stereoscopic 3D animation. Computer graphics in art, computational science and engineering, education, entertainment, and research from around the globe are selected by a blind (not aware of the names of the submitters) jury of experts for this prestigious event. Images and sounds are presented using state-of-the-art display technology. A record 328 entries were received from which 44 pieces were selected on the basis of subject matter, originality, technological innovation, design, and viewability.

There are five showings of the computer graphics theater in the Hynes Convention Center Auditorium:

Monday, 31 July
6:00 p.m. to 7:30 p.m.

Tuesday, 1 August
6:00 p.m. to 7:30 p.m. and
8:30 p.m. to 10:00 p.m.

Wednesday, 2 August
7:00 p.m. to 8:30 p.m.

Thursday, 3 August
7:00 p.m. to 8:30 p.m.

A computer graphics theater catalog and admission to one performance of the computer graphics theater is included with courses or papers/panels registration; only one ticket is issued per registrant. All performances contain the same material.

In addition to the computer graphics theater, animation screening rooms present approximately 100 on-going video programs. Attendees are encouraged to stop by to view animations in the Republic Foyer and Ballrooms A and B of the Sheraton Boston Hotel and Towers during conference hours, Wednesday through Friday.

ACM SIGGRAPH Executive Committee Meeting

The ACM SIGGRAPH Executive Committee holds an open meeting on Thursday, 3 August in the Commonwealth Room, Sheraton Boston Hotel and Towers from 5:30 p.m. to 7:30 p.m. All ACM SIGGRAPH members are invited to attend.

Computer Graphics Theater

L'Anniversaire/Anniversary

Contact
Doris Kochanek
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P.O. Box 6100, Station A
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Breeze

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Complexly Simple

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The Conquest of Form

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Continuum 1. Initiation

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Eurhythmy

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Excerpts from "Leonardo's Deluge"

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Flora

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Gas Turbine Flowfield Simulation

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Gibbon Event

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The Hammer Sequence

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Her Majesty's Secret Serpent
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In Search of New Axis
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The Little Death
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Locomotion
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The Making of Without Border
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Margaux Cartoon
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212-869-2500 (Work)

Mars—The Movie
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Mathematics!
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Megacycles
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A Moonlit Spring Night at Ma-ma Temple
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NBC 1988 Olympic Open
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Night Cafe
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Numerical Experiments on the Interaction of Disk Galaxies
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Soap Opera
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Study of a Numerically Modeled Severe Storm
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Tempest in a Teapot
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Test Scenes from "Echoes of the Sun"
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The Virtual Lobby
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Visualization of Simulated Treatment of an Ocular Tumor
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Voyager: Journey to the Outer Planets
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Pasadena, CA 91109 USA
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Art Show Works on Videotape Credits

Yuriko Amemiya
"Everybody has his gem"/1989
Japan

David Blair
"Wax: or The Invention of Television Among the Bees" USA

Peter Callas
"Karkador"/1986
Australia

Fred Dech
"Plastic Landing"/1989
USA

Christine Foltz
"21st at 3rd Boogie Woogie/ A Mondrian Retrospective in 30sec"/1988
England

John Fujii
"Coredump"/1989
USA

Ralph Gerth
"A View of a Room"/1989
USA

Evelyn Hirato
"Revolve Evolve"
USA

Roderick Hulsbergen
"Rednose Rabbit"/1989
Belgium

Naoko Motoyoshi
"A Moonlit Spring Night at Mama Temple"/1989
Japan

Monique Nahas
"Pygmalion"/1988
France

NHK Enterprises
"The Universe Within, Demo Reel"/1989
Japan

Chitra Shriram
"Leela"/1989
USA

Nicole Stenger
"Gallia"/1988
France

Dean Winkler
"Continuum 1. Initiation"
USA

Marilyn Wulff
"Little Stories"/1988
USA

Edward Zajec
"Composition in Red Green Blue"/1989
USA

Acknowledgements

Conference Support

SIGGRAPH '89 A/V and panels wish to thank General Electric for the use of their PJ-5055 video projectors.

The SIGGRAPH '89 committee wishes to thank Apple Computer for donating a LaserWriter II NT for use by SIGGRAPH '89 and future conferences.

Slides

SIGGRAPH '89 and the speaker slides chair wish to thank the companies and individuals who produced slides for the conference. These computer-generated slides are used in the courses, panels, and paper presentations. The donation of time, equipment, software and, in some cases, labor and materials, are greatly appreciated.

Pre-conference slides:
Lasergraphics, Irvine, CA
Los Alamos National Laboratory, Los Alamos, NM

On-site:
Codd Barrett Associates, Providence, RI
BFA, Albuquerque, NM
Kodak, Rochester, NY

Computer Graphics Theater

SIGGRAPH '89 and the computer graphics theater chair wish to thank the following companies for their time, equipment, software and, in some cases, labor and materials, used in the computer graphics theater.

IPA, The Editing House, Chicago, IL
Polaroid Corporation, Norwood, MA
Theatric Support, Studio City, CA
Pacific Video Resources, San Francisco, CA
And a special thanks to Doris Kochanek, National Film Board of Canada, for her time.

Art Show

SIGGRAPH '89 and the art show chair wish to thank the following companies who also donated time, equipment, software and, in some cases, labor and materials, used in the art show.

Truevision, Inc., Indianapolis, IN
Electrohaome, Kitchener, Ontario, Canada
Rensselaer Polytechnic Institute, Department of the Arts and Rensselaer Design Research Center, Troy, NY
The Computer Museum, Boston, MA
The Institute of Contemporary Art, Boston, MA
Silicon Graphics, Inc., Palo Alto, CA
AST Research, Inc., Irvine, CA
Sixty Eight Thousand, Inc., Carmel, CA

In a conference the size and scope of SIGGRAPH many companies and individuals make significant behind-the-scenes contributions. A special thank you to all employers of volunteers for letting your staff take the extra time that was needed to organize SIGGRAPH '89. Also, thank you to employees of contractors who put in long hours and extra effort to make SIGGRAPH '89 happen.

EXHIBITION

The SIGGRAPH '89 exhibition runs Tuesday through Thursday, 1-3 August in the Hynes Convention Center. Registration for courses and/or papers/panels includes admission to the exhibition. Registration for exhibits also includes entrance to the art show, animation screening room, and the fundamentals and careers seminars.

The exhibition hours are:

Tuesday, 1 August	10:00 a.m.-6:00 p.m.
Wednesday, 2 August	10:00 a.m.-6:00 p.m.
Thursday, 3 August	10:00 a.m.-3:30 p.m.

Children under 16 are not permitted to attend the exhibition.

Abekas Video Systems, Inc.

Booth 932

101 Galveston Drive
Redwood City, CA 94063
415-369-5111; FAX: 415-369-4777
John Dunstan
Exhibits Manager

Using an Ethernet port, the A60 Digital Disk Recorder provides the perfect interface to animation computers for both video transfer and machine control. Playback functions of the A60 may also be controlled via Ethernet. A60 with Touch-up provides complete A60 and VTR control from the Paintbox tablet. The A64 Digital Disk Recorder provides real-time layering in the CCIR 601 digital format. Whether used in the edit suite or in the graphics room, the A64 is the ultimate compositing tool.

Academic Press

Booth 3204

1250 Sixth Avenue
San Diego, CA 92101
619-699-6774; FAX: 619-699-6715
Teena J. Hieb
National Exhibit Coordinator

Academic Press is offering many new and classic titles including: Farin, *Curves and Surfaces for Computer Aided Geometric Design;* Fiume, *The Mathematical Structure of Raster Graphics;* Glassner, *An Introduction to Ray Tracing;* and *Barnsley, Fractals Everywhere.* Our new software package, Dynamic Fractal Design System is also being demonstrated.

ACM SIGGRAPH Show Daily

Booth 300

One Technology Park Drive, P.O. Box 987
Westford, MA 01886
508-692-0700; FAX: 508-692-0525
Robert Holton
Publisher

The *ACM SIGGRAPH '89 Show Daily* covers show news, conference programs, major conference events, product news and developments. It also includes exhibitor listings, a floor plan, convention city entertainment, and restaurant guide. The daily also covers new developments in computer graphics that are featured in the SIGGRAPH '89 conference program.

Adage, Inc.

Booth 412

165 Lexington Road
Billerica, MA 01821
508-667-7070; FAX: 508-667-5969
David Colt
Marketing Manager

Adage, Inc. shows the Adage 200 color graphics display processor and more from its line of high-performance graphics products. Adage's products are used worldwide by major companies, government agencies, and universities in such application areas as CAD/CAE/CAM, C3I, oil exploration, medical imaging, graphic arts and, training and simulation.

Addison-Wesley Publishing Company

Booth 3208

Route 128
Reading, MA 01867
617-944-3700; FAX: 617-944-9338
Carolyn Berry
Senior Marketing Manager

Addison-Wesley, the leading publisher in computer science, proudly presents its newest books in computer graphics and related areas. At long last, Foley/vanDam/Feiner/Hughes' second edition of *Computer Graphics* will be published this winter—copies may be reserved at SIGGRAPH '89. On display are new titles such as Pixar's *The RenderMan Interface,* Shneiderman/Kearsley's *Hypertext Hands-on!,* and Baecker/Marcus' *Human Factors and Typography for More Readable Programs.*

Advanced Graphics, A Division of AGC

Booth 2355

675 Sycamore Drive
Milpitas, CA 95035
408-434-3700; FAX: 408-434-3776
Mary Fujihara
Director

Advanced Graphics demonstrates a PC-based solid modeling math engine featuring transforms, shading, clipping, and projection of 300,000 3D vectors/second. The fully integrated video section offers Z-buffering, Gouraud shading, and texture mapping capabilities.

Advanced Graphics Engineering (AGE)

Booth 1120

8775 Aero Drive, Suite 230
San Diego, CA 92123
619-565-7373; FAX: 619-565-7460
Michael Dolan
President

X-Window server software and TCP/IP communications products for OEM and inbedded graphic controller, terminal, and workstation application are presented. AGE's X-GSP-Server is an optimized MIT X-Window System Server, Version II Rel 3" for the TI 34010 Processor. Additional new products are also displayed.

Advanced Imaging, Division of PTN Publishing

Booth 2222

210 Crossways Park Drive
Woodbury, NY 11797
516-496-8000; FAX: 516-496-8013
Charles Grecky
Director of Advertising

Advanced Imaging is the only magazine devoted to comprehensive coverage of electronic imaging, from both the technology and industry perspectives, and all of its end-user applications.

Advanced Micro Devices (AMD)

Booth 822

901 Thompson Place
Sunnyvale, CA 94088
408-732-2400; FAX: 408-982-6161
John Peskuric
Graphics Marketing Manager

Advanced Micro Devices and its Fusion 29K partners demonstrate high-performance alternatives for distributed graphics processing, using the Am29000 32-bit RISC microprocessor. Corporations worldwide (such as Hitachi, Siemens, Magnavox, Adage, Lundy, and Ferranti) have chosen the 29K as the logical solution for high-performance medical imaging, military, and process control applications.

Advanced Technology Center

Booth 1012

5711 Slauson Avenue, Suite 238
Culver City, CA 90230
213-568-9119; FAX: 213-568-0923
Bruce Cowan
Director, Sales and Marketing

ATC offers GRAFPAK-GKS, a high-performance implementation of GKS level 2b/2c supporting X-Windows and more than 100 other device drivers; and CGM-View, for display and/or hardcopy output of ANSI standard CGM metafiles produced by any conforming software, with support for binary, character, and clear-text encodings.

Alias Research, Inc.

Booth 310

110 Richmond Street East, Suite 504
Toronto, Ontario, Canada M5C 1P1
416-362-9181; FAX: 416-362-0630
Keith Raymond
Marketing Manager

Powerful modeling, easy-to-use animation, and photo-realistic rendering make the ALIAS/2 system the system of choice for conceptual modeling. New products include state-of-the-art ray tracing and DesignPaint, a paint system designed for the industrial designer.

Alliant Computer Systems Corporation

Booth 1418

One Monarch Drive
Littleton, MA 01460
508-486-4950; FAX: 508-486-1398
Terry Holden
Marketing

Alliant and Raster Technologies, an Alliant subsidiary, demonstrate the Visualization Series, a family of multi-user visual supercomputers that combine parallel supercomputing with high-performance PHIGS/PHIGS+-based 3D graphics; the GX4000 3D graphics accelerator for Sun workstations; the Model One family of 2D and 3D graphics terminals; and VISEDGE, a menu-based visualization environment for engineers and scientists.

American Power Conversion Corporation

Booth 843

350 Columbia Street
Peace Dale, RI 02883
401-789-5735; FAX: 401-789-3710
Kara Alexanain
Trade Show Coordinator

American Power Conversion manufactures and markets a line of uninterruptible power supply products for personal computers, engineering workstations, file servers, and communications equipment which provide complete protection from disturbances in the utility power supply. Models range from 110VA to 1500VA and include rack-mount, online, and extended run units.

AmPro Corporation

Booth 112

35 Cabot Road
Woburn, MA 01801
617-932-4800; FAX: 617-932-8756
Peter Honegger
Vice President, Sales

AmPro Corporation designs, develops, and manufactures high-performance large screen projection systems. AmPro offers an unsurpassed selection of projection systems for applications ranging from standard video to the ultra resolution and scanning requirements of CAD/CAM. The new VideoBeam Graphics, a graphics/CAD projector, is formally introduced.

Analog Devices, Inc.

Booth 642

Two Technology Way
Norwood, MA 02062
617-329-4700; FAX: 617-326-8703
Vicki Werning
Marketing Promotions Specialist

Analog Devices displays the high-speed ADSP-2100 microprocessor, the ADSP-2101 microcomputer, and the ADSP-3212/3222, 40-MFLOPS, 64-bit, IEEE floating-point chipset. The converters include: the 12-bit 35-ns AD568, AD668, AD9712, and AD9713 DACS; the ADV453, ADV476, the ADV478/ADV471 triple 8-/6-bit DACS with on-chip RAM and control circuitry; and the 8-bit 250-/300-MHz AD9701/AD9703 DACs. Three 8-bit flash ADCs offer 35- to 200-MSPS rates; the 8-bit AD9502 RS-170 video digitizer includes an 8-bit ADC and all supporting circuitry.

ANL (Association Nationale du Logiciel)

Booth 1322

Campus Scientifique BP 239
Vandoeuvre, France 54500
(33)-83.91.21.58; FAX: (33)-83.27.76.43
Jacques Guidon
Director

ANL is a national public research group which includes: CNRS -CNET - IMRA - INRIA Universities. One of its major goals is to promote software developments from research labs and facilitate technology transfer to industry. At SIGGRAPH, ANL demonstrates products from INRIA, CNRS, various laboratories, and small start-up companies.

Apollo Computer, A subsidiary of Hewlett-Packard Company

Booth 404

330 Billerica Road
Chelmsford, MA 01824
508-256-6600; FAX: 508-256-2938
Bill Percy
Trade Show Manager

Apollo Computer presents a family of powerful personal workstations. With more than 2000 applications available today, the Apollo environment helps workgroups communicate and respond instantly to ideas and changes that occur daily throughout an organization. Come see Apollo's new graphics workstation and its new low-cost workstation that combines functionality and power.

Apple Computer

Booth 1518

20330 Stevens Creek Boulevard
Cupertino, CA 95014
408-974-6597; FAX: 408-974-5192
Sunil Chawla
Application Manager, Simulation and Visualization

Apple Computer features a wide range of innovative graphics solutions ranging from 2D/3D design and modeling to visualization, animation, and realistic rendering. Apple highlights both the Macintosh II and compact lines of personal computers, as well as a variety of Apple and third-party peripherals, and multi-media configurations.

Ardent Computer

Booth 904

880 W. Maude Avenue
Sunnyvale, CA 94086
408-732-0400; FAX: 408-732-2806
Marieca Haas
Lizabeth Reilly

Ardent Computer's TITAN Systems are networked together, demonstrating a balance of computing, imaging, and graphics. Ardent's graphics environment (Dore) combined with new, easy-to-use scientific visualization tools offers scientists and engineers a powerful environment for problem exploration. Ardent is demonstrating significant applications in imaging, MCAE, CFD, computational chemistry, and computational science.

Association for Computing Machinery

First Level, Main Lobby

11 W. 42nd Street
New York, NY 10036
212-869-7440; FAX: 212-944-1318
Lillian Isreal
Manager, Membership Services and Marketing

Association for Computing Machinery (ACM) is displaying its major journals, including *Transactions of Graphics (TOG)*, Special Interest Group (SIG) newsletters and conference proceedings. SIGGRAPH newsletters and conference proceedings are also featured. Anyone wishing to join ACM SIGGRAPH (or any other SIG) may do so at the membership booth in the main lobby on the First Level of the Hynes Convention Center.

AT&T Graphics Software Labs

Booth 132

10291 N. Meridian, Suite 275
Indianapolis, IN 46290
317-844-4364; FAX: 317-575-0649
Deborah Mackey
Regional Sales Manager

AT&T Graphics Software Labs offers a variety of high-resolution, full-color, PC-based applications, including: RIO, our 2D design, and layout software; 35mm Express/GSL, for applications in business graphics; Panorama, our image sequencing software for the Truevision ATVista; and TOPAS, a 3D solids modeling and animation application featuring bend, twist and taper, shadows, true metamorphosis and metallics, and broadcast-quality animation.

AT&T Pixel Machines

Booth 2004

1 Executive Drive
Somerset, NJ 08873
201-563-2278; FAX: 201-356-7990
Joyce Aurelius
Manager, Marketing Communications

AT&T Pixel exhibits a family of supercomputers dedicated to graphics and image processing. With up to 820 MFLOPS of compute power, they are expressly designed for applications requiring real-time rendering and animation of 3D objects, out-the-window simulation, scientific visualization, and image analysis.

Autodesk

Booth 1501

2320 Marinship Way
Sausalito, CA 94965
415-332-2344; FAX: 415-331-8093
Scott Davidson
Manager of Communications

Autodesk Animator is the new desktop video software from Autodesk, the makers of the popular AutoCAD software. Autodesk Animator runs on standard IBM PC and compatible computers with VGA graphics in the 256 color mode. With its comprehensive 2D animation and paint capabilities, Autodesk Animator is a powerful, yet affordable tool for producing educational and promotional video presentations.

Autographix, Inc.

Booth 832

100 Fifth Avenue, P.O. Box 9031
Waltham, MA 02254-9031
617-890-8558; FAX: 617-890-2124
Betsy Pryser
Show Manager

Autographix products include desktop presentation design software, fully configured presentation graphics design, production workstations based on 286 and 386 technology, and overnight slide services. Imaging is available from a network of 13 Autographix Service Centers worldwide. These centers cost effectively convert graphics files from both Autographix workstations/systems and many popular Macintosh and PC-based graphics software packages into high-resolution, full-color output overnight.

AV Communications, A Division of PTN Publishing

Booth 2222

210 Crossways Park Drive
Woodbury, NY 11797
516-496-8000; FAX: 516-496-8013
Charles Grecky
Director of Advertising

AV Communications is the only magazine devoted exclusively to presentations within the corporate market. The magazine covers video, computer graphics, multi-image, business theater, and all variations on the theme of business presentations. The magazine includes regular columns, in-depth features, new products, and hardware/software evaluations.

AV Video, Montage Publishing, Inc.

Booth 2811

25550 Hawthorne Boulevard, Suite 314
Torrance, CA 90505
213-373-9993; FAX: 213-373-0639
Sandra Seeger
Circulation Manager

AV Video is a monthly magazine for hands-on professionals in the fields of audio/visual, video, computer graphics, multi-image, and interactive video. Industries served include business and corporate communications, financial and educational institutions, government, health care, and community service organizations.

Aztek, Inc.

Booth 218

17 Thomas
Irvine, CA 92718
714-770-8406; FAX: 714-770-4986
Catherine A. Revell
Marketing Director

Aztek offers a modular product line of advanced, fully integrated turnkey computer graphics systems, software, and services for professional graphic arts, business presentations, publishing, video productions, training, and advertising applications. Facilities for user tailoring interfacing and integration of Aztek products are provided by a number of optional product enhancements. Aztek offers Artist and Chart as unbundled software packages.

Barco

Booth 1828

1500 Wilson Way
Smyrna, GA 30082
404-432-2346; FAX: 404-432-1470
Kitty McCormick
Sales and Marketing Administrator

Barco is exhibiting its comprehensive range of high-resolution Video/Data/Graphics 5″ and 9″ CRT projectors, featuring 15-72 KHz autolock, 100 MHz RGB Bandwidth, over 2000 lines of resolution. Also on display, direct-view, large-screen CRT monitors including SCM monitors ideal for use in video wall applications, and a computer-controlled, high-resolution graphics display. This monitor sets new standards for color accuracy and is shown with the CALIBRATOR TALK software package which interfaces the monitor with Mac II platforms for ultimate color accuracy.

Brooktree Corporation

Booth 812

9950 Barnes Canyon Road
San Diego, CA 92121
619-535-3273; FAX: 619-452-1249
Naresh Batra
Director of Product Marketing, Components Division

Brooktree designs, develops, and markets high-performance data conversion and mixed signal semiconductors for application in computer graphics, image capture, digitizing, test and measurement, and military markets.

Bruning

Booth 818

777 Arnold Drive
Martinez, CA 94553
415-372-7568; FAX: 415-372-3382
Ron Massaro
Marketing Communications Manager

Bruning is exhibiting a ZETA line of 8-pen plotters. These include A-E cut-sheets, A-E dual-mode, and A-E desktop plotters. Applications range from CAD/CAM to business presentation graphics to long-axis plotting. Bruning is also exhibiting the new CT-100/150 color thermal printers for CAD/CAM 3D imaging, scientific modeling, and presentation graphics.

BTS Broadcast Television Systems

Booth 304

2300 South 2300 West
Salt Lake City, UT 84119
801-972-8000; FAX: 801-972-0837
Patti Carpenter
Public Relations Supervisor

BTS is premiering the Pixelerator Render Engine working in concert with the ALIAS/2 modeling and animation system. The Pixelerator contains a powerful set of rendering and image manipulation tools that run on BTS's new EPIC hardware platform. Through close cooperation with Silicon Graphics, Inc. and Alias Research, Inc., BTS has brought together into a single package the most advanced set of modeling, animation, rendering and image processing tools available today. This unique integration of computer technology with professional video equipment may be seen at booth #304.

Byte by Byte Corporation

Booth 1107

9442 Capital of Texas Highway North, Suite 150
Austin, TX 78759
512-343-4357; FAX: 512-343-4358
Scott A. Peterson
President

Byte by Byte Corporation develops and markets interactive 3D design and animation software for the Amiga and Macintosh personal computers. Rendering options include wireframe, polygonal shading, scanline, and ray tracing in over 16 million colors. The Sculpt-Animate 4D software is powerful, yet easy to use.

CADKEY, Inc.

Booth 2921

440 Oakland Street
Manchester, CT 06040
203-647-0220; FAX: 203-646-7120
Danielle Provencio
Marketing Events Manager

CADKEY, Inc. is demonstrating its full family of 3D CADD tools for the design professional. CADKEY 3.5, DOS and UNIX-based, will be featured for TRUE 3D CADD applications - including mechanical design, detailed drafting, manufacturing, plastics, FEA, and more. CADKEY Solids offers designers a wireframe modeler for detailing and a solids modeler for visualization, interference, and mass property analysis. CADKEY's newest product offering, DATACAD, offers A/E/C professionals a true 3D CAD solution for increased productivity and accuracy.

Cahners Publishing Company

Booth 1323

275 Washington Street
Newton, MA 02158
617-964-3030; FAX: 617-558-4327
Corie Rand
Corporate Trade Show Coordinator

EDN Magazine Edition is written for engineering managers and design engineers working in the electronics OEM. *EDN News Edition* includes news of products, technology, and careers for engineers and engineering managers. *Electronic Business* is the worldwide business magazine for the management team in electronics, computer, and systems companies. *Systems Integration* is the magazine for computer systems integration.

Calzone Case Company

Booth 1313

225 Black Rock Avenue
Bridgeport, CT 06605
203-367-5766; FAX: 203-336-4406
Joseph E. Calzone, III
President

Calzone manufactures a complete line of shipping and storage cases and containers, both custom and standard, for all computer and peripheral equipment. Included are rack mount cases, portable workstations, Studio Series Racks, and lightweight Ultima and Convoy cases.

Canon USA, Inc.

Booth 836

One Canon Plaza
Lake Success, NY 11042
516-488-6700; FAX: 516-488-6322
Steve Steiner
Graphic Systems, Sales Specialist

Canon features color electrophotography technology which reproduces the improved halftone presentation scale without any deteriorization of the text image.

CELCO

Booth 2116

70 Constantine Drive
Mahwah, NJ 07430
201-327-1123; FAX: 201-327-7047
Art Weirgan
Sales

CELCO presents the ultimate in digital color film recorders. The new CELCO Professional model and CELCO Micro, Junior, 5000, and 8000 models provide 16mm through 8 x 10 inch output for business graphics, animation, printing, and scientific film recording applications. CELCO may also be contacted at 714-985-9868 or FAX: 714-982-2464.

CIS Graphics, Inc.

Booth 2345

285 Littleton Road, P.O. Box 695
Westford, MA 01886
508-692-9599; FAX: 508-692-2600
Sandra Lacoss
Marketing Communications Manager

CIS introduces the Geometry Ball family of 3D graphics control devices—the newest addition to their patented "6 degrees of freedom" Dimension-6 product line. See it with software products from Cognivision, TGS, and Visual Edge. CIS also unveils Design-3; the leading European CAD system for textile design in total 3D.

CMP Publications, Inc.

Booth 2229

600 Community Drive
Manhasset, NY 11030
516-562-5000; FAX: 516-562-5407
Frank Nardi
Trade Show Manager

Computer Reseller News is a CMP publication, the newsweekly for the computer and systems integration business. *Informationweek* is a CMP publication, the newsmagazine for information management. *Electronic Engineering Times* is a CMP publication, the industry newspaper for engineers and technical management.

Colorocs Corporation

Booth 900

2830 Peterson Place
Norcross, GA 30071
404-448-9799; FAX: 404-446-1771
Linda Rhodes
Administrative Assistant

Colorocs demonstrates both a full-color electrophotographic printer and copier, and advanced architecture that employs a single print pass to paper. The printer is hosted by a PC-based workstation. The copier is a universal walk-up, easy-to-use, analog unit that operates at 7.5 pages per minute full-color and black only, 22.5 pages per minute.

Commodore Business Machines, Inc.

Booth 418

1200 Wilson Drive
West Chester, PA 19380
215-431-9100; FAX: 215-431-9156
Mary Ann Harkins
Trade Show Supervisor

Commodore is displaying a wide range of workstation solutions including video, image processing, CAD, graphic design, 3D modeling, animation, and X-Windows.

Computer Graphics Review

Booth 742

9221 Quivira
Overland Park, KS 66215
913-541-6626; FAX: 913-541-6697
John Torrey
Associate Publisher

Computer Graphics Review identifies and interprets significant technological and business developments which impact computer graphics purchasing decisions.

Editorial focuses on CAD, CAM, CAE, CIM, image processing, business/presentation graphics, mapping, engineering/scientific graphics, computer animation, and desktop publishing. Essentially any application that deals with digital pictures, images, and graphics is covered.

Computer Graphics World

Booth 300

One Technology Drive, P.O. Box 987
Westford, MA 01886
508-692-0700; FAX: 508-692-0525
Robert Holton
Publisher

Computer Graphics World provides focused coverage of significant new technological trends and product development within the industry including first-hand reports of how computer graphics are being applied in manufacturing, business, science and medicine, and the arts. *Computer Graphics World* is the only international publication to concentrate its editorial on the application-driven segments of the computer graphics market.

Computer Pictures, Montage Publishing, Inc.

Booth 2811

25550 Hawthorne Boulevard, Suite 314
Torrance, CA 90505
213-373-9993; FAX: 213-373-0639
Sandra Seeger
Circulation Manager

This magazine is dedicated to covering graphics on an application and new technology basis. Emphasis is placed on the ever-broadening use of microcomputer graphics in Fortune 1000 corporations and businesses, architectural and engineering desktop publishing and desktop video, graphic arts and design, CAD/CAM, and the educational community.

Control Data Corporation

Booth 2216

9111 Edmonton Road
Greenbelt, MD 20770
301-982-9550
Richard B. Kann
Vista Product Manager

Graphics terminal emulation products for PCs and workstations is exhibited. The VistaCOM product line provides 4105 and 4107 emulation, plotting, and printing. Additionally, the packages provide scripting, file transfer, and diagnostic micro/mainframe linkage functions.

Control Systems, Inc.

Booth 127

2675 Patton Road
St. Paul, MN 55113
800-826-4281 or 612-631-7800; FAX: 612-631-7802
Sheila Oien
Marketing Communications Manager

Control Systems is exhibiting the Artist Series of high-performance display controllers for IBM PC/XT/AT and PS/2, Compaq, and Macintosh personal computers. The product line includes controllers for CAD, desktop publishing, and image processing with resolutions up to 1664 x 1200. A new TI 34020-based Artist graphic controller is announced.

Convex Computer Corporation

Booth 1622

3000 Waterview Parkway
Richardson, TX 75080
214-497-4000; FAX: 214-497-4848
Don Collier
Exhibit Manager

Convex Computer Corporation demonstrates its C Series supercomputers running several computationally intensive graphics applications including computer animation, signal and image processing, CFD, and more. C Series supercomputers offer users scalar, vector, and parallel processing for fast turnaround, huge physical memory for large applications, and connectivity to graphics workstations for integrated visualization.

Covid, Inc.

Booth 743

2400 W. 10th Place
Tempe, AZ 85281
602-966-2221; FAX: 602-966-6728
Suzanne Jones
Marketing Manager

Covid manufactures computer-video interfaces, 100 MHz Distribution Systems, and RGB Sync Umbilical Cables for the education, training, and presentation markets. Interfaces link PCs, terminals and workstations to data monitors and large screen projectors. Covid's 123 S-Video Interface, ideal for the education industry, allows for a direct connection between IBM PS/2 computers and a large screen TV. Distribution Systems send one signal to many monitors/projectors, or send many signals to one projector.

Crosfield Design Systems

Booth 1816

11401 Rupp Drive
Burnsville, MN 55337
612-895-3183; FAX: 612-895-3084
Barbara Hollister
Marketing Support Specialist

Presentation and print capabilities are exhibited by Crosfield Design Systems, offering capability in total graphics communication. Highlights of the show include demonstrations of the desktop presentation systems and the introduction of a new low-cost film recorder.

Cubicomp Corporation

Booth 104

21325 Cabot Boulevard
Hayward, CA 94545
415-887-1300; FAX: 415-887-4683
Martin J. Stein
Vice President/Marketing

Cubicomp is showing new enhancements to its 3D video animation systems—PictureMaker, and Vertigo Series 9.

Dainippon Screen

Booth 1006

5110 Tollview Drive
Rolling Meadows, IL 60008
312-870-1960; FAX: 312-870-1063
Scott Prochaska
Marketing Services Manager

Dainippon Screen, incorporated in 1943, is an integrated manufacturer of image reproduction equipment and systems for the graphic arts industry. These products include electronic page make-up systems, electronic color and monochrome scanners, industrial process cameras, automatic film processors, step and repeat machines, proof presses, and other related equipment.

Dalim France

Booth 1322

6, Avenue des Andes - 2. A. Courtaboeuf
Les Ulis Cedex, France 91952
(33) 69.28.51.51.; FAX: (33) 69.28.60.51
Daniel Cadier
Managing Director

Dalim develops high quality graphic systems for complete solutions on low-cost systems up to high-end prepress systems. They apply to graphic design, AV studios, advertising, corporate design, packaging design, technical documentation, marketing support, print offices, publishing companies, and Litho Studios.

Data Translation, Inc.

Booth 1900

100 Locke Drive
Marlboro, MA 01752
508-481-3700; FAX: 508-481-8620
Susan Jones
Marketing Support Supervisor

Data Translation manufactures a variety of hardware and software products ideally suited for the image processing, video, and graphics markets. These products have capabilities for both monochrome and color applications suited for high speed processing and quality output to monitors, printers, and slide makers.

Digital Arts

Booth 922

7050 Convoy Court
San Diego, CA 92111
619-541-2055; FAX: 619-541-2655
Sheldon Liebman
Vice President/Sales and Marketing

Digital Arts is demonstrating the latest versions of the DGS product line. DGS software modules include advanced 3D modeling, motion scripting, and rendering on a variety of PC-based hardware platforms. Digital Arts is introducing both new features and new platforms at SIGGRAPH '89.

Digital Equipment Corporation

Booth 318

146 Main Street
Maynard, MA 01754
508-493-5111; FAX: 508-493-8780
Betty Lynch
SIGGRAPH Coordinator

Digital Equipment Corporation is displaying its current line of workstation products in various application areas such as compound documents, imaging, scientific visualization, and molecular modeling as well as others. All applications running are under DECwindows, Digitals graphical user interface based on the X-Window System. The newly announced VRE01 19=electroluminescence Flat Panel Monitor is also displayed.

Dubner Computer Systems, Inc.

Booth 3200

6 Forest Avenue
Paramus, NJ 07652
201-845-8900; FAX: 201-845-8063
Evelyn Bronson
Marketing Production Manager

Dubner is demonstrating its interactive 3D modeling, rendering, and animation system, the Graphics Factory, including the GF-30 Character Generator and the GF-40 Paint System. All in one system, this can provide animation playback in real-time or external frame-by-frame. The GF-50 adds a special function keyboard and 300 Mbyte fixed disk.

Du Pont Company

Booth 332

600 Eagle Run Road
Newark, DE 19714-6099
800-225-8418; FAX: 302-453-4501
William H. Tilson, III
Business Manager

Du Pont Pixel Systems is demonstrating its broad range of computer graphics products, including accelerator boards, systems, and image processors. These products have applications in the printing, medical, industrial, creative arts, and defense industries.

Dynair Electronics, Inc.

Booth 2204

5275 Market Street
San Diego, CA 92114
619-263-7711; FAX: 619-264-4181
Kelly Gramman
Marketing Manager

Video routing switchers (multiplexers) and distribution equipment for coax and optical fiber for high-resolution graphics video are on display.

Eastman Kodak Company

Booth 1610

343 State Street
Rochester, NY 14650
716-724-3237; FAX: 716-724-9416
Mary Sample-Smith
Exhibits Coordinator

The Electronic Photography Division is exhibiting new high-resolution thermal dye transfer printers along with still video products for commercial users in applications such as CAD/CAM, industrial design, video production, and other technical and scientific applications.

Electrohome Projection Systems

Booth 2016

809 Wellington Street North
Kitchener, Ontario, Canada N2G 4J6
519-744-7111; FAX: 519-749-3131
Jeff Ward
Trade Show Coordinator

Electrohome Limited, Projection Systems, is exhibiting its complete line of large screen data/graphics projectors. The Electrohome line includes the EDP58XL monochrome, the ECP2000 and ECP Graphics single lens, and the ECP3000 and ECP4000 three lens systems. Microprocessor control on the ECP Graphics, ECP3000 and ECP4000 control all functions of the projectors via infrared remote keyboard including full zone digital convergence.

Electronic Systems Products

Booth 204

1301 Armstrong Drive
Titusville, FL 32780-7999
407-269-6680; FAX: 407-267-6211
Peg Whitmore
Manager, Marketing Communications

Electronic Systems Products designs, develops, and manufactures high-resolution computer/video projection systems. Its Esprit projectors offer a complete range of displays to satisfy requirements for medium through ultra high-resolution color graphics. They include video bandwidths to 100 MHz, upgradable models, and self-diagnostic capability.

Elements Inc.

Booth 2613

17720 N.E. 65th Street
Redmond, WA 98052
206-869-2911; FAX: 206-869-2821

Elements is exhibiting CAD workstations and modular tables in charcoal and grey laminates with natural ash or black PVC edging. They are adapted for CAD ergonomics and most hardware functions, fulfill economical multi-station requirements, durable for full contract use. Also available are files and storage.

ESD: The Electronic System Design Magazine

Booth 1115

1900 West Park Drive, Suite 200
Westborough, MA 01581
508-898-3210; FAX: 508-366-8104
Cynthia Reehl
Sales Promotion Manager

ESD provides comprehensive coverage of the computer-related OEM marketplace with editorial focus of four integrated, in-depth sections: system integration, imaging and graphics, advanced ICs, and VLSI design technology. Visit our booth for a free sample issue.

Evans & Sutherland

Booth 432

600 Komas Drive
Salt Lake City, UT 84108
801-582-5847; FAX: 801-582-0524
Robert Stevenson
Vice President, Marketing

The computer division of Evans & Sutherland designs and builds interactive supercomputing systems for scientific and engineering applications, high-performance 3D graphics hardware for a broad customer base, and specialized software for molecular design. At SIGGRAPH '89, E&S announces CDRS, a turnkey computer-aided industrial design system based on new modeling technology and rendering capability.

Expert Graphics Systems

Booth 2141

4505 Las Virgenes Road, #207
Calabasas, CA 91302
818-880-1347
George Semerau
Director of Marketing

The EGS500 is a parallel interactive real-time visualization system.

Extron Electronics

Booth 123

13554 Larwin Circle
Santa Fe Springs, CA 90670
213-802-8804; FAX: 213-802-2741
Gary Kayye
Sales Manager

Extron is a manufacturer of computer video interfaces, switchers, distribution amplifiers, and computer integration systems. Computer interfaces match computer, CAD workstations, mainframe terminals, and display adapter card video outputs to those required by data monitors and projectors while also allowing local monitor viewing. Extron also has a complete line of TTL, analog video switchers and distribution amplifiers, as well as accessory cables and monitor and projector adapters.

Faros

Booth 1424

Saint Lubin
Louviers, France 27400
(33) 32.40.44.66.; FAX: (33) 32.40.37.70
Christian Le Coadou
Chairman

An interactive graphic simulator in real-time working from PC in 3D for industrial and military application is on display.

Faroudja Laboratories

Booth 3222

946 Benicia Avenue
Sunnyvale, CA 94086
408-245-1492; FAX: 408-245-3363
Ronald Zimbrick
Marketing Manager

On display: The CTE-2 Encoder, which pre-filters luminance and chrominance information prior to encoding to avoid spectral overlay and artifacts; the CFO-N decoder, a comb filter decoder utilizing patented filter design which provides for effective suppresion of color subcarrier dot crawl; the CTC-2 transcoder, a bi-directional, multi-standard component transcoder of unequaled precision; and the VHP-N, vertical and horizontal detail processor for use in NTSC or PAL/SECAM.

Flamingo Graphics

Booth 3214

19 Bishop Allen Drive
Cambridge, MA 02139
617-661-1001; FAX: 617-661-3877
Bob Lang
President

Flamingo Graphics provides custom graphics software to OEMs for the PC, Mac, and UNIX workstations. Flamingo specializes in anti-aliased text rendering and optical transformations, spline-based drawing with output to PostScript, DXF and CGM, and manipulation of continuous tone images, including TIFF and TARGA files. Our clients include Truevision, AT&T, GSL, Nynex, Quark, and New Image.

Folsom Research, Inc.

Booth 1840

526 E. Bidwell Street
Folsom, CA 95630
916-983-1500; FAX: 916-983-7236
Ed Hart
Sales/Marketing

Folsom Research is demonstrating several new scan converter products from its comprehensive line of board-level and stand-alone systems. The scan converters were designed to convert any high-resolution video source to standard NTSC or PAL video.

FOR-A Corporation of America

Booth 2710

320 Nevada Street
Newton, MA 02160
617-244-3223; FAX: 617-965-5085
Gary Carter
National Sales Manager

FOR-A manufactures an extensive line of video products for both production applications and the imaging field. Products include frame stores, and HDTV cameras, as well as time base correctors, and other devices applicable to NTSC applications.

French Expositions in the U.S., Inc.

Booth 1424

810 Seventh Avenue
New York, NY 10019
212-265-5676; FAX: 212-315-1017
Elizabeth Wolf
Director

French Collective Exhibit: See individual alphabetical listings.

Gammadata Computer Inc.

Booth 1229

1350 Busch Parkway
Buffalo Grove, IL 60089
312-541-9119; FAX: 312-541-9130
Art Tanimura
Vice President/General Manager

Gammadata provides color hard copy solutions based on its line of high-performance peripheral controllers. The different versions of the Gammacolor high speed, high-resolution video interface controllers are being demonstrated. These systems have up to 16 input channels, multiple frame store, disk storage, and digital input options.

General Electric Company, PDPO

Booth 1916

Electronics Park, 6-338
Syracuse, NY 13221
315-456-2573; FAX: 315-456-0732
Maureen Hanson
Manager, Marketing Services

Large screen video projectors including the LV8000-MP data/graphics/video projector featuring Talaria light valve technology and the Imager 310 data/video projector are on display.

Getris Images

Booth 1424

23 Chemin des Prés - ZIRST
Meylan, France 38240
(33) 76.90.19.58; FAX: (33) 76.90.72.34
Antoine Patte
Marketing Manager

Getris Images, a leading European supplier of innovative 2D/3D videographics systems, brings out its new line of high-end 32-bit stations: Venice. Venice meets all post-producers and broadcaster's needs: ultrasophisticated paint, the only existing real-time 2D animation system, advanced special effects module, and the Digital Arts 3D software, with 4.2.2 output, real-time, anti-aliasing.

Graftel Systems, Inc.

Booth 2923

323 New Boston Street
Wilmington, MA 01887
617-933-8170; FAX: 617-932-8170
Craig N. Lowe
Director of Sales

Graftel's color device interfaces allow the sharing of color printers/cameras by multiple workstations and terminals. The EM100, Ethernet color device manager, allows UNIX workstations (SUN, SGI) to send images via the network, to color output devices. The VP240 is a video (RGB) interface that can link up to six color monitors to one color printer.

GTCO Corporation

Booth 718

7125 Riverwood Drive
Columbia, MD 21046
301-381-6688; FAX: 301-290-9065
Anne Hageman
Graphic Designer/Tradeshow Coordinator

GTCO is exhibiting its range of I/O peripherals for use in computer graphics: SketchMaster, a high-resolution, low-cost digitizer available in A and B sizes; Digi-Pad Super L Series, lightweight, high-resolution digitizers (17″ x 24″ to 42″ x 60″), with ClearVu cursors; and Macintizer ADB, a 12″ x 12″ digitizer compatible with Macintosh SE and 11/x computers.

Harris Video Systems

Booth 142

960 Linda Vista Avenue
Mountain View, CA 94043
415-969-9100; FAX: 415-961-5353
Steve Hall
Marketing Engineer

Harris Video Systems manufacture the HarrisVws line of integrated video graphics workstations; providing still-store, 2D and 3D graphics and animation functions in a fully integrated workstation environment. Systems may also be configured for presentation and briefing applications.

Helios System/Piiceon

Booth 1941

1996 Lundy Avenue
San Jose, CA 95131
408-432-8030; FAX: 408-943-1309
Arthur W. Fonda
President

Helios Systems is exhibiting its complete line of memory boards for Sun Microsystems, Compaq, Macintosh, Hewlett-Packard, Apollo, NCR, Unisys, and AT&T. Disk/tape subsystems up to 2 gigabytes with new 8mm tape drives are featured.

Hewlett-Packard Company

Booth 1904

3404 East Harmony Road
Fort Collins, CO 80525
303-229-3800; FAX: 303-229-6039
Judy Edwards
Logistics Manager

Hewlett-Packard Company offers a broad range of peripherals and computers to meet the demanding needs of graphics applications. Products include workstations ranging from high-performance 2D to 3D animation systems such as the low-cost 3D graphics system - HP 9000 Model 340SRX, to HP 9000 Model 835 TurboSRX superworkstation, and peripherals for input and hardcopy output.

Heyden Inc.

Booth 1122

71 Veronica Avenue
Somerset, NJ 08873
201-846-5800; FAX: 201-247-0658
Jeffrey H. Booth
Executive Vice President

Heyden presents the Schneider Cartridge Refillable Plotter Pen System, a complete line of plotter pens, made in West Germany. Rollerball, fiber, and stainless steel tube pens are available in four line widths. New Draftrollers—capillary action rollerballs for use on mylar, far less expensive than tungsten carbide—four line widths, including 1.0mm. New double-size ink cartridges.

Hi-tech Marketing (HTM)

Booth 436

See Paragon

Hitachi America, Ltd.

Booth 2028

50 Prospect Avenue
Tarrytown, NY 10591-4698
914-332-5800; FAX: 914-332-1185
M. Takebayashi
Marketing Manager

Hitachi America, Ltd. highlights a large selection of 15″ and 19″ inch monitors featuring state-of-the-art color resolution, a complete line of digitizer tablets in a variety of sizes, and a PC LAD-based software package that provides all the features of a large system.

Howtek, Inc.

Booth 1401

21 Park Avenue
Hudson, NH 03051
603-882-5200; FAX: 603-880-3843
Stephanie Papantonis
Marketing Communications

Howtek is presenting the Total Color Solution and demonstrating its family of flatbed and 35mm color scanners with its Scan-It software. Howtek has two flatbed scanners which enable the user to scan reflective art and 35mm scanners which scan any type of 35mm film. To complete the Total Color Solution, Howtek is showing the ideal output device, the Pixelmaster. Now that its compatible with Color PostScript Language and QuickDraw, it combines brilliant colors, high-resolution, and affordability all on plain paper.

IBM Corporation

Booth 100

44 South Broadway
White Plains, NY 10601
914-686-1810; FAX: 914-686-4527 or 28
Jon Thew

IBM's AIX Family, the PS/2, RISC, and S/370 offers the greatest scalability of solutions from the paperless office to visualization, simulation, and animation. In addition, AIX provides a rich set of application development tools like interface builder and object-oriented toolkits, that enhance the development of interactive computer graphics applications. Solutions for the AIX Family of systems is demonstrated.

IEEE Computer Society Press

Booth 2122

1730 Massachusetts Avenue, N.W.
Washington, DC 20036-1903
202-371-1012; FAX: 202-728-9614
Frieda Koester
Customer Service Manager

Books, magazines and other publications in computer sciences and engineering are featured. Memberships in the IEEE Computer Society are also available.

Ikegami Electronics (USA), Inc.

Booth 604

37 Brook Avenue
Maywood, NJ 07607
201-368-9171; FAX: 201-569-1626
Ray Sooley
Director of Sales and Marketing of Display Products

Ikegami Electronic is exhibiting its complete line of color and monochrome, high-quality raster-scan monitors. Modern design and unique enclosures provide a family appearance for the entire line. Also featured is the new large screen projection system, the TPP-1500.

Ilford Photo Corporation

Booth 1201

West 70 Century Boulevard
Paramus, NJ 07653
201-265-6000; FAX: 201-265-8107
Lyne Moody
Marketing Support Coordinator

Cibacopy photographic color copy systems designed to produce exceptionally high-quality prints and overhead transparencies from 35mm slides or flat art are featured.

i.m.a.g.e. Software

Booth 1121

21224 Vanowen Street
Canoga Park, CA 91303
818-346-4985; FAX: 818-702-8868

IMAgraph Corporation

Booth 736

11 Elizabeth Drive
Chelmsford, MA 01824
508-256-IMAG; FAX: 508-250-9155
Holly Hawkes
Sales/Marketing Representative

IMAgraph, a leading manufacturer of high-resolution, PC-based imaging and graphics controller boards, demonstrates: TI-1210 (1280x1024) graphics controllers, IMAzoom display list accelerator for AutoCAD, Image 32 (1024x1024x32) imaging boards, and TIGA-based UNIX driver for X.11. IMAgraph products serve a variety of applications including: CAD/CAM/CAE, geophysical interpretation, medical imaging, graphic arts, mapping, remote sensing, and desktop publishing.

Infotronic SPA

Booth 1018

Viale Berbera, 49
Milan, Italy 20162
39.2.6472441
I. Pfenninger
Marketing Manager

Infotronic is the leading European supplier of highest resolution fully programmable graphic boards. Infotronic products are widely sold to OEM's, VAR's, resellers and endusers for CAD, DTP, and imaging applications. The boards on display feature resolutions up to 1664 x 1280 both in monochrome and also color or greyscale version.

Inline, Inc.

Booth 1043

625 S. Palm Street
La Habra, CA 90631
213-690-6767; FAX: 213-691-5247
Lola Gershfeld
CFO

Inline, Inc. is a manufacturer of computer video interfaces to a large screen projector/monitor. Inline also manufactures distribution amplifiers for multiple computers and projectors, BNC cables, and other computer peripherals.

INMOS Corporation

Booth 2814

2225 Executive Circle
Colorado Springs, CO 80906
719-630-4215; FAX: 719-630-4325

INMOS Corporation, part of the SGS-Thomson group of companies, demonstrates diverse applications in high-performance computer graphics.

Integrated Computer Solutions

Booth 2223

163 Harvard Street
Cambridge, MA 02139
617-547-0510; FAX: 617-547-0758
Sarah Lummus
Exhibits Manager

Integrated Computer Solutions specializes in the X-Window System. ICS provides training, consulting, and telephone support. ICS's latest product offering in the Xcessories line of X software are OSF/Motif toolkit for Sun, Vax, and other platforms; enhanced Sun X server; and an interactive user-interface design and layout tool. Integrated Computer Solutions is a member of the Open Software Foundation, an affiliate member of the X Consortium, and a corporation sponsor at XUG, the X User's Group.

Intel Princeton Operation

Booth 1317

CN5325
Princeton, NJ 08543
609-275-8080; FAX: 609-734-2672
Paula Zimmerman
Communications Manager

Intel Princeton Operation is the home of DVI Technology, the growing standard for interactive video/graphics in the PC environment. On display is its first DVI product, the Pro750 Application Development Platform and a variety of new DVI demonstrations covering a variety of market areas.

Intelligent Light

Booth 2000

P.O. Box 65
Fair Lawn, NJ 07410
201-794-7550; FAX: 201-794-6215
John P. Mitrano
Marketing Manager

Intelligent Light is a leading computer animation and visualization solution supplier providing software, turnkey systems, servers, and graphic products based on graphic supercomputers and high-performance workstations. Applications demonstrated on the new Apollo DN10000vs and Stellar's graphic supercomputer, and new product announcements, such as the ApolloRecord product, are featured.

Intergraph Corporation

Booth 1604

One Madison Park
Huntsville, AL 35807
205-772-2000; FAX: 205-772-4527
Doug Jones
System Marketing

Intergraph Corporation designs, manufactures, sells, and supports complete interactive computer graphics systems. The systems are integrated configurations of hardware and software featuring user-controlled interactive graphics and database management for a broad range of applications. A typical Intergraph graphics system may utilize any combination of Intergraph Corporation's basic hardware building blocks, which include: data processing systems; Intergraph workstations; integrated communications interfaces; plot servers; and peripherals.

IRIS Graphics, Inc.

Booth 936

Six Crosby Drive
Bedford, MA 01730
617-275-8777; FAX: 617-275-8590
Peter Alpers
Communications Manager

IRIS Graphics, Inc. of Bedford, Massachusetts is exhibiting the IRIS 3024 continuous flow color ink jet printer. Patented technologies, open architecture, and front-end independence enable the IRIS 3024 to print photorealistic color images of data files created on a wide range of design platforms. Over 200 have been installed worldwide.

Ithaca Software

Booth 3210

902 W. Seneca Street
Ithaca, NY 14850
607-273-3690; FAX: 607-273-3697
Lynn Buckman
Tradeshow Coordinator

HOOPS is a 2D and 3D graphics toolkit based on an object-oriented declarative programming interface that greatly simplifies the design of interactive graphics application. The system features a hierarchical graphics database, hidden line/surface removal, multiple light source rendering, multiple orthographic and perspective views, window and input event queue manager. HOOPS is source code compatible with many workstations including Sun, DEC, Apollo, HP, Silicon Graphics, 286/386-PC's, and Mac II. PostScript, HP-GL, and X-Windows are supported.

JRL Systems, Inc.

Booth 1841

6101 W. Courtyard Drive, Bldg. 1
Austin, TX 78730
512-345-7122; FAX: 512-346-7868
Fred Klingensmith
Vice President Marketing

JRL Systems features its 340G Laser Printer, a 22-page-per minute 400 ppi device which accepts HP-GL, Calcome 906/907, CCITT Group 3 and 4, and other input formats. JRL also shows its stand-alone controllers for graphic format conversion.

LAZERUS

Booth 1110

2821 Ninth Street
Berkeley, CA 94710
415-845-1237; FAX: 415-845-1237
Thomas Rust

LAZERUS exhibits its newest developments in supergraphics workstations. In addition, LAZERUS premieres two new products that bring workstation results to personal computers; "LazerRays," high-quality, ray tracing software for PC/XT, AT, 386, and AutoCAD users; as well as "*RADIANT*/PC," full-function, professional solid-modeling and animation software.

Leader Instruments Corporation

Booth 1114

380 Oser Avenue
Hauppauge, NY 11788
516-231-6900; FAX: 516-231-5295
George Gonos
Product Marketing Manager

Leader Instruments is a manufacturer of electronic test and measuring equipment: oscilloscopes, video and audio products, meters and bridges, signal and RF generators.

Levco Sales

Booth 2307

6181 Cornerstone Court East, Suite 101
San Diego, CA 92121
619-457-2011; FAX: 619-457-2325
Wendy Newlon
Marketing Manager

Levco Sales is exhibiting TransLink, a RISC-based enhancement board for the Macintosh line of computers. TransLink is based on the Inmos 32-bit transputer which can provide 10 MIPS per module. The RenderMan photorealistic imaging software for the Macintosh is demonstrated running on Levcos TransLink boards.

Lyon Lamb VAS

Booth 918

4531 Empire Avenue
Burbank, CA 91505
818-843-4831; FAX: 818-843-6544
Dale Rochon
Sales Manager

Lyon Lamb is featuring the RTC—real-time digital scan converter with zoom, pan, and scroll features; the ENC-7—broadcast-quality encoder/sync generator designed specifically for graphic systems, and Minivas—industry-standard video animation controller.

Macmillan Publishing Company

Booth 2922

866 Third Avenue
New York, NY 10022
212-702-2000; FAX: 212-605-9372
Marilyn Jones
Exhibits Manager

Macmillan is displaying a brand new book, *Computer Graphics,* by Francis S. Hill, Jr. of the University of Massachusetts at Amherst. This text introduces the basic concepts and techniques of modern interactive computer graphics and teaches readers how to write application programs.

MAGNI Systems, Inc.

Booth 1207

9500 SW Gemini Drive
Beaverton, OR 97005
503-626-8400; FAX: 503-626-6225
Joann Waddell
Product Manager

MAGNI introduces a new hardware product which offers professional standard video output (640x480) for composite NTSC or S-VHS, when used with a range of VGA cards. It is fully genlockable from either composite or S-VHS sources and offers keying, mixing, and cut effects.

Management Graphics, Inc.

Booth 2815

1401 E. 79th Street
Minneapolis, MN 55425
612-854-1220; FAX: 612-854-6913
Myron Hladum
Director of Promotional Marketing

VIStar, is the newest generation of graphics workstation for the creation of graphic images suitable for a variety of applications with output to film, print and video. Solitaire16, a high-resolution digital image recorder capable of recording images at up to 16,000-lines of addressable resolution. Perfect for pre-print composition work, scientific visualization and other animation applications. Solitaire Image Recorder, a revolutionary film recorder with an imaging speed of 43 seconds for 2K and 4K slide images. Solitaire can produce 2K, 4K and 8K images in formats from 35mm slides through 8 x 10.

Matrox Electronic Systems Ltd.

Booth 1404

1055 St. Regis Boulevard
Dorval, Quebec, Canada H9P 2T4
514-685-2630; FAX: 514-685-2853
Stephen Davies
Exhibits Manager

Matrox is a leader in the design and manufacture of board-level imaging and graphics processors for both the OEM and end-user. Matrox processors are compatible with most industry standard computer architectures including: PC-AT, PS/2, VME-BUS, Multibus I and II as well as SUN-3, SUN-4, SUN-386i, and IBM RT workstations.

McGraw Hill Publishing Co.

Booth 2327

1221 Avenue of the Americas
New York, NY 10020
212-512-2000; FAX: 212-512-6260
Karen Jackson
Marketing Manager

Measurement Systems, Inc.

Booth 1942

121 Water Street
Norwalk, CT 06854
203-838-5561; FAX: 203-853-6244
Tom R. Brass
General Sales Manager

Measurement Systems offers a line of high-performance controls including handgrips, joysticks, and trackballs. All reflect the importance placed on ergonomics in successful equipment design. Controls are available with various interfaces, such as: analog, pulse, coded digital, parallel binary, or serial RS232 or RS422.

Media Cybernetics

Booth 618

8484 Georgia Avenue
Silver Spring, MD 20910
301-495-3305; FAX: 301-495-5964
Cynthia A. Batz
Marketing Administrator

Media Cybernetics exhibits the Image analysis and enhancement software: Image-Pro/Sun, UNIX-based processing on the Sun-4; Image-Pro Color, 24-bit color and multispectral processing on the ATVista board; HALO Window Toolkit, versatile windowing tools for developing graphical user interfaces; and Publishers Partner, a revolutionary gray-scale image editor for producing darkroom quality images.

Media Magic

Booth 942

P.O. Box 2069
Mill Valley, CA 94942
415-381-4224
Michael Strasmich
President

Media Magic publishes and distributes a unique collection of computer graphic videotapes, books, fine arts prints, posters, and 1990 calendars. Visit the booth to receive a catalog, view exciting animated videos, and browse through a selection of important books on computer art, chaos, and fractals.

MegaScan Technology, Inc.

Booth 2810

4000 Kenneth Drive
Gibsonia, PA 15044
412-443-5820; FAX: 412-443-5440
Tracy L. Linza
Sales Administrator

MegaScan features ultra-high-resolution Gray Scale Raster Display Monitor—UHR2007 with ultra-high-resolution Frame Buffers and Display Processor—FDP2103/FDP2107/FDP2111 4, 8 and 12-bits per pixel. Ultra-high-resolution Monochrome Raster Display Monitor—UHR3000, 1-bit x 300 dpi with ultra-high-resolution Frame Buffer and Display Processor—FDP3000/FDP3100—High-performance Controllers are also on display.

Megatek Corporation

Booth 210

9645 Scranton Road
San Diego, CA 92121
619-455-5590; FAX: 619-453-7603
Gerry MacDonald
Coordinator, Marketing Communications

Megatek demonstrates two high-end workstations utilizing Sun computing platforms. SIGMA 70 offers breakthrough performance—2,000,000 vectors/second and 240,000 polygons/second—and is ideally suited for graphics-intensive applications, such as, simulation, scientific visualization, and C3I. The Megatek IGW 200 merges high-speed graphics with image processing capability for mapping, and intelligence applications.

Meiko Scientific Corporation

Booth 722

Reservoir Place, 1601 Trapelo Road
Waltham, MA 02154
617-890-7676; FAX: 617-890-5042
Bob Gardner
Vice President of Sales and Marketing

Meiko are leading vendors of Massively Parallel Supercomputers with over 200 sites in the United States and Europe. The Meiko Computing Surface extends seamlessly in size from 4-64 nodes in a Sun workstation, to 1000 plus nodes as a standard UNIX stand alone supercomputer.

Mercury Computer Systems, Inc.

Booth 2605

600 Suffolk Street
Lowell, MA 01854
508-458-3100; FAX: 508-458-9580
Ellen Gutter
Sales Development Manager

Mercury Computer Systems, Inc. manufactures and markets a family of programmable-attached processors for microcomputers and workstations. The MC family delivers near-supercomputer performance on a RISC-based single board solution which executes vector and scalar operation with 32-bit and 64-bit precision. C and Fortran Compilers and scientific algorithm library are also available.

MERET, Inc.

Booth 1119

1815 24th Street
Santa Monica, CA 90404
213-828-7496; FAX: 213-828-7567
Toby Dobrin
Marketing Administrator

MERET, Inc. is demonstrating its 3MDL26911TVA, a wide-bandwidth, 120MHz fiber-optic transmission system for high-resolution graphics. The 3MDL26911TVA, with automatic gain control, allows for distortion-free remoting of high-resolution video images 1,000 feet and beyond. Applications include medical imaging, CAD/CAM remoting, flight simulation, air traffic control, and more. Information on other fiber-optic transmission systems is available.

Microfield Graphics Inc.

Booth 1223

9825 SW Sunshine Court, Suite A1
Beaverton, OR 97005
503-626-9393; FAX: 503-641-9333
Sharon L. Kelley
Sales Administrator

Microfield, an industry leader in high-resolution, high-performance color graphics controllers for IBM PC/AT, IBM Personal System/2, and BUS-compatible machines, is displaying its ultra-high-performance V8 Color Graphics Controller and its T8/2 Color Graphics Controller. The software that will be used is MS-Window/386, X-Window 11.3, and Microfield Graphics CGI Libraries.

Micrografx, Inc.

Booth 1022

1303 Arapaho Road
Richardson, TX 75081
214-234-1769; FAX: 214-234-2410

Micrografx, an industry leader in graphics software for personal computers, exhibits Micrografx Designer, Graph Plus, and Draw Plus, and 12,000 clip art images for the OS/2 Presentation Manager and Microsoft Windows. Micrografx Designer is a drafting and illustrating tool for graphic artists, engineers, and technical illustrators. Micrografx Graph Plus is a business charting program for creating charts from spreadsheet or database data. Micrografx Draw Plus is an interactive drawing system for creating professional graphics, flowcharts, forms, and illustrations.

Microtime, Inc.

Booth 2218

1280 Blue Hills Avenue
Bloomfield, CT 06002
203-242-4242; FAX: 203-242-9876
John C. Kissel
President

The ImagePlus is an integrated system for 3D modeling, animation, paint, and graphics. Images can be rendered at up to 8000 lines for print quality output. Rendered previews, hierarchical motion, 2D reflectance maps, 3D shadows, grid transformations, and Auto Page effects are standard. A VTR controller is built into the system software.

Midwest Communications Corporation

Booth 2622

One Sperti Drive
Edgewood, KY 41017
606-331-8990
Pete Rightmire
Marketing Communications Manager

Midwest Communications Corporation is the largest professional video and RF equipment distributor for the complete A.C.E. product line, including the new VSC-5000 video scan converter. Midwest is also an exclusive distributor of the ProPaint 16 Graphics System.

Minolta Corporation

Booth 2311

101 Williams Drive
Ramsey, NJ 07446
201-825-4000; FAX: 201-445-9467
John McCasland
Marketing Manager

Minolta exhibits light and color measuring instrumentation as well as the TV color analyzer.

Mitsubishi Electronics America, Inc.

Booth 610

911 Knox Street
Torrance, CA 90502
213-217-5732; FAX: 213-769-1474
Amy White
Assistant Manager, Advertising and Promotions

Mitsubishi Electronics is displaying many graphics products including a new sublimation printer, the S340, and a new G370 color thermal printer. In addition, a sample of Mitsubishi's full line of monitors is on display including the recently announced 20", 21" flat square and 26" monitors.

Mitsubishi International Corporation

Booth 636

701 Westchester Avenue
White Plains, NY 10604
914-997-4960; FAX: 914-997-4976
Anna Mateus Dipasquale
Marketing Coordinator

Shinko offers its new color image scanner in "A/A4 size"/ 400 dpi. In addition, the CHC-336 color thermal transfer printer with built-in intelligent graphics controller creates near total universality with a host of computer graphics systems. Shinko also offers a complete line of color thermal printers in 200 and 300 dpi. for both "A" and "B" size output.

Mitsubishi Professional Electronics

Booth 242

800 Cottontail Lane
Somerset, NJ 08873
201-563-9889; FAX: 201-563-0713
Russ Novy
Communications Administrator

The Professional Electronic Division of Mitsubishi Electric Sales America Inc. is displaying its full line of monitors, projectors, and video copy processors (black and white, and color). Almost all units are autoscan capable. Headquarters are located in Somerset, New Jersey, with branch offices in Norcross, Georgia; Mt. Prospect, Illinois; Irving, Texas; and Cypress, California.

Modgraph, Inc.

Booth 2221

149 Middlesex Turnpike
Burlington, MA 01803
617-229-4800; FAX: 617-272-3062
Michael E. Berman
Vice President Sales

Modgraph's line of Tektronix and DEC-compatible high-resolution graphics terminals along with the recently announced PC/GRAPH-TERM are displayed. The PC/GRAPH-TERM is the first product to fully integrate a high-resolution (1024x780) DEC and TEK-compatible-graphics terminal with IBM PCs and DEC VAXs.

Morgan Kaufmann Publishers, Inc.

Booth 2822

2929 Campus Drive, Suite 260
San Mateo, CA 94403
415-578-9911; FAX: 415-978-0672
Elizabeth Essex
Marketing Coordinator

Morgan Kaufmann is a leading publisher of computer science books. Among its important publications in computer graphics is *An Introduction to Splines for Use in Computer Graphics* and *Geometric Modeling.* Its newest book is *Solid and Geometric Modeling,* by Christoph Hoffman, the first title in the new Morgan Kaufmann series in computer graphics.

Motorola Semiconductor Products

Booth 3221

3102 N. 56th Street
Phoenix, AZ 85018
602-952-3518; FAX: 602-952-4002
Lucie W. Brown
Trade Show Manager

Motorola's HYPERformance 24-bit fixed-point and 32-bit floating-point Digital Signal Processors and the new DSP56ADC16, 16-bit Sigma-Delta Analog-to-Digital Convertor products are featured.

Multiwire Division

Booth 632

250 Miller Place
Hicksville, NY 11801
516-933-8300; FAX: 516-933-8274
Gerard Stoehr
Marketing Manager

Multiwire Division is a manufacturer of high speed/high density circuit boards for prototyping and experimental usage. Full custom designed from schematics, x/y charts or from-to listings.

National Computer Graphics Association (NCGA)

Booth 3023

2722 Merrilee Drive, Suite 200
Fairfax, VA 22031
703-698-9600; FAX: 703-560-2752
Martha Filson
Sales Coordinator
Ron Richard
Coordinator, Chapter and Member Services

Stop by, pick up our materials and join NCGA. See what we have planned: NCGA C4 (CAD/CAM/CAE/CIM) Aerospace and Electronics '89—Santa Clara, California, September 12-15, 1989. NCGA Mapping and GIS '89—Los Angeles, November 12-15, 1989. NCGA '90—Anaheim, California, March 19-22, 1990.

National Semiconductor Corporation

Booth 622

2900 Semiconductor Drive
Santa Clara, CA 95052-8090
408-721-4425; FAX: 408-245-9655
John Blair
Strategic Marketing Manager—Graphics

National is exhibiting its advanced graphics chip set, a family of VLSI building block integrated circuits for a wide range of high-performance video graphics. Also included are a display of National's embedded system processors optimized for office imaging peripherals application. Customer demonstrations are featured.

National Technical Information Service

Booth 1315

5285 Port Royal Road
Springfield, VA 22161
703-487-4807; FAX: 703-321-8547
Lois Grooms

NTIS is a federal agency which provides public access to computer products by the U.S. government. A wide variety of computer products pertinent to business and scientific interests are made available for sale including DATAPLOT—NTIS' best selling interactive computer graphics software package. Information on DATAPLOT and other products is available at the NTIS Booth.

NEC Home Electronics

Booth 1510

1255 Michael Drive
Wood Dale, IL 60191
312-860-9500; FAX: 312-860-5114
Dave Demel
Supervisor, Trade Shows and Special Events

NEC Home Electronics is displaying its most recent line of color monitors including the MacSync, MultiSync 2A, and MultiSync 3D.

NEC Information Systems

Booth 1510

1414 Massachusetts Avenue
Boxborough, MA 01719
508-264-8000; FAX: 508-635-4321
Sue Frank
Trade Show Manager

NEC Information Systems is displaying its most recent line of printers including the LC-890 and LC-890XL.

NEC Professional Systems Division

Booth 1504

1255 Michael Drive
Wood Dale, IL 60191
312-860-9500; FAX: 312-860-5812
Mark Dziekan
Assistant Product Manager

NEC displays their complete DataSmart family of multiple frequency monitors and projectors. These include data monitors with 20″, 26″ and 3D screens; the DP-5200S rear screen data projector; and the DP-1200S 70″-120″ data projector. New introductions include the GraphicSmart GP-3000 graphics projector with a scan frequency of 15-55 KHz and the ImageSmart IDC-1000 Improved Definition Converter.

Nikon Inc.

Booth 503

623 Stewart Avenue
Garden City, NY 11530
516-222-0200; FAX: 516-222-0265
John Harcourt
Marketing Manager, Electronic Imaging Division

Nikon's LS-3500 35mm film scanner produces high-resolution (6144x4096 pixels) images of color, black and white, positive, or negative film originals. Fully automated scanning or an extensive manual command set are available for image manipulation, including color separations. Software is available for MS-DOS and Macintosh operation systems. Nikon's full-color printer produces vivid, fine-grained images with exceptional tonal quality at 1280x1024 pixel resolution through its thermal dye transfer process. Interfaces include GPIB, SCSI, and RGB analog.

Nissei Sangyo America, Ltd.

Booth 1340

800 South Street
Waltham, MA 02154
617-893-5700; FAX: 617-237-2592
Nancilee Franklyn
Marketing Specialist

Nissei Sangyo America, Ltd., displays a new array of graphic products for both the OEM and distribution markets. NSA also displays the newest offerings from Hitachi Yokohama Works—19″ and 20″ color displays, as well as a 20″ monochrome display—ideal for the desktop publishing industry. Also presented are high-resolution color graphics controllers from Infotronic.

Nth Graphics, Ltd.

Booth 1126

1807-S West Braker Lane
Austin, TX 78758
800-624-7552; FAX: 512-832-5954
Debbie Herrington
Manager, Marketing Communications

The Nth 3D Engine display controller performs 3D display list processing at speeds comparable to expensive graphics workstations. Operating at 10 MIPS, 3 MFLOPS, it fits into a single AT-bus card slot and runs 3D applications 10 times faster than an 80386-based PC. For software developers, it comes with the HOOPS graphics library which makes development easier and faster, and makes applications portable across platforms. Resolutions up to 1280x1024. 2MB RAM, standard. 256 colors.

Number Nine Computer Corporation

Booth 232

725 Concord Avenue
Cambridge, MA 02138
617-492-0999; FAX: 617-864-9329
Valerie A. Leighty
Director, Marketing Communications

Number Nine demonstrates its PEPPER series multiprocessor, shared memory graphics boards designed for both IBM's Micro Channel, and industry standard AT/XT buses. PEPPER series boards are supported by a broad range of applications running under DOS, OS/2, and UNIX operating systems as well as TIGA and the extensible NNios graphics OS. PEPPER boards range in resolution from 1600x1200 to 640x480, and support up to 32-bit plane color depth, AutoCAD, and Personal Designer POWER9 display list, and RGB/PAL/NTSC real-time frame capture and output.

Numonics Corporation

Booth 1618

101 Commerce Drive
Montgomeryville, PA 18936
215-362-2766; FAX: 215-361-0167
Celeste Cygan Hafler
Advertising Manager

Numonics Corporation is a manufacturer of high-performance digitizers, plotters, and mouse products which are compatible with most CAD systems using RS232, or IEEE-488 interface. Numonics products serve a full range of graphics applications from computer graphics to computer-aided design. All Numonics products are backed by years of experience in the graphics field.

Omnicomp Graphics Corporation

Booth 3100

1734 West Belt North
Houston, TX 77043
713-464-2990; FAX: 713-827-7540
Anthony G. Masraff
President

Omnicomp specializes in providing systems integrators with high-performance graphics display systems for VME, Multibus II, AT, and host-independent environments. Omnicomp's graphics systems include: graphic display controllers, graphics database managers (i.e. KS, PHIGS, IKS, DORE), frame grabbers, Z-buffers; as well as imaging, true color, and multi-channel capabilities.

Oxberry

Booth 2615

180 Broad Street
Carlstadt, NJ 07072
201-935-3000; FAX: 201-935-0104
James Aneshansley
Director of Marketing

Oxberry is exhibiting bulk-loading, pin-registered film cameras for off-loading all high-resolution film recorders. Cameras are available in three cinemagraphic formats (16mm, 35mm, 65mm), three slide formats (35mm, 46mm, 70mm), and for overhead projection.

Panasonic Communications and Systems Company, Computer Products Division

Booth 1330

Two Panasonic Way
Secaucus, NJ 07094
201-348-7000
Joe Violetti

Panasonic Industrial Company and Panasonic Communication and Systems Company are displaying plasma panel displays, data display, a new line of microcomputer-based graphic and imaging systems including Panasonic micro computer, new 2: optical disc recorders, new 940 MB worm drives, new high-resolution monitors, new color printers, and new software systems.

Panasonic Industrial Company, Display Components Division

Booth 1430

Two Panasonic Way
Secaucus, NJ 07094
201-348-7000
Allen Dragon

(See Panasonic Communications and Systems Company, Computer Products Division listing for exhibits description.)

Pansophic Systems, Inc.

Booths 118 and 222

2400 Cabot Drive
Lisle, IL 60532
312-505-6000; FAX: 312-505-1222
Sharon L. Adcock
Sales Product Manager

Pansophic is exhibiting StudioWorks, an integrated presentation graphics system with text, chart, 2D and 3D art, paint, and video animation capabilities. Pansophic also is exhibiting its newest systems: Nimble, a 2D animation system; and PressWork, a PC-based prepress system. Also on display is EZ/Chart, a PC-based graphics software package, as well as DPict, graphics software for mainframes, minis, and PCs.

Paragon

Booth 436

5460 Hoffner Avenue
Orlando, FL 32812
407-277-8787; FAX: 407-277-9349
Caroline "Liney" Monroe
Trade Show Coordinator

Paragon, the powerful real-time visual simulation systems from Paragon of Orlando, Fla., produce 1000-10,000 polygons at 60 Hz update rate. Paragon...1024x1024 resolution anti-aliasing, multiple channels, and up to 256 moving models. Paragon... texture mapping, sun shading, transparencies, fade-level detail and distortion correction. Paragon...the solution without compromise.

Paragon Imaging Inc.

Booth 943

171 Lincoln Street
Lowell, MA 01852
508-441-2112; FAX: 508-459-9719
William Hayes
General Sales Manager

Paragon provides imaging, data visualization, and human interface software products for application in defense, medical imaging, earth sciences, industrial inspection, and the graphic arts. A new product, the Visualization Workbench, which functions under X-Windows, is demonstrated. It is available for virtually all workstations.

Parallax Graphics

Booth 732

2500 Condensa Street
Santa Clara, CA 95051
408-727-2220; FAX: 408-980-5139
Greg Baker
Director of Sales

Parallax Graphics introduces the VIPER Series video graphics controllers on VME, AT, and Q-bus. VIPER controllers are designed for OEMs and systems integrators developing training, simulation, inspection, cartographic, and other applications requiring real-time video and high-resolution graphics.

PC Week

Booth 1305

One Park Avenue
New York, NY 10016
212-503-3500
Linda Bunis
Trade Show Manager

PC Week, the national newspaper of corporate microcomputing, delivers the latest industry news, analysis, product reviews, and applications in a format designed to help readers buy, integrate, and manage IBM PCs and compatibles. *PC Week* is a Ziff-Davis publication.

Peritek Corporation

Booth 1118

5550 Redwood Road
Oakland, CA 94619
415-531-6500; FAX: 415-530-8563
Jill M. Collins
Sales/Marketing Coordinator

On display are Peritek's new VCM and VCL display controllers and the X-Windows support software for high-resolution graphics applications. Peritek offers the widest range of graphics boards for DEC's Q-bus (MicroVAX and LSI011) and UNIBUS (VAX and PDP) available.

Photron Limited

Booth 2211

Dogenzaka 2-8-7, Shibuyaku
Tokyo, Japan 150
(03) 486-3471; FAX: (03) 486-8760
Hideo Osato
Manager, International Department

The FSC-64000EZ takes high-resolution RGB computer graphics output and converts the signals in real time to NTSC, RGB, R-Y, B-Y, or Y-C so that the images can be stored on videotape, videodisc, or projected in real time.

Pixar

Booth 3110

3240 Kerner Boulevard
San Rafael, CA 94901
415-258-8100; FAX: 415-459-4297
Joy Folla
Marketing Communications Coordinator

Pixel Magazine

Booth 1111

2 rue du Faubourg Poissonniere
Paris, France 75010
(33) 14.523.3981; FAX: (33) 14.247.0873
Joel Laroche
Publisher

Pixel, France's exciting new computer graphics magazine, showcases outstanding computer-generated images created by innovative artists from across the globe. A sister publication of legendary ZOOM magazine, *Pixel* is the world's most exciting, beautiful, and well-printed computer graphics magazine.

Pixelink Corporation

Booth 2110

8 Kane Industrial Drive
Hudson, MA 01749
508-562-4803; FAX: 508-568-0514
Roger Trudeau
Vice President of Sales and Marketing

High (1024x768) very high (1280x1024) and ultra high (1600x1280) resolution monitors-color & greyscale for AT. PS/2 Mac II and other platforms—Autoscan from 15 to 38 KHz from 20 to 50 and 30 to 64KHz-15 in., 19 and 21 in. Pixelink is U.S. importer and factory authorized service center for Philips.

Pixelworks, Inc.

Booth 1130

7 Park Avenue
Hudson, NH 03051
603-880-1322; FAX: 603-880-6558
Mariana Haven

Pixelworks, Inc., a leader in high-resolution, high-performance, graphics controllers is demonstrating the Ultra Clipper Family of Controllers with resolutions ranging from 1024x768 to 1280x1024 running popular CAD packages such as AutoCAD, VersaCAD, CADKEY, CV Personal Designer on PC AT and compatibles, and PS/2 Micro Channel and compatibles.

Polhemus Inc.

Booth 1235

P.O. Box 560
Colchester, VT 05446
802-655-3159; FAX: 802-655-1439
Tom Knoflick
Business Development Manager

Demonstrations of the Polhemus 3SPACER Digitizer, Tracker, and Isotrak products emphasize the benefits of these six-degree-of-freedom input devices in virtual environment, computer graphics, solid modeling, CAD, robotics, and simulation applications. 3SPACER input devices provide an elegant, cost-effective alternative to the conventional 2D mouse, tablet, and trackball for 3D applications.

Presentation Products Magazine

Booth 1321

513 Wilshire Boulevard, #344
Santa Monica, CA 90401
213-455-1414; FAX: 213-393-5222
Adrienne Miller
Advertising Coordinator

Presentation Products Magazine is published monthly with a national BPA audited circulation in excess of 50,000. Copies of the publication and free subscription forms are available at the booth.

PRIOR Data Sciences

Booth 1802

240 Michael Cowpland Drive
Kanata, Ontario, Canada K2M 1P6
613-591-7235; FAX: 613-591-0343
Barry Sullivan
Manager, GKS Sales

PRIOR Data Sciences, known for its software products and real-time systems, offers a level 2C implementation of GKS. PRIOR's GKS/C is available on UNIX, VMS, and DOS operating systems, with C, FORTRAN and Ada callable libraries meeting the ANSI/ISO binding. Also offered is InterMAPhics, an interactive mapping and graphics presentation system.

QMS, Inc.

Booth 700

One Magnum Pass
Mobile, AL 36618
205-633-4399; FAX: 205-633-0013
Carro McFadyen
Public Relations Supervisor

QMS, Inc. provides print solutions for electronic publishing and advanced imaging applications using a variety of host systems and software. The monochrome laser printers have sophisticated text and graphics capabilities, and QMS color printers produce fast, high-quality output for PostScript-language and CAE/CAD applications.

Quantum Books

Booth 1227

One Kendall Square
Cambridge, MA 01239
617-494-5042; FAX: 617-494-1394
Bill Szabo
President

Quantum Books is a premier source for technical books of all publishers, corporate accounts and show discounts. Search services on our 65,000 title database available.

Quantum Data Inc.

Booth 842

2111 Big Timber Road
Elgin, IL 60123
312-888-0450; FAX: 312-888-2802
Allen Jorgensen
President

Quantum Data will feature video signal generators with variable scan and pixel rates to 400 MHz, for manufacturers and users of video monitors. Applications include demonstration, design, human factors evaluation, manufacturing, quality control, and servicing of video monitors.

Rainbow Technologies

Booth 2721

18011-A Mitchell South
Irvine, CA 82714
714-261-0228; FAX: 714-261-0260
Melissa A. Burns
Marketing Coordinator

Rainbow Technologies displays its Software Sentinel Family of software protection devices. Included is the SentinelPro, based on a ASIC chip designed by Rainbow; The Sentinel-C, for customized protection; The Eve, for Macintosh software developers; and the DataSentry, for securing sensitive data files. The SentinelShell, a hardware key that protects software applications without having access to the source code, is being announced.

Ramtek Corporation

Booth 1030

1525 Atteberry Lane
San Jose, CA 95131
408-954-2700; FAX: 408-954-0118
Jack MacInturff
Vice President, Marketing and Sales

Ramtek Corporation, headquartered in San Jose, California designs and develops computer display systems for imaging and graphics markets such as command and control, process control, remote sensing, weather, seismic, and medical imaging.

RGB Technology

Booth 2229

2550 Ninth Street
Berkeley, CA 94710
415-848-0180; FAX: 415-848-0971
Daniel O'Brien
Vice President, Sales and Marketing

RGB Technologies introduces the RGB/View 2000 video input system for workstations. The View enables the live or pre-recorded NTSC television signal to be displayed as a window on any workstation monitor. The window's location and size may be manipulated by front panel switches or under program control using X-Windows. The RGB/Videolink Model 1400A Auto-Sync Video Scan Converter is also shown.

Sampo Corporation of America

Booth 2042

5550 Peachtree Industrial Boulevard
Norcross, GA 30071
404-449-6220; FAX: 404-447-1109
George Korzeniewski
Vice President

Sampo enters the computer peripherals market with its own brand of displays. Sampo displays 14″ and 20″ high- and medium-resolution color display monitors; RGBI and Analog input; 14″, 15″, 19″, and 24″ high-resolution monochrome display monitors; 15.75 to 89 KHz horizontal fixed frequency, resolutions up to 1600x1280; also multi-frequency color monitors; 80286 and 80386 personal computers; and add-on boards.

SAS Institute Inc.

Booth 2301

SAS Circle, Box 8000
Cary, NC 27512-8000
919-467-8000; FAX: 919-469-3737
Sharon Respess
Senior Exhibits Coordinator

NeoVisual software is a broadcast-quality, 3D geometric modeling, graphics, and animation package. It integrates modeling, rendering, and animation into a single, powerful menu-driven package. The software was acquired in 1988 by SAS Institute from Toronto-based Neo-Visuals Inc.

Scientific Computer Systems Corporation

Booth 2212

10180 Barnes Canyon Road
San Diego, CA 92121
619-546-1212; FAX: 619-546-0283
Gwen Carlson
Exhibits Manager

Vector Star, a VectorNet product, provides a 6.4 gigabit aggregate bandwidth platform supplying (8) 1.6 gigabit, full-duplex bandwidth connections. Vector Star uses standard HSC connections to ANSI X359.3 high-speed channel, FDDI, and VMEbus. This product provides cost-effective interfaces and sufficient bandwidth for (4) simultaneous network transfers of large images and data blocks for workstations, computers, and storage devices.

Ron Scott, Inc.

Booth 2723

1000 Jackson Boulevard
Houston, TX 77006
713-529-5868; FAX: 713-529-9370
Ron Scott
President

Quick picture recorder matrix film recorder driver, with Sharpzoom, makes high-resolution slides look sharper and better defined. QFX is an image processing and special effects package that can sharpen images, adjust contrast, brightness and color, and can add a variety of special effects to images. QLIC prints Targa images of any size directly to a Laserjet or compatible printer.

Seiko Instruments USA, Inc.

Booth 2600

1130 Ringwood Court
San Jose, CA 95131
408-922-5800; FAX: 408-922-5840
Cheryl Landman
Marketing Communications Manager

Demonstration of the CH-5000 Series color printers which produce high-quality A and B size color output on paper or overheads. Video, parallel and network interfaces allow connections to workstations, PCs, and Macintosh. The GR-4400 advanced raster display systems with VLSI-based 3D graphics shading engine displayed.

Shima Seiki U.S.A. Inc.

Booth 804

22 Abeel Road
Cranbury, NJ 08512
609-655-4788; FAX: 609-655-3989
Helen Estakhrian
Sales Manager

Shima Seiki displays SGX Systems, high-resolution paint systems with an 8K by 8K maximum size frame buffer. Features full anti-aliasing, high-speed airbrush, soft-edge mask, interpolation resizing, and rotation. Options include 3D polygon/mapping, hard disk/optical disk, and magnetic tape storage.

SIGGRAPH '90

First Level, Main Lobby

Conference Co-Chairs
David D. Loendorf
Jacqueline M. Wollner
Exhibits Chair
Toni Gripper

SIGGRAPH '90, the International Conference on Computer Graphics and Interactive Techniques, will be held August 6-10, 1990 in Dallas, Texas. For details on how you can contribute to the success of this conference, please see the call for participation at the end of this program or pick one up at the SIGGRAPH '90 booth. Posters and pins are also available. For conference information, call 312-644-6610. For exhibition information, call 212-752-0911.

Silicon Graphics

Booths 2700 and 2900

2011 N. Shoreline Boulevard
Mountain View, CA 94039
415-960-1980; FAX: 415-961-0595
Debra Harrison
Manager, Public Relations

Silicon Graphics, a leader in 3D computing, is showcasing its complete family of 3D computers, servers, and workgroup products, and demonstrating the competitive advantages users experience through the utilization of 3D computing. Silicon Graphics and members of its Geometry Partners Program demonstrate solutions in design, drafting, scientific visualization, and other applications.

SKY Computers, Inc.

Booth 1245

Foot of John Street
Lowell, MA 01852
508-454-6200; FAX: 508-459-9873
Derek Warren
Manager, Marketing Communications

Founded in 1980, SKY Computers is a leading supplier of scientific/engineering computer application accelerator boards. Headquartered in Lowell, Massachusetts, the privately held company designs, manufactures, sells, and services computer boards that dramatically accelerate the performance of general computer systems based on Q-bus, Multibus, VMEbus, and IBM PC/XT/AT architectures.

SOFTIMAGE, Inc.

Booth 1312

3510 Blvd. St.-Laurent, Suite 214
Montreal, Quebec, Canada H2X 2V2
514-845-1636; FAX: 514-845-5676
Richard Szalwinsky
Vice President, Marketing

SOFTIMAGE presents the latest version of its 3D animation software, introduced to great acclaim at SIGGRAPH last year. Renowned for its interactive user-interface, flexible and powerful animation, and fast production-quality ray tracing, the enhanced version of the SOFTIMAGE 4D Creative Environment offers new features such as procedural animation control, deformation latices, depth of field, even faster ray tracing, and CAD interfaces.

Software Clearing House, Inc.

Booth 2323

Three Centennial Plaza
895 Central Avenue
Cincinnati, OH 45202
513-579-0455; FAX: 513-579-1064
Kelly Feil-Addy
Assistant Marketing Manager

ImageStation is a graphics presentation program, used with TARGA 16 video graphics imaging boards. It captures video images, reads standard TARGA 16 files, and merges these with charts and graphs. ImageStation directs output to 35mm film recorders, video or color hard-copy devices, and performs graphical analysis on Lotus or Symphony files.

Software Magazine

Booth 1115

1900 West Park Drive, Suite 200
Westborough, MA 01581
508-366-2031; FAX: 508-366-8104
Cynthia Reehl
Sales Promotion Manager

Software Magazine serves 90,000 software designers, developers, and managers in DP/MIS organizations throughout corporate America. In-depth coverage includes every aspect of the corporate software scene—from applications packages to development tools to vendor profiles. Visit the booth for a free sample issue.

Sony Corporation of America

Booth 342

Sony Drive
Park Ridge, NJ 07656
201-930-1000; FAX: 201-930-0491
Rich Adamonis
Advertising Manager

Sony Corporation of America, established in 1960, is a leader in manufacturing, marketing, and distribution of both consumer and professional electronic products. Sony prides itself on its ability to develop a product and then create a market for its product.

South Mountain Software, Inc.

Booth 2305

76 South Orange Avenue, Suite 3
South Orange, NJ 07079
201-762-6965; FAX: 201-762-0118
Susan Dwyer
Vice President

South Mountain Software, Inc. is one of the largest vendors of C language programming tools, specializing in graphical user interfaces, device drivers, 3D charting, windowing, imaging, and other graphics tools. The company also provides graphics programming on a consulting basis and publishes seven PC-based products.

Spaceward Video Systems Ltd.

Booth 500

3/5 Soho Street
London, England W1V 5FA
(01) 287-2727; FAX: (01) 439-6204
Kaarin Weber
Advertising, Public Relations Manager

Spaceward is exhibiting its full range of video graphics systems for the broadcast, corporate, and post-production facilities.

Springer-Verlag New York, Inc.

Booth 3122

175 Fifth Avenue
New York, NY 10010
212-460-1600; FAX: 212-473-6272
Fred Balzac
Computer Science Product Manager

A leading international publisher of books and journals in computer graphics, Springer-Verlag is featuring *The NeWS Book,* the premier volume in the new Sun Technical Reference Library series; Hall's *Illumination and Color in Computer Generated Imagery;* and the first *Computer Animation Dictionary,* by Roncarelli.

Star Technologies, Inc.--Graphicon Products Division

Booth 710

P.O. Box 13951
Research Triangle Park, NC 27709
919-361-3800; FAX: 919-361-3888
Brad Wyckoff
Senior Marketing Engineer

The Graphicon 1700 Simulator (1700S) is the price/performance leader for out-the-window simulation. The 1700S manipulates 2000 large-shaded polygons while updating the scene at 30 frames per second. The 1700S' applications range from flight simulation and driver training to ship's pilot instruction.

Stellar Computer Inc.

Booth 1410

85 Wells Avenue
Newton, MA 02159
617-964-1000; FAX: 617-964-8962
Sharon Cullina
Manager, Exhibits and Promotions

Stellar displays its 2000 Series Graphics and Departmental Supercomputers, which double the performance of its previous systems, and set new price and performance benchmarks for users requiring interactive visualization and distributed, high-performance computation. Demonstrations feature the newest capabilities of AVS, the industry's first tool which allows users to visualize their data without graphics programming.

StereoGraphics Corporation

Booth 2714

2171-H E. Francisco Boulevard
San Rafael, CA 94901
415-459-4500; FAX: 415-459-3020
Dave Holbrook
Director of Marketing

Computer graphics technology has evolved from black and white to color, from 2D to 3D, and now to stereo 3D; the most sophisticated graphics productivity tool available for visualization of data. StereoGraphics Corporation offers flicker-free, stereo 3D display systems that are plug-compatible with any unmodified computer.

Summagraphics Corporation

Booth 1928

60 Silvermine Road
Seymour, CT 06483
203-881-5434; FAX: 203-881-5367
Susan Seeger
Sales Communications Specialist

Summagraphics Corporation is exhibiting its full line of computer graphics tablets ranging in sizes 6″ x 9″ up to 42″ x 60″ including the industry standard SummaSketch. Products are demonstrated in CAD/CAE, desktop publishing, and presentation graphics on a variety of platforms.

Sun Microsystems, Inc.

Booth 1804

2550 Garcia Avenue, Bldg. 6
Mountain View, CA 94043
415-960-1300; FAX: 415-969-9131
John Loiacono
Hardware Manager

Sun Microsystems, Inc. is demonstrating a wide range of new graphics technologies including the GX and GXP families of accelerated graphics workstations. The GX allows very fast rendering of 2D/3D vectors, while the GXP offers 24-bit color and 3D solids modeling. Also featured are SunVideo, which displays true-color full-motion video images and the TAAC application accelerator for advanced rendering, image processing, and volume rendering. SunPHIGS and SunGKS graphics software are demonstrated on a broad range of workstations.

Supercomputing Review

Booth 2325

8445 Camino Santa Fe
San Diego, CA 92121
619-452-4242; FAX: 619-452-4224
Eamonn Wilmott
President

Supercomputing Review is the premier magazine of high-performance computer graphics. A complimentary copy is available for computer graphics professionals at our booth. Pick up your copy and see why *Supercomputing Review* is one of the fastest growing computer magazines in the world.

SuperMac Technology

Booth 410

485 Potrero
Sunnyvale, CA 94086
408-245-2202; FAX: 408-735-7250
Peter Dippery
Exhibit Manager

SuperMac Technology develops, manufactures, and markets color, greyscale, and monochrome graphics subsystems which today include displays, graphic cards, software, and application support products. These graphic subsystems extend the capability of personal computers into new vertical markets and their application in the traditional office automation and business market.

Symbolics, Inc.

Booth 2910

8 New England Executive Park East
Burlington, MA 01803
617-221-1000; FAX: 617-221-1099
Deborah Risi
Trade Show and Promotions Manager

Symbolics offers menu-driven computer graphics systems for 2D animation and paint, and for full 3D animation. The system supports RGB output for NTSC, PAL, and HDTV formats as well as for print and film. Bundled configurations include computer hardware, software, training, and service from Symbolics.

Team Systems

Booth 1540

2934 Corvin Drive
Santa Clara, CA 95051
408-720-8877; FAX: 408-720-9643
Helen O'Malley
Marketing/Sales Assistant

Team Systems displays its complete line of ASTRO video generators with dot clocks from 75 MHz to 400 MHz and applications in engineering, production, and servicing of display systems.

Techexport, Inc.

Booth 103

One North Avenue
Burlington, MA 01803
617-229-6900; FAX: 617-229-7706
James Dadmun
President

Techexport is a sales and marketing company providing international distribution and support for a comprehensive range of computer graphics products. The company serves the videographics, 3D modeling and animation, presentation graphics, prepress, and industrial display markets with hardware, application software, and peripherals. Techexport operates through five subsidiary offices in Europe and 60 distributors worldwide.

Tech-Source Inc.

Booth 2224

442 South North Lake Boulevard
Altamonte Springs, FL 32701
407-830-8301; FAX: 407-339-2554
Richard E. Bendfelt
Director of Sales

Tech-Source is exhibiting high-performance VME graphics controllers capable of supporting 4-32 planes with overlays (including configurations with multiple displayheads supported by the same controller), compatible with Sun 3/E, Sun 3/160, Sun 3/260, Sun 4/260, Motorola, Delta Series, Heurikon, AT&T, and other VME- compatible systems. Comprehensive software support for PHIGS, GKS, Pixrect, Suntools, DataViews, X-Windows, etc.

Tektronix, Inc.

Booth 1530

P.O. Box 1000
Wilsonville, OR 97070
503-682-3411; FAX: 503-682-4948
Dean Staley
Exhibits Manager

Tektronix displays the new XD/88 Series high-performance graphics workstations, featuring the new Motorola 88000 RISC compute engine; 17 MIPS performance, X11, video-out. 4200/4300 Series high-performance graphics workstations/terminals, running industry-leading software from Wavefront, Dalim, SDRC, and others are also on display. New products include: ColorQuick low-cost color ink-jet printer; and Phaser CPS Color Print Station, with PostScript-compatible printing for AppleTalk Networks.

Tektronix, Inc., Liquid Crystal Products & Displays

Booth 1301

P.O. Box 500
Beaverton, OR 97007
503-627-7111; FAX: 503-627-5139
Dean Staley
Exhibits Manager

The Liquid Crystal Products & Displays Division of Tektronix manufactures 3D stereoscopic and high-resolution monochrome monitors.

Texas Instruments

Booth 704

P.O. Box 655303-MS 8214
Dallas, TX 75265
214-997-3871; FAX: 214-997-3198
Janis Harbus
Exhibit Marketing Manager

Texas Instruments is demonstrating the TMS 340 family Graphics System Processors. Other products being demonstrated include TIGA-340, PC graphics software interface, running Microsoft at windows, and AutoCAD, 8800 Building Block Family and new software development board, 1 MB VideoRAMs, and graphics system development tools.

Texas Memory Systems, Inc.

Booth 1700

9888 Bissonnet, #470
Houston, TX 77036
713-771-8200; FAX: 713-771-8187
Hope Marcotte
Exhibits Coordinator

The Real-Time Machine: The SAM-800/1000 mass memory system allows fast, real-time processing with up to 1-Gbyte memory, 200 Mbyte/sec. bandwidth, 16 I/O ports, and 960 MFLOP processing power. It interfaces to Sun, VMEbus, DEC, and Concurrent systems, for high-performance applications like image processing, data acquisition, medical imaging, and simulation.

Texnai, Inc.

Booth 117

No. 620, 2-1, Udagawa-cho, Shibuya-ku
Tokyo, Japan 150
(03) 464-6927; FAX: (03) 476-2372
Norie Hiraide
Secretary General

Texnai is exhibiting its newly developed frame buffers such as FBX24/AT, FBX32HD, and a 386-based image archiving and retrieval system, GWS386-opt. The FBX24/AT is a full-color adapter (1K x 1K x 24-bit) for PC-AT compatibles and the FBX32HD is a frame buffer (2K x 2K x 32-bit) designed for VME bus and HDTV applications. The GWS3 86-opt is a fully integrated system equipped with 5" optical disk drives, FBX24/AT, 200 DPI color image scanner TX-200, and an ink-jet color printer. LaserFile is its MS-DOS-based image file manager, and YUI is a newly developed paint program.

Thomson Digital Image

Booth 1318

22 rue Hégésippe Moreau
Paris, France 75018
(33) 43.87.58.58; FAX: (33) 43.87.61.11
Denis Schlumberger
Vice President, Sales

TDI presents EXPLORE, a high-performance 3D computer graphics software, for the animation, architectural visualization, and industrial design markets. Distributed worldwide through a network of subsidiaries and distributors, EXPLORE has already established itself as a leader on European and Asian markets. TDI presents the new 2.1 Version at SIGGRAPH.

Time Arts Inc.

Booth 2228

P.O. Box 6476
Santa Rosa, CA 95406
707-576-7722; FAX: 707-576-7731
Laura Malone
Director of Marketing

Lumena on the IBM/PC, UNIX and Macintosh platform is a paint software program for the creation and production of professional images for design, prepress, presentation, and 2D video applications.

Toshiba America Electronic Components Inc.

Booth 1304

One Parkway North, Suite 500
Deerfield, IL 60015-2547
312-945-1500; FAX: 312-945-1044
Craig Westcott
Assistant Manager, Sales and Marketing

Toshiba is exhibiting high-resolution color monitors, color and monochrome display tubes, and LCDs. The FLAT and SQUARE (FS) displays are featured. The FS Invar mask and flatter faceplate achieve superior ergonomics. The 21″ FS 64 KHz color monitor is being demonstrated with 0.26mm and 0.29mm dot pitch CRTs. New portrait mode 17″ FS and 15″ FS color monitors, operating at 90 KHz, are also on display.

Toyo Spectrum

Booth 1540

2934 Corvin Drive
Santa Clara, CA 95051
408-720-8877; FAX: 408-720-9643
Helen O'Malley
Marketing and Sales Assistant

Toyo Spectrum offers color and black and white video printers with an integrated video-interface and frame buffers to directly capture the picture for a screen-dump in less than one second.

Truevision Inc.

Booth 2610

7340 Shadeland Station
Indianapolis, IN 46256
800-858-TRUE; FAX: 317-576-7700

Truevision videographics products enable users to process true color images with high resolution. The cards provide the ultimate in high-quality frame capture and display. Products on display include: TARGA and ATVista for IBM ATs and compatibles; NuVista and the HR for Macintosh II, the VIDI/O Box (NTSC *and* PAL) encoder/decoder, TIPS Imaging Software, and other new products.

University of Lowell

Booth 511

One University Avenue-CPE
Lowell, MA 01854
508-452-5000, Ext. 2693; FAX: 508-453-6035
Frank Drake
Research Manager

Edge-of-the-art tools for visualization, created as products of active research are displayed. These include high-resolution, high-performance graphics and imaging hardware, the Imaging Kernal System (IKS), GKS under X11 and imaging, a laser light show and other computer art.

Univision Technologies, Inc.

Booth 1213

12 Cambridge Street
Burlington, MA 01803
617-273-5388; FAX: 617-229-2860
Bonnie Shields
Corporate Communications

A leader in ultra-high-resolution display controllers, and video capture boards, Univision features the 2K x 2K 12-bit display controller on a VME architecture. In addition, a full range of PC/AT products including image acquisition high-resolution display controllers and a full VGA emulation on a 1280x1024 resolution display controller is shown.

USVideo

Booth 1703

One Stamford Landing
62 Southfield Avenue
Stamford, CT 06902
203-964-9000; FAX: 203-964-1824
Terri Chapman

USVideo, an IBM-compatible graphics board manufacturer, is demonstrating revolutionary video cards. The VGA-R video card is able to Genlock VGA to NTSC and incorporate the IBM VGA standard with full professional level NTSC/RS170A Video Graphics. The USVideo Genlock Module combines both interactive live video and the computer-generated VGA images which allow desktop graphics users to create OVERLAY and display this combined image on television or studio monitors, projection equipment or VCRs.

UnixWorld Magazine

Booth 2142

444 Castro Street
Mountain View, CA 94041
415-940-1150; FAX: 415-967-1257
Liz Martin
Tradeshow Coordinator

UnixWorld is directed to the open systems computing markets, covering systems integration and design topics for OEMs, VARs, and volume end-users. Editorial focuses on UNIX/XENIX-based networks, workstations, multi-user systems, software, and associated peripherals. Articles provide news of the industry, market analysis, in-depth product reviews, and tutorials for programming and business applications.

Video Manager, Montage Publishing, Inc.

Booth 2811

25550 Hawthorne Boulevard, Suite 314
Torrance, CA 90505
213-373-9993; FAX: 213-373-0639
Sandra Seeger
Circulation Manager

Video Manager, the newsmonthly for the decision-maker, provides the latest in industry news, as well as in-depth feature articles and regular columns covering management issues, production angles, video equipment roundups, and interactive video.

Videomedia S.E.D., Inc.

Booth 1211

211 Weddell Drive
Sunnyvale, CA 94089
408-745-1700; FAX: 408-745-6721
Tim Andrew
Show Coordinator

Videomedia displays V-LAN, Universal Control Network, interfacing the computer graphic systems, etc. to video tape recorders, laser disks, etc. Application programs (animation, time delay, sequence, etc.) to control V-LAN are also on display.

Visual Information Technologies Inc.

Booth 2207

3460 Lotus Drive
Plano, TX 75075
214-596-5600; FAX: 214-867-4489
Karen Rodgers
Show Coordinator

The VITec Image Computer delivers 172 MIPS of image processing power to the UNIX/VME bus workstation for military and commercial applications. The VITec Computer achieves its unprecedented power by utilizing the industry's first full-custom VLSI image processing chip set, allowing for small footprint, high reliability, and unmatched performance and functionality. The VITec software system supports graphics-based programming concepts, such as display list processing and object orientation, and MIT's X-Window System, bringing image processing into the user-friendly domain.

W.W. Gaertner Research Inc.

Booth 1124

140 Water Street
Norwalk, CT 06854
203-866-3200; FAX: 203-838-5026
Brian Bostwick
Project Engineer

W.W. Gaertner manufactures advanced, customized, real-time display generators for military and commercial applications specializing in high-speed color stroke, raster, and hybrid display systems and software for ground-based simulation and airborne use. Customers include military and governmental agencies and leading aerospace contractors worldwide.

Wacom, Inc.

Booth 2101

West 115 Century Road
Paramus, NJ 07652
201-265-4226; FAX: 201-265-4722
Jeffrey Nichols
Sales Manager

Wacom is exhibiting its full line of digitizers. Its cordless and batteryless cursors and styluses are transforming the industry. Its cordless pressure stylus, which looks and feels like an ordinary ball-point pen, gives the artist complete freedom of expression. Come see the future of computer graphics today.

Waldman Lighting Company

Booth 2041

9 W. Century Drive
Wheeling, IL 60090
312-520-1060; FAX: 312-520-1730
D. Jones
President

Task lighting for CAD, computer workstations and drafting is featured.

Wasatch Computer Technology, Inc.

Booth 2208

123 E. 2nd South
Salt Lake City, UT 84111
801-575-8043; FAX: 801-575-8075
Mary Ware
Marketing Director

Wasatch is exhibiting its computer graphics software and systems including its new line of animation software. Full-color illustration (32-bit deep), with 2000 and 4000 line resolution capability is demonstrated as well as presentation graphics, 3D modeling and rendering software. These products utilize high-resolution (1024x768) displays. Samples from the various input/output devices are also on display.

Wavefront Technologies

Booth 1630

530 E. Montecito Street
Santa Barbara, CA 93103
805-962-8117; FAX: 805-963-0410
Gary Stump
Vice President of Marketing

Wavefront Technologies is a leading supplier of dynamic 3D computer animation and rendering software for the scientific, engineering, and entertainment markets. The Dynamic Imaging Software consists of four modules: Model, PreView, Image, and Medit and is based on current industry standards. Wavefront offers customers device-independence by running on a wide variety of hardware platforms.

John Wiley & Sons, Inc.

Booth 3206

605 Third Avenue
New York, NY 10158
212-850-6000; FAX: 212-850-6088
Diane Cerra
Editor

Stop by the Wiley booth to see Wiley's latest publications in computer graphics, including *Interactive 3D Computer Graphics* by L. Ammeraal, *High-Resolution Computer Graphics Using Pascal* by I.O. Angell and G. Griffith, and *Programming The User Interface* by J.R. Brown and S. Cunningham.

Winsted Corporation

Booth 602

10901 Hampshire Avenue South
Minneapolis, MN 55438
612-944-8556/800-328-2962; FAX: 612-944-1546
Randy Smith
Sales and Marketing

Winsted features computer graphics and furniture, ergonomic tables, and stands. Fully adjustable for users efficiency and comfort. An entire new line of disk and tape storage.

XCOM S.A.

Booth 1322

ZAC Le Pré Milliet Montbonnot Saint-Martin
Saint Simier, France 38330
(33) 76.52.00.46; FAX: (33) 76.52.03.97
J.M. Boulet
Export Manager

Since 1983, XCOM has been developing and marketing high-performance computer graphics stations. At SIGGRAPH '89, XCOM introduces its new middle range 3D graphics workstation: OPIUM. Aimed at the audiovisual market, OPIUM, the most powerful workstation PC computer is designed to meet any user requirements, either American or European.

Yamashita Engineering Manufacture Inc.

Booth 2217

559-1 Funako, Atsugi-city
Kanagawa 243
Japan
(81)462-28-8692
Nobuo Inoue
Assistant General Manager

Yamashita is displaying the Scan Converter CVS-910, Scan Converter CVS-900, Scan Converter CVS-950A, and Down Divider CVS-450.

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318	Digital Equipment Corporation
332	Du Pont Company
2016	Electrohome Projection Systems
204	Electronic Systems Products
432	Evans & Sutherland
123	Extron Electronics
604	Ikegami Electronics (USA), Inc.
736	IMAgraph Corporation

1207	MAGNI Systems, Inc.
1404	Matrox Electronic Systems
2810	MegaScan Technology, Inc.
210	Megatek Corporation
1119	Meret, Inc.
610	Mitsubishi Electronics America, Inc.
1510	NEC Home Electronics/NEC Information Systems
1340	Nissei Sangyo America, Ltd.
3100	Omnicomp Graphics Corporation
1330	Panasonic Communications & Systems Company
1430	Panasonic Industrial Company
1118	Peritek Corporation
1130	Pixelworks, Inc.
1030	Ramtek Corporation
2128	RGB Technology
2042	Sampo Corporation of America
2600	Seiko Instruments USA, Inc.
500	Spaceward Video Systems Ltd.
2714	StereoGraphics Corporation
1804	Sun Microsystems, Inc.
410	SuperMac Technology
103	Techexport, Inc.
2224	Tech-Source Inc.
1530	Tektronix, Inc.
1301	Tektronix, Liquid Crystal Products & Displays
117	Texnai Inc.
1304	Toshiba America Electronic Components Inc.
1124	W.W. Gaertner Research Inc.

Booth	Graphics Aided Drafting
1518	Apple Computer
1501	Autodesk
418	Commodore Business Machines, Inc.
718	GTCO Corporation
1119	Meret, Inc.
1340	Nissei Sangyo America, Ltd.
1126	Nth Graphics, Ltd.
1804	Sun Microsystems, Inc.
1530	Tektronix, Inc.
1630	Wavefront Technologies

Booth	Graphics Arts Systems
932	Abekas Video Systems, Inc.
1322	ANL
1518	Apple Computer
132	AT&T Graphics Software Labs
1501	Autodesk
218	Aztek, Inc.
1107	Byte by Byte Corporation
418	Commodore Business Machines, Inc.
1322	Dalim France
922	Digital Arts
3214	Flamingo Graphics
1424	Getris Images
142	Harris Video Systems
1317	Intel Princeton Operation
1110	LAZERUS
2307	Levco Sales
2815	Management Graphics, Inc.
1119	Meret, Inc.
1022	Micrografx, Inc.
2218	Microtime, Inc.
2622	Midwest Communications Corporation
1340	Nissei Sangyo America, Ltd.
804	Shima Seiki U.S.A. Inc.
1312	SOFTIMAGE, Inc.
2323	Software Clearing House, Inc.
500	Spaceward Video Systems Ltd.
1804	Sun Microsystems, Inc.
410	SuperMac Technology
103	Techexport, Inc.
117	Texnai Inc.
2228	Time Arts Inc.
2610	Truevision Inc.
2208	Wasatch Computer Technology, Inc.
1630	Wavefront Technologies
2217	Yamashita Engineering Manufacture Inc.

Booth	Graphics Standards Packages
1120	Advanced Graphics Engineering (AGE)
1322	ANL
1518	Apple Computer
2345	CIS Graphics, Inc.
418	Commodore Business Machines, Inc.
1900	Data Translation, Inc.
318	Digital Equipment Corporation

1904	Hewlett-Packard Company
2223	Integrated Computer Solutions
232	Number Nine Computer Corporation
3110	Pixar
1802	PRIOR Data Sciences
1804	Sun Microsystems, Inc.
410	SuperMac Technology
1530	Tektronix, Inc.
704	Texas Instruments
511	University of Lowell
2217	Yamashita Engineering Manufacture Inc.

Booth	Hardcopy; Photographs
1518	Apple Computer
1610	Eastman Kodak Company
2923	Graftel Systems Inc.
1201	Ilford Photo Corporation
2815	Management Graphics, Inc.
942	Media Magic
503	Nikon Inc.
2723	Ron Scott, Inc.
1804	Sun Microsystems, Inc.
2208	Wasatch Computer Technology, Inc.

Booth	Hardcopy; Slides
1518	Apple Computer
832	Autographix, Inc.
218	Aztek, Inc.
2923	Graftel Systems Inc.
1201	Ilford Photo Corporation
2815	Management Graphics, Inc.
2615	Oxberry
2723	Ron Scott, Inc.
1804	Sun Microsystems, Inc.
103	Techexport, Inc.
2228	Time Arts Inc.
2208	Wasatch Computer Technology

Booth	Hardcopy; Video Paper
1518	Apple Computer
1610	Eastman Kodak Company
1229	Gammadata Computer Inc.
2923	Graftel Systems Inc.
2814	INMOS Corporation
942	Media Magic
242	Mitsubishi Professional Electronics
503	Nikon Inc.
2600	Seiko Instruments USA, Inc.
342	Sony Corporation of America
1804	Sun Microsystems, Inc.
1530	Tektronix, Inc.
1540	Toyo Spectrum

Booth	High-Performance Graphics Processors
2355	Advanced Graphics, A Division of AGC
822	Advanced Micro Devices (ADM)
1418	Alliant Computer Systems Corporation
642	Analog Devices, Inc.
1518	Apple Computer
904	Ardent Computer
2004	AT&T Pixel Machines
218	Aztek, Inc.
304	BTS Broadcast Television Systems
418	Commodore Business Machines, Inc.
1322	Dalim France
1900	Data Translation, Inc.
318	Digital Equipment Corporation
332	Du Pont Company
432	Evans & Sutherland
2141	Expert Graphics Systems
142	Harris Video Systems
1904	Hewlett-Packard Company
2814	INMOS Corporation
1317	Intel Princeton Operation
1604	Intergraph Corporation
1110	LAZERUS
2307	Levco Sales
2815	Management Graphics, Inc.
1404	Matrox Electronic Systems
210	Megatek Corporation
722	Meiko Scientific Corporation

1119	Meret, Inc.
1223	Microfield Graphics Inc.
636	Mitsubishi International Corporation
622	National Semiconductor Corporation
1340	Nissei Sangyo America, Ltd.
232	Number Nine Computer Corporation
1126	Nth Graphics, Ltd.
3100	Omnicomp Graphics Corporation
436	Paragon
732	Parallax Graphics
1118	Peritek Corporation
2700/ 2900	Silicon Graphics, Inc.
1245	SKY Computers, Inc.
500	Spaceward Video Systems Ltd.
710	Star Technologies, Inc.—Graphicon Products Division
1410	Stellar Computer, Inc.
1804	Sun Microsystems, Inc.
410	SuperMac Technology
103	Techexport, Inc.
2224	Tech-Source Inc.
1530	Tektronix, Inc.
704	Texas Instruments
2610	Truevision Inc.
511	University of Lowell
1213	Univision Technologies, Inc.
1124	W.W. Gaertner Research Inc.
2208	Wasatch Computer Technology, Inc.

Booth	**High-Resolution Graphic Display Systems**
412	Adage, Inc.
1418	Alliant Computer Systems Corporation
112	AmPro Corporation
1518	Apple Computer
904	Ardent Computer
832	Autographix, Inc.
1828	Barco
304	BTS Broadcast Television Systems
418	Commodore Business Machines, Inc.
127	Control Systems, Inc.
1322	Dalim France
1006	Dainippon Screen
318	Digital Equipment Corporation

3200	Dubner Computer Systems, Inc.
332	Du Pont Company
2016	Electrohome Projection Systems
204	Electronic Systems Products
2141	Expect Graphics Systems
123	Extron Electronics
2710	FOR-A Corporation of America
2028	Hitachi America, Ltd.
604	Ikegami Electronics (USA), Inc.
736	IMAgraph Corporation
1317	Intel Princeton Operation
1604	Intergraph Corporation
2815	Management Graphics, Inc.
2810	MegaScan Technology, Inc.
210	Megatek Corporation
722	Meiko Scientific Corporation
1119	Meret, Inc.
1223	Microfield Graphics Inc.
2622	Midwest Communications Corporation
610	Mitsubishi Electronics America, Inc.
2221	Modgraph, Inc.
1504	NEC Professional Systems Division
1340	Nissei Sangyo America, Ltd.
232	Number Nine Computer Corporation
1126	Nth Graphics, Ltd
3100	Omnicomp Graphics Corporation
1330	Panasonic Communications & Systems Company
1430	Panasonic Industrial Company
732	Parallax Graphics
1118	Peritek Corporation
1130	Pixelworks, Inc.
842	Quantum Data, Inc.
1030	Ramtek Corporation
2128	RGB Technology
2042	Sampo Corporation of America
2700/ 2900	Silicon Graphics, Inc.
342	Sony Corporation of America
1410	Stellar Computer, Inc.
2714	StereoGraphics Corporation

1804	Sun Microsystems, Inc.
410	SuperMac Technology
2910	Symbolics, Inc.
103	Techexport, Inc.
2224	Tech-Source Inc.
1530	Tektronix, Inc.
1301	Tektronix, Liquid Crystal Products & Displays
704	Texas Instruments
1700	Texas Memory Systems, Inc.
117	Texnai Inc.
2228	Time Arts Inc.
1304	Toshiba America Electronic Components Inc.
2610	Truevision Inc.
511	University of Lowell
1213	Univision Technologies, Inc.
1124	W.W. Gaertner Research Inc.
2208	Wasatch Computer Technology, Inc.
2217	Yamashita Engineering Manufacture Inc.

Booth	Image Processing
412	Adage, Inc.
2222	Advanced Imaging
1418	Alliant Computer Systems Corporation
642	Analog Devices, Inc.
1322	ANL
1518	Apple Computer
904	Ardent Computer
2004	AT&T Pixel Machines
832	Autographix, Inc.
304	BTS Broadcast Television Systems
836	Canon U.S.A.
418	Commodore Business Machines, Inc.
127	Control Systems, Inc.
1622	Convex Computer Corporation
104	Cubicomp Corporation
1900	Data Translation, Inc.
922	Digital Arts
318	Digital Equipment Corporation
332	Du Pont Company
1610	Eastman Kodak Company
3214	Flamingo Graphics

1840	Folsom Research, Inc.
1904	Hewlett-Packard Company
1401	Howtek, Inc.
736	IMAgraph Corporation
2814	INMOS Corporation
1317	Intel Princeton Operation
1604	Intergraph Corporation
1110	LAZERUS
2307	Levco Sales
918	Lyon Lamb VAS
1207	MAGNI Systems, Inc.
2815	Management Graphics, Inc.
1404	Matrox Electronic Systems
618	Media Cybernetics
210	Megatek Corporation
722	Meiko Scientific Corporation
1119	Meret, Inc.
610	Mitsubishi Electronics America, Inc.
636	Mitsubishi International Corporation
622	National Semiconductor Corporation
503	Nikon Inc.
1340	Nissei Sangyo America, Ltd.
232	Number Nine Computer Corporation
3100	Omnicomp Graphics Corporation
1330	Panasonic Communications & Systems Company
1430	Panasonic Industrial Company
943	Paragon Imaging Inc.
3110	Pixar
700	QMS, Inc.
1030	Ramtek Corporation
2128	RGB Technology
2723	Ron Scott, Inc.
2700/ 2900	Silicon Graphics, Inc.
1245	SKY Computers, Inc.
1312	SOFTIMAGE, Inc.
1410	Stellar Computer, Inc.
1804	Sun Microsystems, Inc.
410	SuperMac Technology
2224	Tech-Source Inc.
1700	Texas Memory Systems, Inc.
2228	Time Arts Inc.
511	University of Lowell
1213	Univision Technologies, Inc.
2207	Visual Information Technologies Inc.
2217	Yamashita Engineering Manufacture Inc.

Booth	Interactive Graphics Terminals
2355	Advanced Graphics, A Division of AGC
1418	Alliant Computer Systems Corporation
404	Apollo Computer
1518	Apple Computer
418	Commodore Business Machines, Inc.
2216	Control Data Corporation
318	Digital Equipment Corporation
332	Du Pont Company
432	Evans & Sutherland
2141	Expert Graphics Systems
1424	Faros
736	IMAgraph Corporation
1317	Intel Princeton Operation
210	Megatek Corporation
1223	Microfield Graphics Inc.
2221	Modgraph, Inc.
232	Number Nine Computer Corporation
732	Parallax Graphics
1030	Ramtek Corporation
2042	Sampo Corporation of America
2600	Seiko Instruments USA, Inc.
1530	Tektronix, Inc.

Booth	Low-Cost Graphics Systems
2355	Advanced Graphics, A Division of AGC
822	Advanced Micro Devices (AMD)
404	Apollo Computer
1518	Apple Computer
832	Autographix, Inc.
1107	Byte by Byte Corporation
418	Commodore Business Machines, Inc.
2216	Control Data Corporation
1322	Dalim France
318	Digital Equipment Corporation
3200	Dubner Computer Systems, Inc.
1424	Faros
142	Harris Video Systems
1904	Hewlett-Packard Company
1401	Howtek, Inc.
1317	Intel Princeton Operation
1110	LAZERUS

2307	Levco Sales
210	Megatek Corporation
1223	Microfield Graphics Inc.
2622	Midwest Communications Corporation
2221	Modgraph, Inc.
622	National Semiconductor Corporation
1340	Nissei Sangyo America, Ltd.
232	Number Nine Computer Corporation
1126	Nth Graphics, Ltd.
3100	Omnicomp Graphics Corporation
436	Paragon
732	Parallax Graphics
1118	Peritek Corporation
1130	Pixelworks, Inc.
1804	Sun Microsystems, Inc.
410	SuperMac Technology
103	Techexport, Inc.
2224	Tech-Source Inc.
1530	Tektronix, Inc.
704	Texas Instruments
117	Texnai Inc.
2610	Truevision Inc.
511	University of Lowell
1703	US Video
1124	W.W. Gaertner Research Inc.
2217	Yamashita Engineering Manufacture Inc.

Booth	Manufacturing Systems
2921	CADKEY, Inc.
318	Digital Equipment Corporation
1904	Hewlett-Packard Company
3210	Ithaca Software
1119	Meret, Inc.

Booth	Mechanical Design Systems
404	Apollo Computer
1518	Apple Computer
2921	CADKEY, Inc.
318	Digital Equipment Corporation
1904	Hewlett-Packard Company
1604	Intergraph Corporation
3210	Ithaca Software
210	Megatek Corporation
1223	Microfield Graphics Inc.
1340	Nissei Sangyo America, Ltd.
1126	Nth Graphics, Ltd.
2700/ 2900	Silicon Graphics, Inc.
1312	SOFTIMAGE, Inc.
2714	StereoGraphics Corporation
1804	Sun Microsystems, Inc.
1530	Tektronix, Inc.

Booth	Monitors
412	Adage, Inc.
1518	Apple Computer
1828	Barco
418	Commodore Business Machines, Inc.
318	Digital Equipment Corporation
2028	Hitachi America, Ltd.
604	Ikegami Electronics (USA), Inc.
2810	MegaScan Technology, Inc.
610	Mitsubishi Electronics America, Inc.
242	Mitsubishi Professional Electronics
1510	NEC Home Electronics/NEC Information Systems
1504	NEC Professional Systems Division
1340	Nissei Sangyo America, Ltd.
1330	Panasonic Communications & Systems Company
1430	Panasonic Industrial Company
2110	Pixelink Corporation
2042	Sampo Corporation of America
2600	Seiko Instruments USA, Inc.
342	Sony Corporation of America
1804	Sun Microsystems, Inc.
410	SuperMac Technology
103	Techexport, Inc.
1530	Tektronix, Inc.
1301	Tektronix, Liquid Crystal Products & Displays
117	Texnai Inc.
1304	Toshiba America Electronic Components Inc.

Booth	Numerical Control (NC,CNC,DNC)
1518	Apple Computer
1604	Intergraph Corporation
704	Texas Instruments

Booth	PHIGS
1418	Alliant Computer Systems Corporation
404	Apollo Computer
904	Ardent Computer
2345	CIS Graphics, Inc.
318	Digital Equipment Corporation
1904	Hewlett-Packard Company
1604	Intergraph Corporation
210	Megatek Corporation
622	National Semiconductor Corporation
3100	Omnicomp Graphics Corporation
1410	Stellar Computer, Inc.
1804	Sun Microsystems, Inc.
1530	Tektronix, Inc.
1630	Wavefront Technologies

Booth	Piping Systems
1604	Intergraph Corporation

Booth	Plotters
1518	Apple Computer
2106	Brooktree Corporation
818	Bruning
318	Digital Equipment Corporation
1904	Hewlett-Packard Company
2028	Hitachi America, Ltd.
1604	Intergraph Corporation
1841	JRL Systems, Inc.
1618	Numonics Corporation
1122	Schneider/Heyden Group
2600	Seiko Instruments USA, Inc.

Booth	Printers
1518	Apple Computer
2106	Brooktree Corporation
818	Bruning
900	Colorocs Corporation
1006	Dainippon Screen
318	Digital Equipment Corporation
1610	Eastman Kodak Company
1229	Gammadata Computer Inc.
1904	Hewlett-Packard Company
1401	Howtek, Inc.
2814	INMOS Corporation
1604	Intergraph Corporation
936	IRIS Graphics, Inc.
1841	JRL Systems, Inc.
610	Mitsubishi Electronics America, Inc.
636	Mitsubishi International Corporation
1510	NEC Home Electronics/NEC Information Systems
503	Nikon Inc.
1330	Panasonic Communications & Systems Company
1430	Panasonic Industrial Company
700	QMS, Inc.
2600	Seiko Instruments USA, Inc.
342	Sony Corporation of America
103	Techexport, Inc.
1530	Tektronix, Inc.
117	Texnai Inc.
1540	Toyo Spectrum

Booth	Projectors
112	AmPro Corporation
1518	Apple Computer
2016	Electrohome Projection Systems
204	Electronic Systems Products
242	Mitsubishi Professional Electronics
1504	NEC Professional Systems Division
2714	StereoGraphics Corporation
2217	Yamashita Engineering Manufacture Inc.

Booth	Publications/Publishers
3204	Academic Press
300	ACM SIGGRAPH Show Daily
3208	Addison-Wesley Publishing Company
2222	Advanced Imaging
2222	AV Communications
2811	AV Video
1323	Cahners Publishing
2229	CMP Publications
742	Computer Graphics Review
300	Computer Graphics World
2811	Computer Pictures
1115	ESD: The Electronic System Design Magazine
2122	IEEE Computer Society Press
2922	Macmillan Publishing Company
942	Media Magic
2822	Morgan Kaufmann Publishers
3023	National Computer Graphics Association
1305	PC Week
1111	Pixel Magazine
1321	Presentation Products Magazine
1227	Quantum Books
1115	Software Magazine
3122	Springer-Verlag New York, Inc.
2142	UnixWorld Magazine
2811	Video Manager
3206	John Wiley & Sons, Inc.

Booth	Research Systems
1322	ANL
1518	Apple Computer
304	BTS Broadcast Television Systems
3210	Ithaca Software
1119	Meret, Inc.
943	Paragon Imaging Inc.
1235	Polhemus Inc.
1312	SOFTIMAGE, Inc.
1124	W.W. Gaertner Research Inc.
1630	Wavefront Technologies

Booth	Robotics
1322	ANL
1900	Data Translation, Inc.
2814	INMOS Corporation
1604	Intergraph Corporation
3210	Ithaca Software
722	Meiko Scientific Corporation
1119	Meret, Inc.
1235	Polhemus Inc.

Booth	Scientific Visualization
310	Alias Research, Inc.
1418	Alliant Computer Systems Corporation
1322	ANL
1518	Apple Computer
904	Ardent Computer
132	AT&T Graphics Software Labs
2004	AT&T Pixel Machines
304	BTS Broadcast Television Systems
1107	Byte by Byte Corporation
2345	CIS Graphics, Inc.
1622	Convex Computer Corporation
1900	Data Translation, Inc.
318	Digital Equipment Corporation
332	Du Pont Company
1610	Eastman Kodak Company
432	Evans & Sutherland
123	Extron Electronics
1424	Faros
1904	Hewlett-Packard Company
2814	INMOS Corporation
2000	Intelligent Light
3210	Ithaca Software
1110	LAZERUS
2307	Levco Sales
1404	Matrox Electronic Systems
942	Media Magic
210	Megatek Corporation
722	Meiko Scientific Corporation
1126	Nth Graphics, Ltd.
2615	Oxberry
943	Paragon Imaging Inc.
3110	Pixar
1235	Polhemus Inc.
2128	RGB Technology
2212	Scientific Computer Systems Corporation
2600	Seiko Instruments USA, Inc.
2700/ 2900	Silicon Graphics, Inc.
1312	SOFTIMAGE, Inc.
1410	Stellar Computer Inc.
2714	StereoGraphics Corporation
1804	Sun Microsystems, Inc.
2910	Symbolics, Inc.
1530	Tektronix, Inc.
1700	Texas Memory Systems, Inc.
511	University of Lowell
1630	Wavefront Technologies

Booth	Software
3204	Academic Press
1120	Advanced Graphics Engineering (AGE)
3208	Addison-Wesley Publishing Company
822	Advanced Micro Devices (AMD)
1012	Advanced Technology Center
1322	ANL
1518	Apple Computer
904	Ardent Computer
132	AT&T Graphics Software Labs
832	Autographix, Inc.
1107	Byte by Byte Corporation
2921	CADKEY, Inc.
2345	CIS Graphics, Inc.
2216	Control Data Corporation
1322	Dalim France
1900	Data Translation Inc.
922	Digital Arts
332	Du Pont Company
3214	Flamingo Graphics
1941	Helios Systems/Piiceon
1904	Hewlett-Packard Company
2028	Hitachi America, Ltd.
2000	Intelligent Light
2223	Integrated Computer Solutions
1604	Intergraph Corporation
3210	Ithaca Software
1110	LAZERUS
2307	Levco Sales
2815	Management Graphics, Inc.
618	Media Cybernetics
210	Megatek Corporation
722	Meiko Scientific Corporation
1022	Micrografx, Inc.
1315	National Technical Information Service (NTIS)
503	Nikon Inc.
232	Number Nine Computer Corporation
1330	Panasonic Communications & Systems Company
1430	Panasonic Industrial Company
118/222	Pansophic Systems, Inc.
943	Paragon Imaging Inc.

1235	Polhemus Inc.
1802	PRIOR Data Sciences
700	QMS, Inc.
2301	SAS Institute Inc.
1312	SOFTIMAGE, Inc.
2305	South Mountain Software, Inc.
500	Spaceward Video Systems Ltd.
710	Star Technologies, Inc.—Graphicon Products Division
1804	Sun Microsystems, Inc.
410	SuperMac Technology
103	Techexport, Inc.
1530	Tektronix, Inc.
704	Texas Instruments
117	Texnai Inc.
2610	Truevision Inc.
1124	W.W. Gaertner Research
2208	Wasatch Computer Technology, Inc.
1630	Wavefront Technologies

Booth	Stand-Alone Image Processing
1322	ANL
1518	Apple Computer
832	Autographix, Inc.
418	Commodore Business Machines, Inc.
318	Digital Equipment Corporation
332	Du Pont Company
1840	Folsom Research, Inc.
2814	INMOS Corporation
1604	Intergraph Corporation
2307	Levco Sales
210	Megatek Corporation
1126	Nth Graphics, Ltd.
3100	Omnicomp Graphics Corporation
700	QMS, Inc.
1312	SOFTIMAGE, Inc.
1804	Sun Microsystems, Inc.
117	Texnai Inc.
2228	Time Arts Inc.
511	University of Lowell

Booth	Tablets
318	Digital Equipment Corporation
718	GTCO Corporation
103	Techexport, Inc.
1530	Tektronix, Inc.
2101	Wacom, Inc.

Booth	Turnkey Systems—Hardware
832	Autographix, Inc.
218	Aztek, Inc.
2345	CIS Graphics, Inc.
418	Commodore Business Machines
104	Cubicomp Corporation
922	Digital Arts
1424	Getris Images
1941	Helios Systems/Piiceon
1317	Intel Princeton Operation
1604	Intergraph Corporation
1110	LAZERUS
918	Lyon Lamb VAS
2815	Management Graphics, Inc.
722	Meiko Scientific Corporation
2218	Microtime, Inc.
118/222	Pansophic Systems, Inc.
1802	PRIOR Data Sciences
2042	Sampo Corporation of America
804	Shima Seiki U.S.A. Inc.
1312	SOFTIMAGE, Inc.
500	Spaceward Video Systems Ltd.
1804	Sun Microsystems, Inc.
1322	XCOM S.A.

Booth	Turnkey Systems—Software
832	Autographix, Inc.
218	Aztek, Inc.
2345	CIS Graphics, Inc.
418	Commodore Business Machines, Inc.
104	Cubicomp Corporation
922	Digital Arts
1424	Getris Images
1941	Helios Systems/Piiceon
1604	Intergraph Corporation
1110	LAZERUS
2815	Management Graphics, Inc.
2218	Microtime, Inc.
118/222	Pansophic Systems, Inc.
1802	PRIOR Data Sciences
804	Shima Seiki U.S.A. Inc.
1312	SOFTIMAGE, Inc.
500	Spaceward Video Systems Ltd.
1804	Sun Microsystems, Inc.
2208	Wasatch Computer Technology, Inc.
1322	XCOM S.A.

Booth	Video Digitizers & Displays
418	Commodore Business Machines, Inc.
127	Control Systems, Inc.
1900	Data Translation, Inc.
3200	Dubner Computer Systems, Inc.
332	Du Pont Company
204	Electronic Systems Products
2710	FOR-A Corporation of America
2923	Graftel Systems Inc.
1317	Intel Princeton Operation
1404	Matrox Electronic Systems
1340	Nissei Sangyo America, Ltd.
232	Number Nine Computer Corporation
1330	Panasonic Communications & Systems Company
1430	Panasonic Industrial Company
732	Parallax Graphics
2714	StereoGraphics Corporation
1804	Sun Microsystems, Inc.
2610	Truevision Inc.
2217	Yamashita Engineering Manufacture Inc.

Booth	Video Discs
932	Abekas Video Systems, Inc.

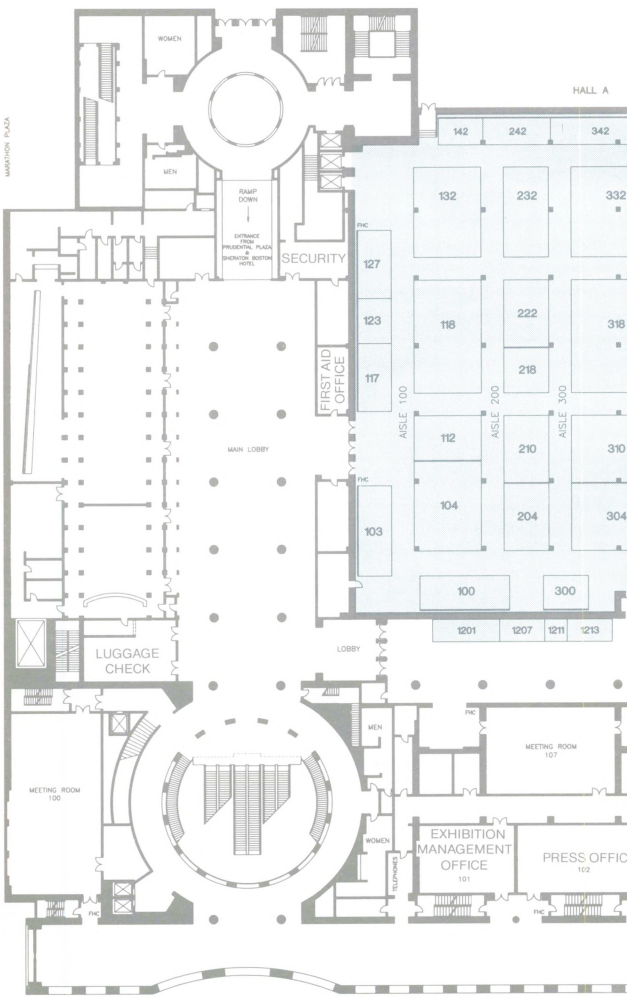
Booth	Video Projectors
112	AmPro Corporation
1828	Barco
2016	Electrohome Projection Systems
204	Electronic Systems Products
1916	General Electric Company, PDPO
604	Ikegami Electronics (USA), Inc.
242	Mitsubishi Professional Electronics
1504	NEC Professional Systems Division
342	Sony Corporation of America

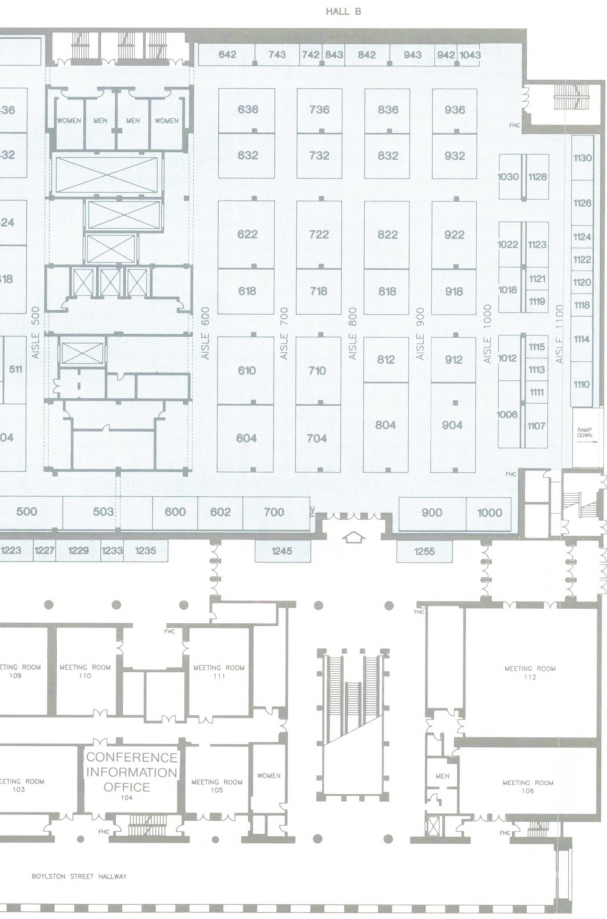
Booth	Videotape Recorders
1504	NEC Professional Systems Division
342	Sony Corporation of America
1211	Videomedia S.E.D. Inc.

Booth	Miscellaneous
3221	**A/D Converters; Digital Signal Processors** Motorola Semiconductor Products
1941	**Add on Memory; Add on Storage Systems** Helios Systems/Piiceon
2921	**A/E/C Software** CADKEY, Inc.
2605	**Application Accelerators; Attached Processors** Mercury Computer Systems, Inc.
1312	**Architectural Design; Terrain Mapping** SOFTIMAGE, Inc.
3023	**Association; Computer Graphics Conference** National Computer Graphics Association
2613	**CAD Workstations** Elements Inc.
412	**C4I; Electronic Pre Press** Adage, Inc.
1012	**CGM** Advanced Technology Center
632	**Circuit Boards; Prototyping** Multiwire Division
2922	**College Textbooks** Macmillian Publishing Company
1900	**Color Electronic Prepress; Electronic Photography** Data Translation, Inc.
1229	**Color Hardcopy** Gammadata Computer Inc.
2311	**Color Measurement** Minolta Corporation
1530	**Color Printers; X-Window Terminals** Tektronix, Inc.
700	**Color Printing** QMS, Inc.
942	**Computer Art and Books; Videotapes** Media Magic
2615	**Computer Graphic Film Cameras** Oxberry

Exhibits Floor Maps

First Level
Hall A Booth Numbers 100-511
Hall B Booth Numbers 600-1130
Corridor Booth Numbers 1201-1255




HALL B
642
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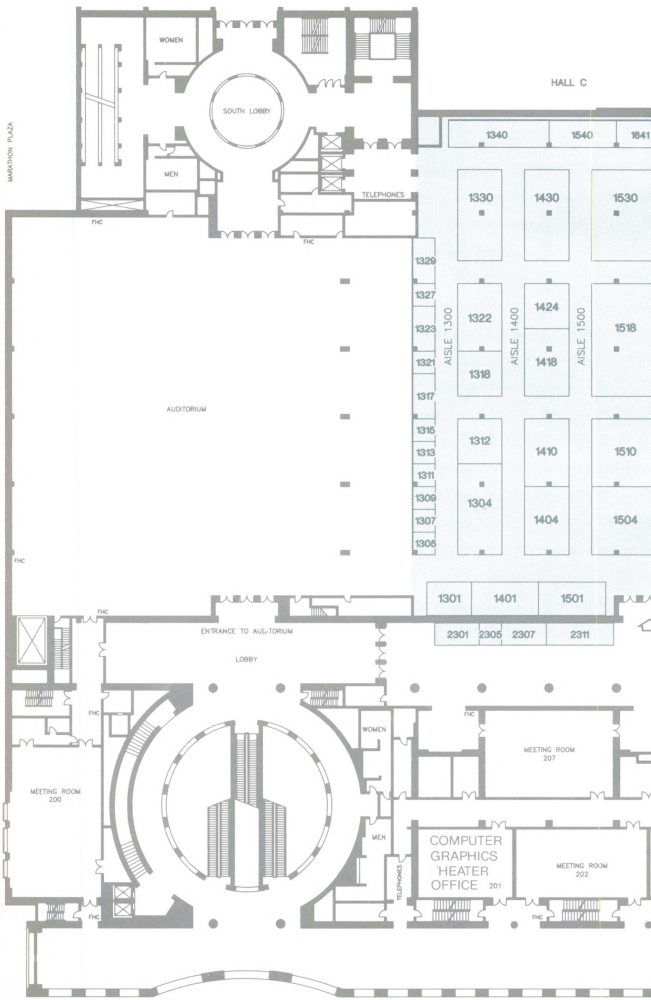
BOYLSTON STREET

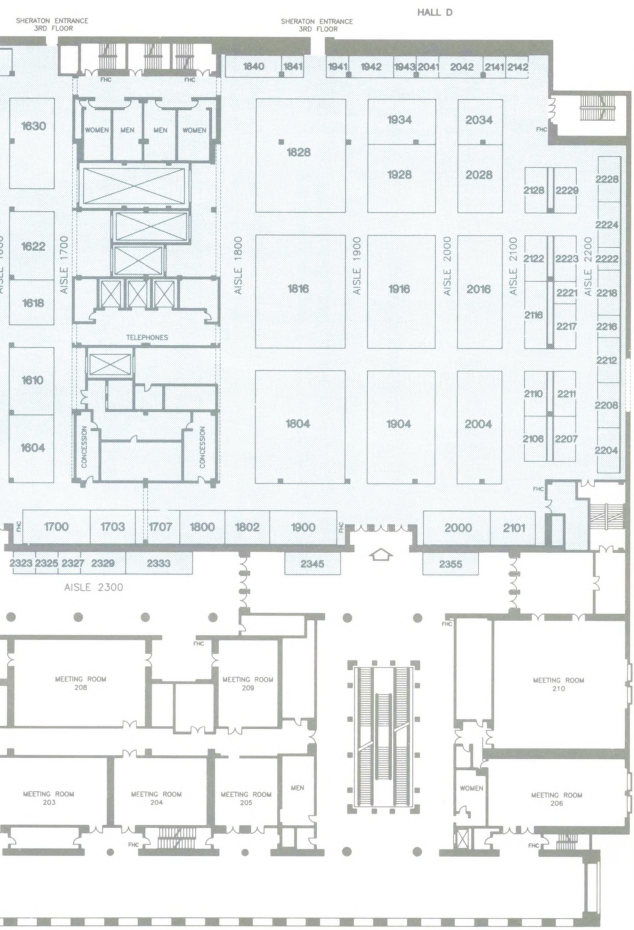
Second Level

Hall C Booth Numbers 1301-1707

Hall D Booth Numbers 1800-2229

Corridor Booth Numbers 2301-2355

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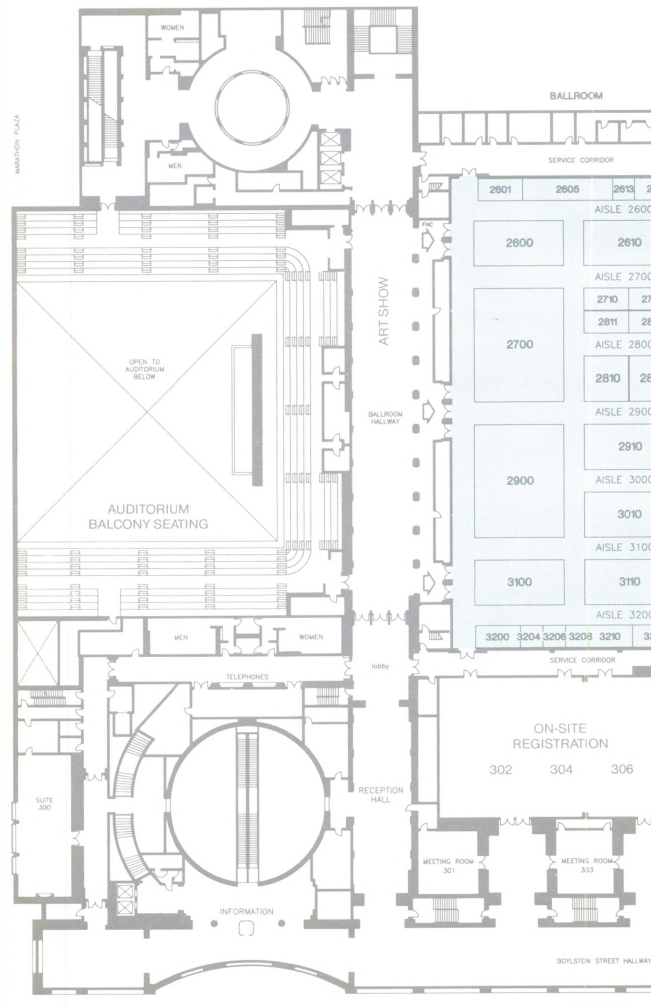
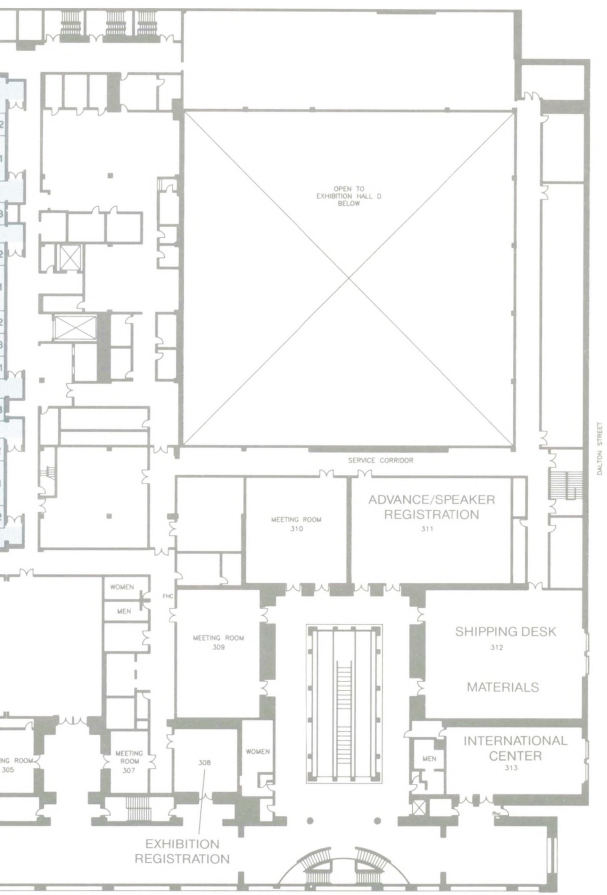
Third Level

Ballroom Booth Numbers 2600-3222

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EXHIBITION
REGISTRATION

SIGGRAPH '90 CALL FOR PARTICIPATION

The Pioneers Return to Dallas

SIGGRAPH '90

17th International Conference
on Computer Graphics and Interactive Techniques
August 6-10, 1990

Participate in SIGGRAPH '90

Each year the Association for Computing Machinery's Special Interest Group on Computer Graphics (ACM SIGGRAPH) holds an international conference. It draws as many as 30,000 people to see the presentation of technical papers, panels, courses, manufacturer and developer exhibits, an art show, and a film and video theater. Along with the traditional events, SIGGRAPH '90 will offer new ones including workshops and an exhibit of hypermedia.

The SIGGRAPH conference is the place to see what's new in computer graphics. Developers announce new products, animators work all year long to debut new films, experts prepare technical papers on new techniques and theories.

The SIGGRAPH conference attracts engineers, scientists, artists, and personal computer users—just about everyone who has anything to do with computer graphics. Whether they do automobile design, medical imaging, scientific visualization, or animation. Whether they're a novice or an expert.

Dallas will host the SIGGRAPH '90 conference August 6 through August 10. The conference organizers invite you to attend and encourage you to participate. Here's how you can get involved:

Submit a Paper

Submit previously unpublished research papers, survey papers, or short papers on new results. The papers committee will review submissions, select papers for the conference proceedings, and invite the authors to present their work at the conference.

Topics of Interest

The papers committee is looking for pioneering work. Possible topics include (but are not limited to): algorithms, animation applications, art, CAE/CAD/CAM, color, computational geometry, geometric modeling, graphics hardware, graphics systems, hypermedia, image synthesis and analysis, interactive techniques, video, visualization, and volumes.

How to Submit a Paper

All papers should include a 100- to 300-word abstract. Research papers should contain original results or novel applications and meet ACM standards for scholarly publication. They should be no longer than 20 double-spaced typewritten pages. Survey papers should be comprehensive in reviewing the field and contain a thorough bibliography. They should be no longer than 50 double-spaced typewritten pages. This year for the first time, the papers committee is also soliciting short papers that describe interesting results.

Call the SIGGRAPH '90 conference management office at 312-644-6610 to request an author's packet. These packets provide further details about ACM publication standards, submission guidelines, and the SIGGRAPH reviewing process.

The tight review and production schedule makes SIGGRAPH one of the most timely publication media for research results. It also means papers will be accepted or rejected based on the paper as submitted.

Background on Papers

SIGGRAPH is the preeminent forum for the presentation and publishing of scholarly papers on computer graphics. Presentations at SIGGRAPH attract leaders from industry and academia. SIGGRAPH documents their contributions to the state of the art in the conference proceedings (published as a special issue of *Computer Graphics*). The proceedings from each conference become essential references on hardware, software, and theory for computer graphics professionals.

Deadlines

Submit five copies of each paper and any associated graphics for formal review by Tuesday, January 9, 1990. The committee will notify authors of acceptance by March 1990. Final camera-ready papers will be due in mid-May 1990.

Send papers to:

Forest Baskett
SIGGRAPH '90 Papers Chair
Silicon Graphics, Inc.
2011 North Shoreline Blvd.
Mountain View, CA 94039
415-962-3608
415-965-3328 FAX
baskett@baskett.sgi.com

Papers Committee

Alan H. Barr
California Institute of Technology

Richard J. Beach
Xerox PARC

Jim Blinn
California Institute of Technology

Ingrid Carlbom
Digital Equipment Corporation, Cambridge

Edwin E. Catmull
Pixar

Elaine Cohen
University of Utah

Robert L. Cook
Light Source

Tony D. DeRose
University of Washington

Nick England
Sun Microsystems, Inc.

A. Robin Forrest
University of East Anglia, U.K.

Henry Fuchs
University of North Carolina, Chapel Hill

Donald P. Greenberg
Cornell University

Leo Guibas
Stanford University
and Digital Equipment Corporation

Satish Gupta
IBM, Yorktown Heights

Pat Hanrahan
Princeton University

Paul Heckbert
University of California, Berkeley

Jeffrey Lane
Digital Equipment Corporation

Robert Sproull
Sutherland, Sproull and Associates

Spencer Thomas
University of Michigan

Turner Whitted
Numerical Design, Ltd.

Jane Wilhelms
University of California, Santa Cruz

Jim Winget
Silicon Graphics, Inc.

Propose a Panel

Describe a topic and recommend as many as four panel members you would like to hear discuss it. The panels committee will review proposals and ask authors of selected proposals to organize their panels.

The committee would like to see proposals involving cross-disciplinary and collaborative research. For example, they encourage artists working alongside specialists in scientific visualization, medical imaging, or multi-media to submit panel proposals.

Topics of Interest

—computer art and design
—computer animation
—interactive and multi-media applications of computer graphics
—current controversies in computer graphics
—scientific visualization graphics
—graphics workstation
—medicine, engineering, and the basic sciences
—the focus of the computer graphics industry
—emerging concepts in software and hardware
—future directions in computer graphics applications

How to Propose a Panel

The committee will select panels based on the importance, originality, focus, and timeliness of topics. In addition, the committee will consider the potential for lively discussion and debate between panelists, and between the panel and audience.

The preferred panel structure has a maximum of four panelists (including chair). The committee will not consider panels with more than five members.

The panel proposal should be no longer than two pages in length. It should include a description of the topic to be discussed and position statements by each of the panelists. Include a cover sheet with panel title and level (beginning, intermediate, or advanced); panelists' names and affiliations; panel organizer's name, affiliation, address, and phone number; and a 150-word summary of the panel.

Call the SIGGRAPH '90 conference management office at 312-644-6610 to request an author's packet. These packets provide further detail about ACM publications standards, proposal guidelines, and the SIGGRAPH reviewing process.

Background on Panels

Panels will be at the same time as the presentation of papers. Panel sessions will be 90 minutes in length, with at least 45 minutes allotted for discussion and debate. After brief position statements by each member, panelists will exchange ideas in an informal atmosphere. A brief panel description will appear in the conference proceedings.

All panels will be recorded and transcribed. Transcriptions will be made available to paper and panel attendees after the conference.

Deadlines

Submit five copies of each panel proposal by Tuesday, January 9, 1990. No late submissions will be considered. The committee will notify authors of acceptance by March 1990.

Send proposals to:

Alyce Kaprow
SIGGRAPH '90 Panels Chair
The New Studio
26 Hope Street
Newton, MA 02166
617-969-0288

Panels Committee

David S. Backer
Fluent Computer Systems

Alka Badshah
Apollo Computer

Thomas A. DeFanti
University of Illinois, Chicago

Masa Inakage
Media Studio

Delle Maxwell
Consultant

Vibeke Sorensen
California Institute of the Arts

Propose a Course

Share your expertise and your excitement. The courses committee is looking for individuals committed to supporting the learning process and to helping others understand new concepts. Creative approaches to presentations and materials are welcome. For the first time this year, the committee will consider proposals for a limited number of multi-year courses. The committee will invite the authors of selected proposals to organize and to teach the courses they proposed.

Topics of Interest

Courses might explain chunky planar, progressive radiosity, super VGA, PEX, fractals, microworlds, and hypermedia. New theoretical concepts, new hardware features, and new interactive techniques.

How to Propose a Course

Proposals should include a description of the material to be presented, the level of the course (beginning, intermediate, or advanced), a discussion of techniques for presentation, an outline of the course with time allotments per topic area, and proposed speakers. They should also include a two-sentence summary that highlights the content of the course. The committee will base its selections on the outline and the quality of the offering.

To encourage quality of presentation and production of high-quality materials, the committee will consider a limited number of proposals for multi-year courses. The following criteria will be used to review the proposals and the actual courses:

—The proposal should specify how the course benefits from a multi-year presentation.
—Course materials, notes, and lectures must be updated and improved between years.
—There should be continuity of course content and good speakers.
—A minimum of 200 people must attend to demonstrate interest in the topic.
—The attendee review must reflect the high quality of the course.
—A knowledgeable volunteer attendee will critique the course presentation and review the course notes.

Acceptance as a multi-year course does not guarantee presentation in the following year if the criteria are not met. To preserve the flexibility of the course offerings, only a limited number of proposals for multi-year courses can be accepted.

Call the SIGGRAPH '90 conference management office at 312-644-6610 to request a course proposal packet. These packets provide further detail about suggested topics, presentation techniques, proposal guidelines, and the SIGGRAPH reviewing process.

Background on Courses

Practitioners, educators, and researchers present courses at the beginning, intermediate, and advanced levels. They present topics in-depth using visual and written materials designed to support the learning process. They teach for one day (seven hours) on Monday or Tuesday. Course notes will be distributed to each course attendee and will also be available for sale at the conference. The availability of facilities in the convention center will limit the number and choice of courses.

Deadlines

Submit five copies of each proposal to the courses committee by Tuesday, December 19, 1989. The committee will notify authors of acceptance by the end of February.

Send course proposals to:

Patricia Wenner
SIGGRAPH '90 Courses Chair
Computer Science Department
Bucknell University
Lewisburg, PA 17837
717-524-1266
pwenner@bucknell.bitnet

Courses Committee

Teresa Bleser
The George Washington University

Frank Bliss
Electronic Data Systems

Mark Hamilton
Arizona State University

Nan Schaller
Rochester Institute of Technology

Dino Schweitzer
United States Air Force Academy

Submit a Film or Video

Submit new computer generated animation. The committee will review submissions and select pieces to show in the film and video theater. Some pieces not accepted for evening shows will be shown in an animation screening room. An open-deck room will also be available. There, anyone can show their latest creation, in other words, work that was not ready by the deadline date.

Topics of Interest

The film and video theater committee is looking for pioneering work. The committee is particularly interested in animation sequences generated using small desktop systems and in work from the international community. But, the work can come from virtually any field:

—education
—science and industry
—broadcast
—motion pictures
—art
—corporate communications
—research

Live performance and stereoscopic 3D formats are also of interest to the committee.

How to Submit a Film or Video

Call the SIGGRAPH '90 conference management office at 312-644-6610 to receive the SIGGRAPH '90 Film and Video Theater Guide for Submission. It provides helpful information about length, acceptable media, and the selection process.

Background on the Film and Video Theater

For many people the film and video theater is the highlight of a SIGGRAPH conference. And for many animators it's the culmination of a year's work. For everyone it's a chance to see the debut of the world's most stunning and sophisticated computer graphics animation.

Deadline

Submit your film or video by Tuesday, May 8, 1990.

Send films and video to:

Dave Inglish
SIGGRAPH '90 Film and Video Theater Chair
Walt Disney Pictures
1420 Flower Street
Glendale, CA 91221
818-956-2581
818-956-2660 FAX
mickey!david@csvax.caltech.edu

Submit Computer Art and Critical Essays

Submit slides of two-dimensional wall and frame buffer works, sculpture and installations, animations, and interactive works. The art show committee will look for work that demonstrates both aesthetic quality and a significant use of computers.

Submit critical essays examining computer art through the methods of art criticism, art theory, art history, and aesthetics. Essays should include a 100-word abstract. And they should be no more than 20 double-spaced typewritten pages.

The committee will select work in a wide range of styles and techniques to hang in the show and to publish in the art show slide set. ACM SIGGRAPH will sell the slide set at the conference and afterward. Work from the show will also appear in the art show catalog along with selected critical essays.

How to Submit Computer Art and Critical Essays

Call the SIGGRAPH '90 conference management office at 312-644-6610 to request a guide for art show contributors. This guide provides submission forms, further details, entry guidelines, and a description of the SIGGRAPH art show reviewing process.

Deadlines

Submit critical essays by Tuesday, January 9, 1990.

Submit slides of two-dimensional wall and frame buffer works, sculpture and installations by Tuesday, February 27, 1990.

Submit videotapes of animation and interactive entries by Tuesday, May 8, 1990.

Send art show entries to:

Tom Linehan
SIGGRAPH '90 Art Show Chair
Visualization Laboratory
College of Architecture
Texas A&M University
College Station, TX 77843
409-845-3465
409-845-4491 FAX

Submit Technical Slides

Submit 35mm slides of new computer-generated images. The technical slide committee will select images to appear in the slide set. ACM SIGGRAPH will sell the slide sets at the conference and afterward as a publication documenting computer graphics for the year.

How to Submit Technical Slides

The committee will select images that demonstrate techniques, algorithms, and procedures which are new or improved over previously published works. The images' visual content will also be considered.

The slide submission form will be published in *Computer Graphics,* Volume 23, Number 5, October 1989, or may be obtained from the slides chair. Call the SIGGRAPH '90 conference management office at 312-644-6610 for more information.

Background on Technical Slide Sets

The technical slide set represents the state of the art in computer graphics. It provides images for SIGGRAPH opening sessions and conference promotional pieces as well as a valuable tool for education.

Deadline

Submit technical slides by Tuesday, March 20, 1990. Early submissions will be considered for conference promotional pieces.

Submit technical slides to:

Vickie Renbarger
SIGGRAPH '90 Slides Chair
Lawrence Livermore National Laboratory
P.O. Box 808, L-627
Livermore, CA 94550
415-423-1976
vic%luxor.llnl.gov

Propose a Workshop

The workshop committee invites proposals from people who would like to outline a problem in computer graphics; organize a group of at most 15 people to discuss the problem; and produce a report of the group's results. The committee will review the proposals and select topics for workshops in late January 1990. SIGGRAPH will publish a call for individuals to participate in selected workshops.

People interested in one of the workshop topics must then submit a two- to five-page position paper to the workshop organizer. The committee will review position papers and select workshop participants. Just before the conference, selected participants will send in supplemental documents for distribution to other workshop participants.

How to Submit a Workshop Proposal

Call the SIGGRAPH '90 conference management office at 312-644-6610 to request a workshop proposal packet. These packets provide further details about workshop responsibilities, proposal guidelines and the SIGGRAPH reviewing process.

Background on Workshops

The annual SIGGRAPH conference has become an event at which colleagues can meet to discuss topics of common interest. This exchange of ideas among members of an international community is an important function of the conference and advances the discipline.

Workshops are an event new to the conference this year. They will provide a structured environment for small group discussions of selected problems. Unlike workshops at previous SIGGRAPH conferences, this year's workshops will stress the idea of a working group which produces a finished report for publication in *Computer Graphics*. The one- or two-day workshops will meet early in the week to discuss current problems in research or industry. Individuals involved in work on the problem at their school or business will be able to compare their work, define issues, discuss solutions, and define areas requiring further work.

Deadline

Submit workshop proposals by Tuesday, January 9, 1990.

Submit workshop proposals to:

Christine A. Barton
SIGGRAPH '90 Workshops and Special Interest Groups Chair
Morgan Guaranty Trust Company
23 Wall Street
New York, NY 10015
212-483-4095
212-797-4435 FAX

Organize a Special Interest Group Meeting

The traditional special interest group meetings provide an informal discussion forum. The committee encourages special interest group organizers to submit their topics early so that the conference program can include the locations of rooms for the special interest group meetings. However, even at the conference, you can organize special interest group meetings as long as space is available.

Send inquiries about special interest group meeting space to:

John E. French, Jr.
GeoQuest Systems, Inc.
4605 Post Oak Place
Suite 230
Houston, TX 77027
713-662-8065
713-621-4136 FAX

Submit a Prospectus for a Hypermedia Document

This call for hypermedia is new to the conference this year, but it will work just like the call for technical papers or art show submissions. Send us a draft of your work—self-guided hypermedia documents and participatory interactive information environments. Our jury will select innovative and creative submissions for presentation at the conference, and we will run them continuously during the conference.

How to Submit a Prospectus for a Hypermedia Document

We encourage you to submit a prospectus that tells us about your hypermedia document or interactive environment. The prospectus should be two- to five-pages in length and must contain these items:

1) a title, its creators, and a contact person,
2) a 150-word abstract suitable for the conference program,
3) a description of the innovative and creative features,
4) the equipment configuration that you will provide for your installation
5) its current completion status and target dates prior to the conference.

Background on Hypermedia

Hypermedia combines textual, visual, aural, dynamic, and structural information through interactive computer graphics to create an innovative environment to explore, organize, and manipulate information. Computer graphics workstations with high-fidelity sound, rich video sources and impressive dynamic graphics provide the technological basis for these advances. As the examples of hypermedia documents and environments proliferate, SIGGRAPH '90 encourages authors, editors, and creators to present their pioneering efforts in Dallas to educate, involve, and stimulate the computer graphics community.

Deadline

Submit your prospectus by Tuesday, January 9, 1990. We encourage you to accompany it with a sample document or a videotaped demonstration. The committee will notify authors of selected hypermedia documents or interactive environments by early March 1990. They will need to submit completed documents or to demonstrate the final environment in early June so that we can confirm the equipment configuration for the conference.

Send proposals to:

Richard J. Beach
Xerox PARC
3333 Coyote Hill Road
Palo Alto, CA 94304
415-494-4822
beach.pa@xerox.com

Exhibit Products

SIGGRAPH presents an unparalleled opportunity to reach the leaders of the computer graphics profession. It is the premier industry showcase for the newest and most exciting computer graphics technology—including hardware, software, applications, and systems. Over 250 exhibitors will demonstrate their products to an international audience of over 25,000 people from industry, science, and the arts. SIGGRAPH '90 is proud to announce that the U.S. Department of Commerce has selected the conference to participate in its Foreign Buyer Program.

In 1990 the conference will be in the Dallas Convention Center, one of the country's finest conference and exhibition facilities (over 300,000 square feet of exhibit space in one, column-free hall). The exhibit, all conference sessions, the film and video theater, and the art show will all be under one roof.

How to Reserve Exhibit Space

Call or write the SIGGRAPH '90 exhibition management office to request an exhibitor prospectus.

SIGGRAPH '90 Exhibition Management
Robert T. Kenworthy, Inc.
866 United Nations Plaza
New York, NY 10017
212-752-0911
212-223-3034

Toni Gripper
SIGGRAPH '90 Exhibits Chair
Frame Technology Corporation

SIGGRAPH '90 Conference Committee

Co-chairs
David D. Loendorf
Los Alamos National Laboratory

Jacqueline M. Wollner
Convex Computer Corporation

Conference Coordinator
Karen Pryor

Papers
Forest Baskett
Silicon Graphics, Inc.

Panels
Alyce Kaprow
The New Studio

Courses
Patricia Wenner
Bucknell University

Workshops and Special Interest Groups
Christine A. Barton
Morgan Guaranty Trust Company

Exhibits
Toni Gripper
Frame Technology Corporation

Film and Video Theater
Dave Inglish
Walt Disney Pictures

Art Show
Tom Linehan
Texas A&M University

Slides
Vickie Renbarger
Lawrence Livermore National Laboratory

Audio/Visual
Amie Slate

Creative Directors
Hugh Dubberly
Apple Computer, Inc.

Thom Marchionna
Apple Computer, Inc.

International Coordinator
Lois Blankstein
Association for Computing Machinery

Market Relations
Laurie A. Windham
Regis McKenna, Inc.

Merchandise
Toni Staffieri
Fresh Electronic Publishing

Proceedings Editor
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Xerox PARC

Registration
Eric Bosch
McMaster University

Student Volunteer Coordinator
Martin Streicher
Convex Computer Corporation

Treasurer
Brian Herzog
Sun Microsystems, Inc.

Vice Chair for Conference Planning
Andrew C. Goodrich
RasterOps

ACM SIGGRAPH Liaison
Lois A. Blankstein
Association for Computing Machinery

Audio/Visual Management
Audio Visual Headquarters Corporation

Conference Accounting
Smith, Bucklin and Associates, Inc.

Conference Management
Smith, Bucklin and Associates, Inc.

Exhibit Management
Robert T. Kenworthy, Inc.

Public Relations
Smith, Bucklin and Associates, Inc.

Major Deadlines

All deadlines are firm and will be strictly observed. This allows a fair selection process and time for production of printed materials.

Paper Submissions
Tuesday, January 9, 1990

Forest Baskett
SIGGRAPH '90 Papers Chair
Silicon Graphics, Inc.
2011 North Shoreline Blvd.
Mountain View, CA 94039
415-962-3608
415-965-3328 FAX
baskett@baskett.sgi.com

Panel Proposals
Tuesday, January 9, 1990

Alyce Kaprow
SIGGRAPH '90 Panels Chair
The New Studio
26 Hope Street
Newton, MA 02166
617-969-0288

Course Proposals
Tuesday, December 19, 1989

Patricia Wenner
SIGGRAPH '90 Courses Chair
Computer Science Department
Bucknell University
Lewisburg, PA 17837
717-524-1266
pwenner@bucknell.bitnet

Film and Video Theater Submissions
Tuesday, May 8, 1990

Dave Inglish
SIGGRAPH '90 Film and Video Theater Chair
Walt Disney Pictures
1420 Flower Street
Glendale, CA 91221
818-956-2581
818-956-2660 FAX
mickey!david@csvax.caltech.edu

Art Show Submissions

Critical Essays
Tuesday, January 9, 1990

Slides of two-dimensional wall and frame buffer works, three-dimensional sculpture and installations
Tuesday, February 27, 1990

Videotape of animations and interactive works
Tuesday, May 8, 1990

Tom Linehan
Visualization Laboratory
College of Architecture
Texas A&M University
College Station, TX 77843
409-845-3465
409-845-4491 FAX

Technical Slide Submissions
Tuesday, March 20, 1990
Vickie Renbarger
SIGGRAPH '90 Slides Chair
Lawrence Livermore National Laboratory
PO Box 808, L-627
Livermore, CA 94550
415-423-1976
vic%luxor.llnl.gov

Workshop Proposals
Tuesday, January 9, 1990
Christine Barton
SIGGRAPH '90 Workshops and Special Interest Groups Chair
Morgan Guaranty Trust Company
23 Wall Street
New York, NY 10015
212-483-4095
212-797-4435 FAX

Hypermedia Submissions
Tuesday, January 9, 1990
Richard J. Beach
Xerox PARC
3333 Coyote Hill Road
Palo Alto, CA 94304
415-494-4822
beach.pa@xerox.com

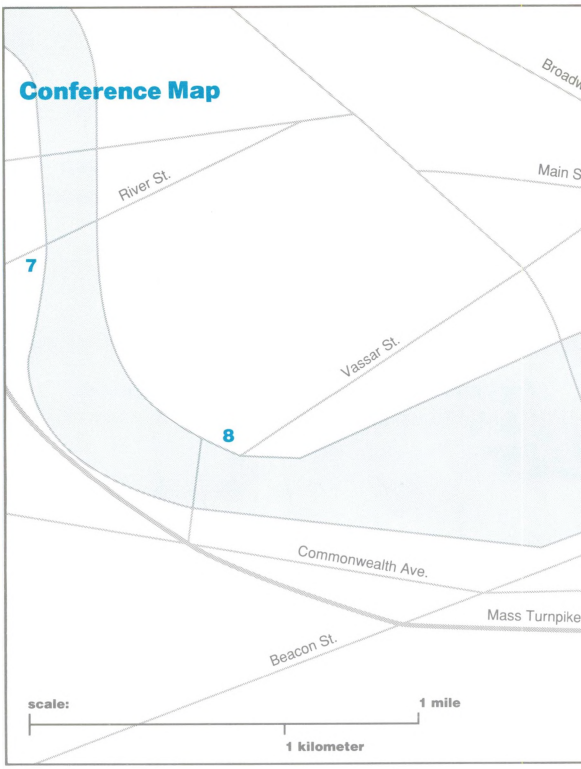
Early Registration
Friday, June 29,1990

For information about the conference contact:

SIGGRAPH '90 Conference Management
Smith, Bucklin and Associates, Inc.
111 East Wacker Drive
Suite 600
Chicago, IL 60601
312-644-6610

For information about the exhibition contact:

SIGGRAPH '90 Exhibition Management
Robert T. Kenworthy, Inc.
866 United Nations Plaza
New York, NY 10017
212-752-0911
212-223-3034 FAX



1 Back Bay Hilton*
40 Dalton Street
Boston, MA 02115
617-236-1100

2 Boston Park Plaza Hotel and Towers
50 Park Plaza at Arlington Street
Boston, MA 02117
617-426-2000

3 The Colonnade*
120 Huntington Avenue
Boston, MA 02116
617-424-7000

4 Copley Plaza
138 St. James Avenue
Boston, MA 02116
617-267-5300

5 Copley Square Hotel
47 Huntington Avenue at Copley Plaza
Boston, MA 02116
617-536-9000

6 57 Park Plaza
200 Stuart Street
Boston, MA 02116
617-482-1800

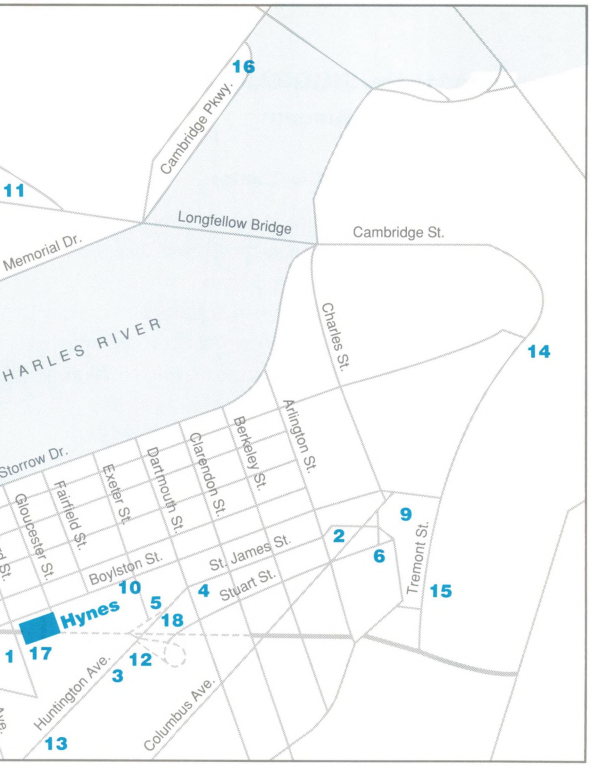
7 Guest Quarters
400 Soldiers Field Road
Boston, MA 02134
617-783-0090

8 Hyatt Regency Cambridge
575 Memorial Drive
Cambridge, MA 02139
617-492-1234

9 Lafayette Hotel
One Avenue de Lafayette
Boston, MA 02111
617-451-2600

10 Lenox Hotel
710 Boylston Street
Boston, MA 02116
617-536-5300

11 Marriott Cambridge
Two Cambridge Center
Boston, MA 02142
617-494-6600



12 Marriott Copley Place**
110 Huntington Avenue
Boston, MA 02116
617-236-5800

13 Midtown Hotel
220 Huntington Avenue
Boston, MA 02115
617-262-1000

14 Omni Parker House
60 School Street
Boston, MA 02108
617-227-8600

15 Quality Inn Downtown
275 Tremont Street
Boston, MA 02116
617-426-1400

16 Royal Sonesta
5 Cambridge Parkway
Cambridge, MA 02142
617-491-3600

17 Sheraton Boston Hotel and Towers*
Headquarters Hotel
Prudential Center
Boston, MA 02199
617-236-2000

18 Westin Hotel Copley Place*
10 Huntington Avenue
Boston, MA 02110
617-262-9600

*These hotels are within walking distance of the Hynes Convention Center, therefore buses are not provided.

**Limited bus service is available Wednesday-Friday to and from the Hynes Convention Center for the paper/panel sessions only.

Directions to the SIGGRAPH '89 Art Show at the Computer Museum

From the Hynes Convention Center:

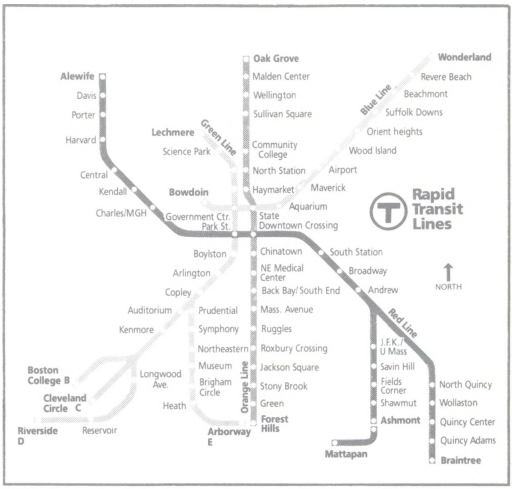
Enter the MBTA commonly known as the "T" at the Auditorium Station on Massachusetts Avenue. Take the Green Line (inbound) to Park Street Station where you transfer to the Red Line (outbound) to South Station (two stops). From the South Station you can take a 10-minute walk North along Atlantic Avenue to the first intersection. Go right on Congress Street for two blocks, across the bridge spanning Fort Point Channel to the Museum Wharf and The Computer Museum. Or you can take the #6 or #7 bus right outside the "T" South Station.

The cost of the "T" is $.75 and the bus is an additional $.50. There is no transfer between the "T" and the bus. Allow yourself about 35 to 40 minutes to make the trip.

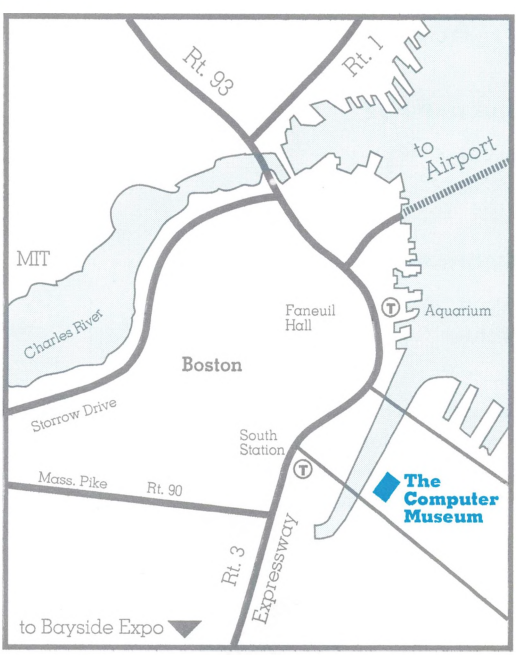
The Computer Museum is located at:

Museum Wharf
300 Congress Street
Boston, MA 02210

Massachusetts Bay Transportation Authority (MBTA) Map



Roadway Map



FUTURE CONFERENCE DATES

SIGGRAPH '90

August 6-10, 1990
Dallas, TX

Co-chairs

David D. Loendorf
Los Alamos National Laboratory

Jacqueline M. Wollner
Convex Computer Corporation

SIGGRAPH '91

July 29-August 2, 1991
Las Vegas, NV

Co-chairs

Michael J. Bailey
San Diego Supercomputer Center

Carol Byram
Sony Microsystems Company

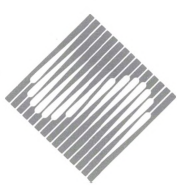
SIGGRAPH '92

July 27-31, 1992
Chicago, IL

SIGGRAPH '93

August 2-6 1993
Anaheim, CA

For additional information regarding future conferences, contact SIGGRAPH Conference Management Office at 111 E. Wacker Drive, Suite 600, Chicago, IL 60601 or call 312-644-6610.



Credits

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"Dream Cloud" Masa Inakage © 1985

"Cod" Marc Palumbo/TBA

"Bubbles Wire Injection into a Turbulent Flow" J. Salem, J. Sethian, A. Ghoniem/Thinking Machines Corporation © 1988

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