The Pioneers Return to Dallas

SIGGRAPH 1990

17th International Conference on Computer Graphics and Interactive Techniques

SIGGRAPH '90 DALLAS

Final Program

Cover photo by Bill Robbins

Welcome

Welcome to Dallas! Thank you for making time in your schedule to attend SIGGRAPH '90, the 17th International Conference on Computer Graphics and Interactive Techniques! As you embark on your adventure at the world's largest and most exciting computer graphics event, keep in mind this is your once-a-year chance to share new ideas, create solutions, and experience the most exciting advancements in computer graphics technology.

So, if you're here for the first time—or you're a seasoned SIGGRAPH attendee—we're sure you'll want to experience it all! You'll be educated by numerous cutting-edge courses, papers and panels; entertained by the dynamic art show and film and video theater; and amazed at the world's state-of-the-art technology exhibition.

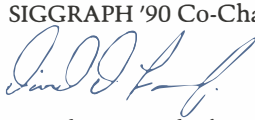
Along with traditional events, SIGGRAPH '90 offers you new educational venues, such as workshops and an exhibit of hypermedia. Sunday seminars and special interest groups offer an opportunity to discuss specific computer graphics techniques, theories, technology and trends with a wide mix of SIGGRAPH personalities.

At this time, it's also appropriate to express our thanks to all the volunteers and professionals who have worked diligently and with great enthusiasm over the past two years to make this conference possible. In addition, we'd like to especially welcome the international attendees—who have traveled great distances—and our Soviet colleagues who will bring SIGGRAPH to the U.S.S.R. next year.

This program will assist you in taking full advantage of the opportunities available to you. After anxiously awaiting this moment, we hope that SIGGRAPH will inspire you with fresh ideas and spark you to take home the excitement and energy you've experienced at this truly dynamic conference.

Thanks for joining us. We're glad you're here!

SIGGRAPH '90 Co-Chairs



David D. Loendorf

Jacqueline M. Wollner

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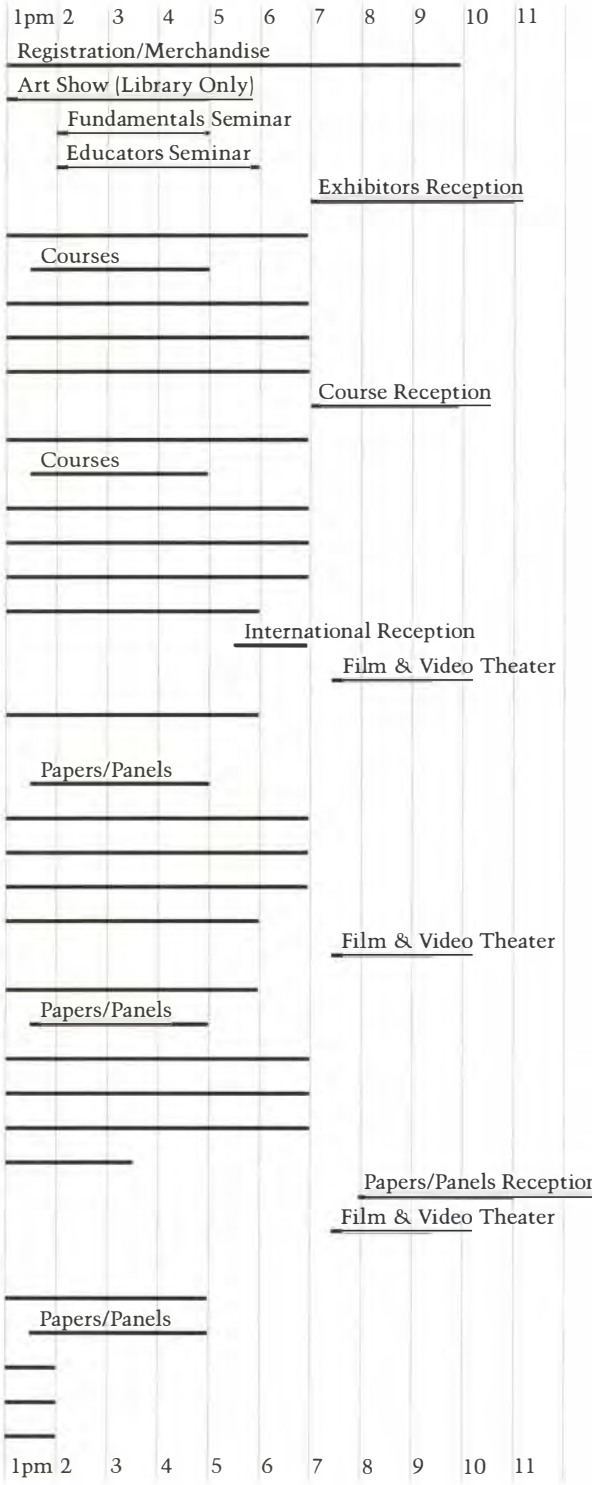
SIGGRAPH '90 AT-A-GLANCE

*A portion of the SIGGRAPH '90 art show is exhibited at the J. Erik Jonsson Central Library Gallery from July 26-October 7. Gallery hours are: Mon.-Fri., 9 am-9 pm, Saturday, 9 am-5 pm and Sunday, 1-5 pm


1pm 2 3 4 5 6 7 8 9 10 11
Registration/Merchandise
Art Show (Library Only)
Fundamentals Seminar
Educators Seminar
Exhibitors Reception
Courses
Course Reception
Courses
International Reception
Film & Video Theater
Papers/Panels
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Papers/Panels
Papers/Panels Reception
Film & Video Theater
Papers/Panels
1pm 2 3 4 5 6 7 8 9 10 11

General Information

Airline Information

Main Corridor, East Exhibit Hall Entrance,
Dallas Convention Center
Sunday: Noon-7 p.m.
Monday-Thursday: 8 a.m.-5 p.m.
Friday: 8:30 a.m.-2 p.m.

The official SIGGRAPH '90 travel agency, ARTA Travel, and American Airlines is available to assist you with your travel plans during the above hours. Changes to your itinerary may be made at this booth; however, due to industry regulations, tickets issued by other travel agencies or carriers directly, cannot be reissued by ARTA Travel.

Audio/Visual Services

A/V Office
Room E408, Dallas Convention Center
Sunday: 9 a.m.-9 p.m.
Monday-Friday: 8:30 a.m.-5 p.m.

Direct all questions about audio/visual needs to this office during the hours listed above. For more information, call 214-658-7900.

Film and Video Theater and
Animation Screening Room Office
Room E405, Dallas Convention Center
Monday-Friday: 10 a.m.-5 p.m.

Contributors can gather here to exchange ideas, leave messages or handle concerns.

Speaker Prep Room
Room E409, Dallas Convention Center
Sunday: 9 a.m.-9 p.m.
Monday-Thursday: 7 a.m.-10 p.m.
Friday: 7 a.m.-5 p.m.

All speakers are encouraged to checkin during speaker prep room hours as listed above. Here you may preview your slides and videotapes, ask questions and rehearse your SIGGRAPH presentation.

Speaker Slidemaking Room
Room E409, Dallas Convention Center
Sunday: Noon-5 p.m.
Monday-Thursday: 8:30-5 p.m.

Speakers with last-minute slide changes can make alterations in this office (which also serves as the

speaker prep room). This service is donated by Impress Imaging Presentations, Inc. For information, call 800-621-1276.

Child Care

Child care services are offered by most SIGGRAPH '90 hotels. Contact the concierge desk or guest services department of your hotel to find out which services are provided.

Conference Management Office

Room E402/403, Dallas Convention Center

If you have questions regarding SIGGRAPH '90, personnel are on hand to assist you. You may either visit the office or reach them by phoning 214-658-7911.

Exhibition Management Office

Room E401, Dallas Convention Center

If you have questions regarding the exhibition, personnel are on hand to assist you. You may either visit the office or reach them by phoning 214-658-7916.

First Aid Office

Main Corridor, East Exhibit Hall Entrance,
Dallas Convention Center

A registered nurse or paramedic is on duty in this office during registration hours. The first aid office telephone number is 214-658-7081.

Housing Assistance

Main Corridor, East Exhibit Hall Entrance,
Dallas Convention Center
Sunday: Noon-10 p.m.
Monday-Tuesday: 7:30 a.m.-7 p.m.

A representative from the Dallas Housing Bureau is available at the housing desk during the above hours on Sunday, Monday and Tuesday. The housing desk telephone number is 214-658-7905. Persons requiring assistance on Wednesday, Thursday or Friday may call the Dallas Housing Bureau at 214-746-6677.

Information Booths

Main Corridor, East Exhibit Hall Entrance, Dallas Convention Center

Two information booths are available to answer quick questions and help you locate your conference destinations beginning at noon on Sunday and thereafter during registration hours.

International Business Center

Registration Area, Dallas Convention Center
Sunday: Noon-10 p.m.
Monday-Tuesday: 7:30 a.m.-7 p.m.
Wednesday-Thursday: 8 a.m.-6 p.m.

The International Business Center is a place for you to meet with SIGGRAPH '90 exhibitors who are interested in international trade. Here international attendees may inquire about registration, locate translators, communicate back to your office, and meet other international attendees. Translators are available to assist you Sunday through Thursday during the above hours.

Luggage Check

Main Corridor, East Exhibit Hall Entrance,
Dallas Convention Center

Want to store your suitcase, backpack or briefcase? For your convenience during registration hours, visit the SIGGRAPH '90 luggage check service.

Merchandise

Merchandise Desk
Registration Area, Dallas Convention Center
Sunday: Noon-10 p.m.
Monday-Tuesday: 7:30 a.m.-7 p.m.
Wednesday-Thursday: 8 a.m.-6 p.m.
Friday: 9 a.m.-5 p.m.

The merchandise desk serves as the pick up point for all course notes and merchandise purchased through advance or on-site registration. If you didn't purchase merchandise through advance registration, you may buy SIGGRAPH '90 course notes, proceedings, slide sets, art show and film and video theater catalogs, or SIGGRAPH '90 souvenirs through the on-site registration desk. Merchandise purchased at on-site registration must be picked up at the merchandise desk.

SIGGRAPH '90 Boutique
Main Lobby, Dallas Convention Center
Sunday: Noon-6 p.m.
Monday-Thursday: 9 a.m.-7 p.m.
Friday: 9 a.m.-5 p.m.

The SIGGRAPH '90 boutique offers a convenience to attendees who don't wish to stand in a registration line to buy a SIGGRAPH '90 souvenir. Cash, checks, and credit cards will be accepted for payment in the boutique.

Catalogs, Proceedings and Video Reviews
Please note that one film and video 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 or the boutique.

New this year, *SIGGRAPH Video Reviews* are sold through the ACM booth in the main cooridor, East Exhibit Hall entrance in the Dallas Convention Center.

After the conference, proceedings, slide sets and video reviews are available for purchase. For proceedings and slide sets, phone the ACM Order Department at 301-528-4261; or write ACM Order Department, P.O. Box 64145, Baltimore, MD 21264. To order video reviews, the toll-free number is 800-223-5503.

Message Center

Main Corridor, East Exhibit Hall Entrance,
Dallas Convention Center

Receive messages from SIGGRAPH attendees, your home or office at the SIGGRAPH '90 message center. The phone number is 214-658-8200.

Press Activities

Media Education Workshop
Room S414, Dallas Convention Center
Monday: 3-5 p.m.

In response to media requests, SIGGRAPH '90 is hosting its first educational workshop for members of the media. All registered press are invited to attend this event, which addresses the basics of computer graphics technology, terminology and trends.

Press Briefing
Room E410, Dallas Convention Center
Tuesday: 8-10 a.m.

Highlights of SIGGRAPH '90 are presented to press members on Tuesday, August 7 from 8 to 9:30 a.m. in Room E410 of the Dallas Convention Center. The briefing features several leading authorities from various computer graphics disciplines—art, animation, multimedia and scientific visualization. Speakers give an overview of the conference and talk on the future of the industry.

A private, guided press tour of the exhibition is offered from 9:30 to 10 a.m., immediately following the question-and-answer session. The tour takes place one half hour before the official opening.

Press Policies

To obtain press credentials, members of the media must adhere to the following:

- Full-time writers must have an editorial business card or a letter from an editor requesting press credentials. These titles are accepted: editor, photographer, cameraperson, reporter, writer and analyst.
- Free-lance writers must have a letter from a computer graphics-related magazine stating they have been assigned to cover SIGGRAPH '90, or a copy of an article written by them that was published in a computer graphics-related magazine within the last two years.
- Consultants with industry newsletters must have a business card with the name of the newsletter or a copy of the publication.

Advertising representatives are not eligible for press credentials.

Please note that press attendance at courses is limited to one hour and press members may take seats only after all registrants have been seated.

No cameras or recording devices are permitted in the SIGGRAPH '90 courses, papers/panels, art show, exhibition or film and video theater.

Press Rooms

Press Office
Room E406, Dallas Convention Center
Sunday: 2-6 p.m.
Monday-Thursday: 8 a.m.-6 p.m.
Friday: 8 a.m.-Noon

The press office serves as a general information center for members of the press. Press members should come directly to this room to register and pick up press badges. This room is equipped with telephones, a message board, conference course notes and proceedings for your reference. Exhibitor press materials may be picked up in this room. In addition, a list of SIGGRAPH '90 photo opportunities is posted here. The press office number is 214-658-7920.

Press Interview Room
Room E407, Dallas Convention Center
Sunday: 2-6 p.m.
Monday-Thursday, 8 a.m.-6 p.m.
Friday: 8 a.m.-Noon

Members of the media may use this area to conduct interviews, meet acquaintances and relax between events. Telephones, IBM-compatible and Macintosh personal computers are available for press use.

Press Conference Room
Room E410, Dallas Convention Center

This room may be reserved through the press office for those requiring media conference space. It is equipped with seating and is wired to accommodate broadcasting and live interviewing needs.

Registration

East Exhibit Hall, Dallas Convention Center

On-site registration for SIGGRAPH '90 activities is during the following times:

Sunday, August 5.....Noon-10 p.m.
Monday, August 6.....7:30 a.m.-7 p.m.
Tuesday, August 7 .....7:30 a.m.-7 p.m.
Wednesday, August 8.....8 a.m.-6 p.m.
Thursday, August 9 .....8 a.m.-6 p.m.
Friday, August 10.....9 a.m.-1 p.m.

Restaurant Information

East and West Exhibit Halls, Dallas Convention Center

Restaurant information desks provide SIGGRAPH '90 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

East Exhibit Hall, Dallas Convention Center

The shipping desk 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

Main Corridor, East Exhibit Hall Entrance, Dallas Convention Center

Learn about local groups! Information concerning SIGGRAPH groups in your hometown, their membership and activities can be obtained here.

Slide Sets

SIGGRAPH '90 technical, art show, and stereoscopic 3D slide sets ordered before the conference must be picked up at the merchandise desk in the registration area of the Dallas Convention Center. After the conference, slide sets are available from the ACM Order Department. See the merchandise listing on page 8 for details.

Smoking Policy

Smoking is not permitted at conference locations.

Social Functions

SIGGRAPH '90 receptions create the perfect atmosphere for seeing old friends, making new acquaintances, exchanging ideas and simply having fun and relaxing. This year SIGGRAPH has planned some exciting and memorable evenings for your enjoyment.

The breathtaking Morton S. Meyerson Symphony Center is a lovely setting for the Monday evening course reception, held from 7 to 10 p.m. This new Dallas landmark, designed by world-renown architect I. M. Pei, is considered an engineering tour de force with its computer-designed structure and sweeping conoid window. Enjoy bountiful food, refreshments and camaraderie which makes SIGGRAPH receptions distinctive. Buses leave the Dallas Convention Center beginning at 6:30 p.m. and will drop you at your hotel after the reception.

On Thursday evening, come to Science Place I—Fair Park to celebrate the end of a productive SIGGRAPH week at the papers/panels reception. From 8 to 11 p.m. visit our own SIGGRAPH-style "Texas State Fair" at this event reminiscent of the Lone Star State's annual summer state fair. A tent is located near picturesque lagoons behind the Science Place, so when you've explored the hands-on exhibits inside, step outside for corn dogs, buttery corn-on-the-cob and other delights characteristic of county and state fairs. Buses will depart for Fair Park from the convention center at 7:30 p.m. We recommend you let our bus service drop you at your hotel afterward as well.

Telephone Numbers

A/V Office.....214-658-7900
Conference Management Office 214-658-7911
Dallas Housing Bureau 214-746-6677
Emergencies (ambulance, fire, police).....911
Exhibition Management Office.....214-658-7916
Film and Video Theater Office.....214-658-7907
First Aid Office.....214-658-7081
Housing Assistance.....214-658-7905
Message Center.....214-658-8200
Press Office.....214-658-7920
Registration.....214-658-7938
Speaker Slidemaking Room.....214-658-7937

Transportation

Frequent shuttle bus transportation is available between SIGGRAPH '90 hotels and the Dallas Convention Center, free of charge. Shuttle buses are also provided for all conference activities.

Information on public transportation is available at the information booth.

Courses-At-A-Glance

Introductory-Monday	1	Fundamentals and Overview of Computer Graphics
	2	Color and Computer Graphics
	3	Introduction to Hypertext and Hypermedia
	4	An Artistic Introduction to Computer Animation
Tuesday	5	Generation of Three-Dimensional Data for Computer Image Synthesis
	6	Stereographics
	7	Emerging User-Interface Media: Potentials and Challenges
Intermediate-Monday	8	Human Figure Animation: Approaches and Applications
	9	PHIGS PLUS: Advanced Three-Dimensional Graphics with a Standard Application Programmer Interface
	10	Character Animation by Computer
	11	Volume Visualization Algorithms and Architectures
	12	Solid Modeling: Architectures, Mathematics, and Algorithms
	13	Curve and Surface Design: From Geometry to Applications

Intermediate-Monday

14 The Computer Graphics Interface (CGI)—The Next International Graphics Standard

15 Fractals: Analysis and Modeling

16 Introduction to Window Management

Tuesday

17 Computer Graphics in Visual Effects

18 The RenderMan Interface and Shading Language

19 X3D-PEX (PEX): Three-Dimensional Graphics in a Distributed Window System

20 The PostScript Page Description Language

21 Radiosity

22 Video Technology for Computer Graphics

23 Modeling and Animating with Implicit Surfaces

Advanced-Monday

24 Advanced Topics in Ray Tracing

Tuesday

25 Unifying Parametric and Implicit Surface Representations for Computer Graphics

26 State of the Art in Facial Animation

27 State of the Art in Data Visualization

28 Parallel Algorithms and Architectures for 3D Image Generation

Courses

SIGGRAPH '90 courses offer an intensive day of instruction by industry experts presenting up-to-date material on a wide variety of topics in computer graphics and interactive techniques. Course attendees not only hear about but see graphics used in creative ways, as course speakers use multimedia presentations to help accomplish the educational goals of the course.

Courses are held in the Dallas Convention Center and the Hyatt Regency from 8:30 a.m.-5 p.m. on Monday, August 6 and Tuesday, August 7. The course locations are listed in the course locator in your registration packet and are posted on a kiosk in the registration area. Lunches are served to course attendees.

Course notes are available for pick up in the registration area in the Dallas Convention Center.

Course registrants are invited to a reception at the Morton S. Meyerson Symphony Center on Monday evening from 7 to 10 p.m. (See the social functions listing in the general information sections for details.) Course descriptions are provided on pages 18 to 45.

Course Categories

If you are registering on-site, the following list helps you determine which courses are appropriate for you. Each course is categorized as to the level of material, to best meet student 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
For intermediate 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, to supply a model or other structure for the discipline and supply

substantial technical content and depth. Most courses cover many specific topics in detail, such as algorithms, techniques, and architectures.

Advanced
An advanced course covers a narrow topic in substantial technical depth. Presentations will often include challenging mathematical concepts and programming examples.

Students in these courses are well-informed in the general topic of the course and are ready to consider advanced material. They have gained their knowledge through intermediate courses, reading, and significant years of experience.

1

Fundamentals and Overview of Computer Graphics

Monday, Introductory

Course Description

This course starts with a historical perspective of computer graphics and an introduction to the fundamental concepts. The current state of the industry and important trends are discussed, followed by a topics survey. Emphasis is on breadth of coverage rather than on teaching technical details. The guiding principle gives attendees an intuitive understanding of many concepts instead of detailing introductory issues.

Chair

Olin Lathrop
Cognivision, Inc.

Lecturers

Norman Badler
University of Pennsylvania

Richard M. Fichera
Independent Consultant

Olin Lathrop
Cognivision, Inc.

Carl Machover
Machover Associates

2

Color and Computer Graphics

Monday, Introductory

Course Description

This course introduces terminology, principles, guidelines, and heuristics for using color in user interfaces, screen presentations, and hardcopy graphics. The course covers physiological, perceptual, cognitive, and communication issues, such as how human beings see color, what colors to select, how to select them, how to display and communicate color effectively, and how to design with color.

Chair

Aaron Marcus
Aaron Marcus and Associates

Lecturers

Aaron Marcus
Aaron Marcus and Associates
Gerald Murch
Tektronix, Inc.
Wanda J. Smith
Hewlett-Packard Laboratories

3

Introduction to Hypertext and Hypermedia

Monday, Introductory

Course Description

This course gives attendees an introduction to the concepts of hypertext (non-sequential writing) and hypermedia (multimedia hypertext), the background for evaluating hypertext applications, and the ability to structure and design hypertext document systems with good human factors characteristics. Lecturers cover: the definition of hypertext and hypermedia, a survey of applications, some existing hypertext systems with demonstrations, user interface issues and problems, empirical testing, navigating large information spaces, automatic transformation of linear text files, and future developments, including technology transfer issues.

Chair

Jakob Nielsen
Technical University of Denmark

Lecturers

Hannah Kain
Baltica Finance

John Leggett
Texas A&M University

Jakob Nielsen
Technical University of Denmark

4

An Artistic Introduction to Computer Animation

Monday, Introductory

Course Description

Covers ideation to execution of a design through the use of computer animation. Speakers introduce the fundamentals of storyboarding, 2D and 3D graphics, animation, image processing, character animation, and the integration of technology into traditional methods. Actual techniques and concepts are demonstrated with in-class hardware and software, slides and video.

Chair

Maria Palazzi
Rutgers University

Lecturers

John Donkin
The Ohio State University

Maria Palazzi
Rutgers University

Anne Seidman
Moore College of Art

5

Generation of Three-Dimensional Data for Computer Image Synthesis

Tuesday, Introductory

Course Description

This course gives an understanding of the issues and techniques involved in basic data generation for computer graphics and user interface issues. It covers application-independent data generation techniques, with various easy-to-understand/implement procedures. Presenters share effective techniques and procedures, program samples, and interactive real-time demonstrations of various techniques. This course differs from the traditional courses in CAD, geometry and free-form surface design as it concentrates on the basic techniques which underlie the more sophisticated approaches.

Co-Chairs

Wayne E. Carlson
The Ohio State University
Richard E. Parent
The Ohio State University

Lecturers

Wayne E. Carlson
The Ohio State University
Richard Parent
The Ohio State University
Kevin Weiler
Stardent Computer
Turner Whitted
Numerical Design, Ltd.

6

Stereographics

Tuesday, Introductory

Course Description

Although 3D graphics creates and interacts with data in 3D, the majority of display devices allow only perspective rendering of images in 2D. This course provides a detailed introduction to the rapidly growing area of stereographics and other 3D display techniques. Topics include: perceptual issues, an overview of 3D display technologies, stereoscopic perspective transformations, in-depth material on the design and display characteristics of time-interlaced stereoscopic display systems, 3D hardcopy techniques, and stereo animation issues. Both commercial 3D display systems and prototype systems are demonstrated.

Chair

David F. McAllister
North Carolina State University

Lecturers

Robert J. Beaton
Virginia Tech
Larry F. Hodges
Georgia Institute of Technology
Phil Johnson
Tektronix, Inc.
Lennie Lipton
Stereographics Corporation
Shaun Love
North Carolina State University
David F. McAllister
North Carolina State University
Rodney Don Williams
Texas Instruments

7

Emerging User-Interface Media: Potentials and Challenges

Tuesday, Introductory

Course Description

This course surveys emerging user-interface media: display technology, stereoscopic graphics, eye-tracking, speech, and spatial input. For each, the underlying theories of device operation are explored, detailing examples of current "products." It discusses the current status and future potential of these interfaces, including merits, limitations, and range of suitable applications. Instructors offer practical advice toward using these technologies at the interface, and present demonstration systems built by themselves and others.

Chair

Chris Schmandt
MIT Media Lab

Lecturers

Walter Bender
MIT Media Lab

Scott Fisher
NASA Ames Research Center

Robert J.K. Jacob
Naval Research Laboratory

Chris Schmandt
MIT Media Lab

8

Human Figure Animation: Approaches and Applications

Monday, Intermediate

Course Description

This course poses the challenge of human figure animation and describes the major approaches which have been adopted (kinematics, dynamics and artificial intelligence). It examines three application areas—ergonomic evaluation of environments, simulation of micro-worlds, and human figure animation for film and video production.

Chair

Tom Calvert
Simon Fraser University

Lecturers

Norman I. Badler
University of Pennsylvania

Armin Bruderlin
Simon Fraser University

Tom Calvert
Simon Fraser University

Thecla Schiphorst
Simon Fraser University

Jane Wilhelms
University of California, Santa Cruz

David Zeltzer
MIT

9

PHIGS PLUS: Advanced Three-Dimensional Graphics with a Standard Application Programmer Interface

Monday, Intermediate

Course Description

PHIGS PLUS is the ANSI/ISO proposed extension to the PHIGS standard and is supported by multiple vendors as the API for providing advanced rendering and advanced primitive geometries within the PHIGS environment. This course covers the evolution, architecture, and algorithms of PHIGS PLUS. It explores the impact of PHIGS PLUS on an application environment and investigates necessary considerations for application and graphics-system implementers.

Chair

Edy Henderson
Sun Microsystems, Inc.

Lecturers

Henri Gouraud
Digital P.R.L.

Griff Hamlin
McDonnell Douglas

Edy Henderson
Sun Microsystems, Inc.

Eileen McGinnis
Sun Microsystems, Inc.

Mike Stapleton
System Simulation Ltd.

Spencer Thomas
University of Michigan

10

Character Animation by Computer

Monday, Intermediate

Course Description

Speakers will show computer-animated films and discuss how each work was created.

Chair

Bill Kroyer
Kroyer Films, Inc.

Lecturers

John Chadwick
Ohio State Computer Graphics Group, Columbus

Matt Elson
Symbolics, Inc.

Doris Kochanek
National Film Board of Canada

Bill Kroyer
Kroyer Films, Inc.

11

Volume Visualization Algorithms and Architectures

Monday, Intermediate

Course Description

The last three years have seen a revolution in techniques for visualizing 3D sampled data. This course provides a technical overview and comparison of these new techniques, emphasizing algorithms and architectures, not applications. Algorithms to be presented include marching cubes, dividing cubes, gray-level gradient shading, and volume rendering. Architectures presented include CUBE, the Pixar Image Computer, GE's dividing cubes, and the University of North Carolina's Pixel-Planes-based systems. The course includes a panel discussion focusing on unsolved technical issues in volume visualization.

Chair

Marc Levoy
University of North Carolina

Lecturers

Pat Hanrahan
Princeton University

Karl-Heinz Hoehne
University Hospital Eppendorf

Arie Kaufman
SUNY at Stony Brook

Marc Levoy
University of North Carolina

William Lorensen
General Electric Corporation

12

Solid Modeling: Architectures, Mathematics, and Algorithms

Monday, Intermediate

Course Description

Following a brief review of pertinent background concepts and an overview of the assumed modeling environment, lecturers present basic, contemporary solid modeling architectures. They introduce the importance of a boundary evaluation algorithm in such environments and describe an approach to such algorithms. Common curve and surface representation schemes and intersection algorithms are then discussed; basic issues and contemporary approaches for boundary representations are presented. Finally, the role of features in modeling systems, feature recognition and design are discussed.

Chair

James R. Miller
The University of Kansas

Lecturers

George Allen
McDonnell Douglas

James R. Miller
The University of Kansas

Kevin J. Weiler
Stardent Computer

Peter R. Wilson
Rensselaer Polytechnic Institute

13

Curve and Surface Design: From Geometry to Applications

Monday, Intermediate

Course Description

This course presents geometric foundations for curve and surface design, including: Bézier curves and curve interpolation, B-spline and NURBS curves, geometric continuity and parameterizations, tensor product surfaces, Coons and Gordon surfaces, Bézier triangles, trimmed NURBS surfaces, and surface interrogation. The presentation relies on intuitive geometric concepts, with applications to practical design problems. Live interactive demonstrations will be given.

Chair

Gregory M. Nielson
Arizona State University

Lecturers

Thomas A. Foley
Arizona State University

Gregory M. Nielson
Arizona State University

Alyn P. Rockwood
Silicon Graphics Computer Systems

14

The Computer Graphics Interface (CGI)—The Next International Graphics Standard

Monday, Intermediate

Course Description

The Computer Graphics Interface (CGI) provides a 2D, device-independent foundation level standard for designing graphics devices and interfacing them with graphics packages and other graphics standards such as GKS, PHIGS and CGM. Lecturers present CGI procedural bindings and data encodings, a reference model showing various configurations in which the CGI can occur, and the use of the CGI as a system level interface. They emphasize the graphic object pipeline, compound primitives, segments, input functions, and raster functions.

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

15

Fractals: Analysis and Modeling

Monday, Intermediate

Course Description

Covers basic principles and applications of fractals, supported by video animations and live demonstrations. Its goal is to present the theoretical foundations of fractals from the computer graphics point of view, their algorithmic generation and their uses in modeling, including many new state-of-the-art algorithms. Topics include random fractals, dynamical systems and fractals, and modeling.

Chair

Dietmar Saupe
Universität Bremen

Lecturers

Heinz-Otto Peitgen
Universität Bremen

Przemyslaw Prusinkiewicz
University of Regina

Dietmar Saupe
Universität Bremen

16

Introduction to Window Management

Monday, Intermediate

Course Description

This course is intended to provide a basis for the understanding of window management systems and uses this basis to illustrate the tradeoffs and solutions in implementing currently available systems.

The course begins with the presentation of a general model for window management systems, grouping various window management systems components into kernel and user components. Both the kernel and the user components are discussed, using examples from current industry practice. It covers component selection, design, and implementation.

Chair

Jonathan E. Steinhart
Independent Consultant

Lecturers

Mark Callow
Silicon Graphics Computer Systems
Richard J. Greco
Intel Scientific Computers
Robert Reed
Independent Consultant
Jonathan E. Steinhart
Independent Consultant

17

Computer Graphics in Visual Effects

Tuesday, Intermediate

Course Description

The presence of computer graphics in visual effects has increased dramatically. This course introduces the use of computer graphics in filmmaking. Topics include the visual effects process, problems working with film, and computer graphics applications in feature films. Speakers cover the technical details of their work and explain the concerns of production which guide the decision-making process. Examples are presented from *The Abyss, Back to the Future II, The Hunt for Red October* and *Indiana Jones and the Last Crusade.*

Co-Chairs

Scott E. Anderson
Industrial Light & Magic

Jonathan P. Luskin
Industrial Light & Magic

Lecturers

Scott E. Anderson
Industrial Light & Magic

Lincoln Hu
Industrial Light & Magic

Douglas S. Kay
Industrial Light & Magic

Jonathan P. Luskin
Industrial Light & Magic

Dennis Muren
Industrial Light & Magic

18

The RenderMan Interface and Shading Language

Tuesday, Intermediate

Course Description

The RenderMan Interface is a 3D scene description interface for realistic image synthesis. This course explores both the geometric modeling interface, for describing the shapes and positions of objects in a scene, and the Shading Language, for describing appearance characteristics of those objects. Rendering algorithms and renderer implementations are not discussed; rather, the use of interface features is described. Many useful Shading Language techniques are demonstrated, examining several examples of successful images and animations which made extensive use of RenderMan and the Shading Language.

Chair

Tony Apodaca
Pixar

Lecturers

Tony Apodaca
Pixar
Phil Beffrey
Digital Arts
Mark Dippe
Industrial Light & Magic
Pat Hanrahan
Princeton University
Darwyn Peachey
Pixar
Steve Upstill
Pixar

19

X3D-PEX (PEX): Three-Dimensional Graphics in a Distributed Window System

Tuesday, Intermediate

Course Description

X3D-PEX (PEX) is an emerging multi-vendor supported protocol extension to the X Window System for the rendering of PHIGS and PHIGS-PLUS 3D graphics within windows in a distributed environment. PEX also allows developers to take advantage of advanced graphics by using a standard application programming interface such as PHIGS. This course covers the evolution and architecture of PEX, explores the impact PEX use might have on application environments, and investigates important considerations for application and graphics-system implementers.

Chair

Marty Hess
Sun Microsystems, Inc.

Lecturers

Marty Hess
Sun Microsystems, Inc.

Dave Plunkett
Solbourne Computer, Inc.

Randi Rost
Digital Equipment Corp.

Jeff Stevenson
Hewlett-Packard Co.

20

The PostScript Page Description Language

Tuesday, Intermediate

Course Description

Introduces the PostScript page description language— a powerful, programmable interface to imaging systems used for both printer and screen graphics. Begins with defining the role PostScript plays in an imaging system, and then explains the PostScript imaging model used by PostScript and language features. Covers uses of the PostScript language as a graphics exchange format, and newer developments such as Display PostScript and color extensions. Allows the attendee with a programming background to leave with a working knowledge of PostScript.

Chair

Leo Hourvitz
NeXT, Inc.

Lecturers

Ken Anderson
Adobe Systems Inc.

Linda Gass
Adobe Systems Inc.

Leo Hourvitz
NeXT, Inc.

John F. Sherman
University of Notre Dame

21

Radiosity

Tuesday, Intermediate

Course Description

Describes radiosity algorithms and how they have evolved in computer graphics. The radiosity method, based on thermal engineering principles, simulates global illumination phenomena, such as indirect lighting, shadows, color-bleeding, and surface interreflections. This view-independent approach is particularly applicable to diffuse environments, but has recently been extended to incorporate specular surfaces and scattering. Due to new progressive refinement approaches, the technique is now practical for the rapid generation of high-quality images of complex environments. Descriptions of all pertinent algorithms and their limitations are presented.

Chair

Donald P. Greenberg
Cornell University

Lecturers

Michael F. Cohen
University of Utah

Donald P. Greenberg
Cornell University

Roy A. Hall
Cornell University

Holly E. Rushmeier
Georgia Institute of Technology

John R. Wallace
3D/EYE Inc.

Greg Ward
Lawrence Berkeley Laboratory

22

Video Technology for Computer Graphics

Tuesday, Intermediate

Course Description

This course gives computer graphics professionals a thorough understanding of the practical applications and theory of video technology. It begins with scanning theory, describing the monochrome video signal, the NTSC color video signal, color encoding techniques, and signal measurement. It reviews all current video formats including D-1/D-2 digital video and HDTV. It continues with contemporary video production and post-production techniques, including video special effects hardware, combining CGI with live action. Lecturers present criteria for evaluating 3D graphics systems and a quantitative approach to analyzing 3D animation systems.

Chair

Dean Winkler
Post Perfect Inc.

Lecturer

Dean Winkler
Post Perfect Inc.

23

Modeling and Animating with Implicit Surfaces

Tuesday, Intermediate

Course Description

This course introduces designers and computer graphics system builders to implicit surfaces, showing advantages and disadvantages relative to more conventional modeling techniques. Researchers from academia and industry introduce the basic concepts of implicit surfaces, discuss how such surfaces are useful, present techniques for the building, animating and realizing of these surfaces, and discuss their current research results.

Co-Chairs

Brian Wyvill
University of Calgary
Jules Bloomenthal
Xerox PARC

Lecturers

Thad Beier
Pacific Data Images
Jim Blinn
California Institute of Technology
Jules Bloomenthal
Xerox PARC
Alyn Rockwood
Silicon Graphics Computer Systems
Brian Wyvill
University of Calgary
Geoff Wyvill
University of Otago

24

Advanced Topics in Ray Tracing

Monday, Advanced

Course Description

This course details color phenomena and photometry, offering a more complete understanding of the basic ray tracing algorithm and its limitations. It provides attendees an understanding of ray tracing assumptions and allows attendees to appropriately apply ray tracing and understand its theoretical limits.

Lecturers bring attendees up to date on the frontiers of ray tracing research, discussing the combination of ray tracing and radiosity. They show the power and use of ray tracing for purposes other than direct image synthesis, and discuss modeling and animation techniques that use ray tracing mechanisms in non-obvious ways to achieve surprising results, and discuss the frontiers of ray tracing.

Chair

Andrew Glassner
Xerox PARC

Lecturers

Jim Arvo
Hewlett-Packard/Apollo Computer

Andrew Glassner
Xerox PARC

Roy Hall
Cornell University

Jim Kajiya
California Institute of Technology

Don Mitchell
AT&T Bell Laboratories

John Wallace
3D/EYE Inc.

25

Unifying Parametric and Implicit Surface Representations for Computer Graphics

Tuesday, Advanced

Course Description

One effective way to represent or render a complex surface is by using polynomials or ratios of polynomials. Two approaches for incorporating this idea are parametric and implicit surface representations, each suited to certain types of problems. This course compares, contrasts, and unifies these approaches with an emphasis on the Bernstein/Bézier representation. The course begins with a brief description of both representations and applies material to three fundamental problems, namely piecewise surface generation, rendering techniques and algorithms to convert between parametric and implicit representations. Presenters cover both the basics as well as recent research insights and results.

Chair

Brian A. Barsky
University of California at Berkeley

Lecturers

Chanderjit Bajaj
Purdue University

Brian A. Barsky
University of California, Berkeley

Tony DeRose
University of Washington

Christoph M. Hoffmann
Purdue University

Joe Warren
Rice University

26

State of the Art in Facial Animation

Tuesday, Advanced

Course Description

This course offers a state-of-the-art presentation on facial modeling and animation which includes data sources, modeling techniques, animation approaches, parameterized expression models, dynamic physical simulation, speech synchronization, and interactive real-time "performance" systems. This is an updated version of the course offered at SIGGRAPH '89.

Chair

Frederic I. Parke
NYIT Computer Graphics Laboratory

Lecturers

Brad deGraf
deGraf/Wahrman

Matt Elson
Symbolics

Frederic I. Parke
NYIT Computer Graphics Laboratory

Bill Reeves
Pixar

Keith Waters
Schlumberger Laboratory of Computer Science

Lance Williams
Apple Computer, Inc.

Brian Wyvill
University of Calgary

27

State of the Art in Data Visualization

Tuesday, Advanced

Course Description

Active participants in data visualization relay the latest research, ideas, and experiences. Each speaker appears more briefly in favor of providing exposure to a larger number of different views, keeping the discussion focused on the truly latest and state-of-the-art work.

Course also discusses the latest technical details of visualization research in-depth. A unique opportunity to hear ideas and experiences that are not ready for, or are usually omitted from, formal publication. No representation of earlier papers or 1989 technical session topic repeats.

Chair

Mark Smith
Cognivision, Inc.

Lecturers

Matthew Arrott
University of Illinois, Urbana-Champaign

Todd Elvins
San Diego Supercomputer Center

Larry Gelberg
Stardent Computer, Inc.

George Grinstein
University of Lowell

Arie Kaufman
SUNY at Stony Brook

Rainald Loehner
The George Washington University

Hikmet Senay
The George Washington University

Mark Smith
Cognivision, Inc.

28

Parallel Algorithms and Architectures for 3D Image Generation

Tuesday, Advanced

Course Description

This course highlights several ongoing research areas within parallel graphics display algorithms and elaborates on the radiosity approach and polygon rendering algorithms. It discusses parallel programming techniques as related to graphics algorithms to provide knowledge of the various issues involved. Principal designers of several graphics workstation architectures present their design philosophy, discuss the field in general, and expand upon future architectures. They discuss how these techniques are used in commercial products and determine the feasibility of true real-time 3D graphics at the workstation level.

Chair

Scott Whitman
The Ohio State University

Lecturers

Kurt Akeley
Silicon Graphics Computer Systems

Dan Baum
Silicon Graphics Computer Systems

Wm. Leler
Independent Consultant

Doug Voorhies
Apollo/HP

Scott Whitman
The Ohio State University

Papers and Panels-at-a-Glance

Day	Time	Dallas Convention Center Arena
Wednesday	9:00-10:30	Opening Session
	10:45-12:30	Papers: Dynamics
	1:45-3:15	Papers: Rendering
	3:30-5:00	Papers: Object Space Methods
Thursday	9:00-10:30	Papers: Radiosity
	10:45-12:30	Papers: Interaction
	1:45-3:15	Papers: Non Photo Realistic Rendering
	3:30-5:00	Papers: Animation
Friday	9:00-10:30	Papers: Lighting and Shading
	10:45-12:30	Papers: Hardware
	1:45-3:15	Papers: Surfaces and Volumes
	3:30-5:00	Papers: Pools, Puddles, Stones, Waterfalls, and Fire

Dallas Convention Center Theater	Dallas Convention Center East Ballroom C-D
Panel: Grand Challenges of Computational Science	
Panel: Interface and New Interactive Systems	Panel: Using Photo-graphic-Quality Images In Desktop Applications
Panel: Multimedia Document Architecture	Special Session: SIGGRAPH Bowl
Panel: Beyond Scientific Visualization: Mapping Information	Panel: Interactive Art and Artificial Reality
Panel: Hand Tools or Head Tools?	Panel: New Methods, New Art Forms: 3D Applications in Sculpture
Special Session: "Hip, Hype, and Hope—The Three Faces of Virtual Worlds"	
Special Session: "Hip, Hype, and Hope—The Three Faces of Virtual Worlds" (continued)	
Panel: What is Happening on the Hill?	Panel: Getting it Off the Screen and Onto Paper: Current Accomplishments and Future Goals
Panel: Visualization Technologies as a Tool for Science Education	Panel: The State of the Animation Industry
	Panel: Color Portability—Reality in the '90s
	Panel: Digital Publication: Status, Opportunities and Problems

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 offer techniques and tools for attendees in all areas of computer graphics.

SIGGRAPH '90 received a record number of paper submissions. 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.*

Panels

Panel sessions—held concurrently with paper sessions—offer attendees an alternative 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, multimedia, interactive techniques, emerging concepts in hardware and software, and new applications in science, industry, and the arts. All sessions are recorded and transcribed for distribution to attendees after the conference.

Paper sessions are offered in parallel with panel sessions Wednesday through Friday, August 8-10, in the Dallas Convention Center. 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 Science Place 1, Fair Park from 8 to 11 p.m. (See social functions on page 12 for details.)

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

Opening Session
Dallas Convention Center Arena

SIGGRAPH '90 Welcome
David D. Loendorf
Jacqueline M. Wollner
SIGGRAPH '90 Co-Chairs

SIGGRAPH Report
James J. Thomas
SIGGRAPH Chair

1990 SIGGRAPH Award
Presented by Bertram Herzog

Computer Graphics Achievement Award
Recipients:
Richard Shoup
Alvy Ray Smith

Guest Speaker
Innovations in Publishing SIGGRAPH Materials
Richard J. Beach
SIGGRAPH Editor-in-Chief

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

Papers: Dynamics
Dallas Convention Center Arena

Chair
Jane Wilhelms
University of California at Santa Cruz

Curved Surfaces and Coherence for Non-penetrating Rigid Body Simulation
David Baraff
Cornell University

Dynamic Simulation of Autonomous Legged Locomotion
Michael A. McKenna and David Zeltzer
MIT

Geometric Collisions for Time-Dependent Parametric Surfaces
Brian Von Herzen, Alan H. Barr and Harold R. Zatz
California Institute of Technology

Rapid, Stable Fluid Dynamics for Computer Graphics
Michael Kass and Gavin Miller
Apple Computer, Inc.

Panel: Grand Challenges of Computational Science
Dallas Convention Center Theater

There has been a massive expansion in the computational infrastructure supporting scientific research in the last five years. Today tens of thousands of researchers have access from their desktop computers to supercomputer centers over the national network. Scientific visualization has arisen as a critical tool of discovery, analysis and communication; fundamental research problems with economic or scientific impact are being attacked.

Leading researchers discuss how advanced computing and visualization resources are used to advance knowledge on these problems in university, industrial, and governmental research centers. They explain the White House's High Performance Computing Program, a $500 million annual program for computer and technology research and development.

Chair
Larry Smarr
NCSA

Panelists
Gregory McRae
Carnegie Mellon University
Arthur Freeman
Northwestern University
David Dixon
E. I. Du Pont De Nemours & Co.
Eric Lander
MIT

WEDNESDAY, 1:45 P.M.-3:15 P.M.

Papers: Rendering
Dallas Convention Center Arena

Chair
Jim Blinn
California Institute of Technology

Cone-Spheres
Nelson Max
Hikari Kinema and Lawrence Livermore National Laboratory

Particle Transport and Image Synthesis
James Arvo
Apollo Systems Division of Hewlett-Packard
David Kirk
California Institute of Technology

Rendering CSG Models with a ZZ-Buffer
David Salesin
Stanford University
Jorge Stolfi
DEC Systems Research Center

Antialiasing of Interlaced Video Animation
John Amanatides and Don P. Mitchell
AT&T Bell Laboratories

Panel: Interface and New Interactive Systems
Dallas Convention Center Theater

Developments in theory, technology, the marketplace, and business suggest that we are entering a period of accelerating growth in the variety and pervasiveness of interactive products. Integrated medium technology platforms are emerging in entertainment, design, engineering, manufacturing, and education. Delivery systems range from television screens to bodysuits.

In the world of "traditional" computers, user-interface design has become a discipline with established, sometimes contradictory, theory and design principles. These new interactive technologies underline the need to develop and extend the domain of user-interface design. Panelists identify and discuss key interface issues for new media and technologies.

Chair
Brenda Laurel
Interactivist

Panelists
David Nagel
Apple Computer, Inc.
Chris Schmandt
MIT Media Lab
Michael Naimark
Independent Media Artist and Researcher
Douglas Crockford
Lucasfilm Games, a Division of LucasArts Entertainment

Panel: Using Photographic-Quality Images in Desktop Applications

Dallas Convention Center, East Ballroom C-D

PC technology and applications have advanced significantly, but they are still primitive compared to professional publishing. Ordinary desktop computers cannot use photographic-quality images due to bandwidth constraints; quality is sacrificed because the computer cannot process and manipulate complex images. Today, new technology eliminates these barriers and enables desktop computers to use high-quality, true-color images.

Making photographic-quality images part of ordinary computers enhances and creates a new class of applications. This panel addresses hardware and software advances that remove the technical barriers to 24-bit color images, including compression, printer and board technologies. It discusses new ways to integrate photographic-quality color images into desktop applications.

Chair
Jim Rafferty
C-Cube MicroSystems

Panelists
Dan Putman
Adobe Software
Mike Templeman
Aldus Corporation
Andrew Singer
Radius, Inc.

WEDNESDAY, 3:30 P.M.-5:00 P.M.

Papers: Object Space Methods
Dallas Convention Center Arena

Chair
Tom Sederberg
Brigham Young University

Parallel Object-Space Hidden Surface Removal
Wm. Randolph Franklin and Mohan S. Kankanhalli
Rensselaer Polytechnic Institute

Hidden Curve Removal for Free Form Surfaces
Gershon Elber and Elaine Cohen
University of Utah

Using Tolerances to Guarantee Valid Polyhedral Modeling Results
Mark Segal
Silicon Graphics Computer Systems

Merging BSP Trees Yields Polyhedral Set Operations
Bruce Naylor
AT&T Bell Laboratories
John Amanatides
York University
William Thibault
California State University at Hayward

Panel: Multimedia Document Architecture
Dallas Convention Center Theater

Multimedia information systems capable of managing combined text, graphics, still images, audio, and video are leaving the laboratory to enter the mainstream of information technology. An important level of organization for information handled by such systems is the multimedia document, which provides a means for packaging and coordinating related objects of different media types. Furthermore, multimedia document architecture is a fundamental model for representing the structure, content, and presentation characteristics of multimedia documents.

However, most existing architectures are unique—designed specifically for the systems that use them—and do not permit easily exchanged information. This panel addresses some of the current problems associated with multimedia document architectures and important issues of the future.

Chair
Stephen Bulick
U.S. West Advanced Technologies

Panelists
Terry Crowley
Bolt, Berenek, and Newman
Lester Ludwig
Bell Communications Research
Jonathan Rosenberg
Bellcore

Special Session: SIGGRAPH Bowl

Dallas Convention Center, East Ballroom C-D

Test your knowledge about the history of computer graphics research and the SIGGRAPH conference by participating as a member of the "SIGGRAPH Bowl!"

A spinoff of the famous televised College Bowl, invited teams representing leading universities and graphics companies will test their knowledge of SIGGRAPH history.

Participants identify quotes from important SIGGRAPH papers, recognize rendered images and film show animations of past years, and answer trivia questions about events, trends, and personalities of past SIGGRAPH conferences.

Co-Chairs
Tomas Porter
Pixar
Pat Hanrahan
Princeton University

Masters of Ceremony
Jim Blinn
California Institute of Technology
Nick England
Sun Microsystems
Rob Pike
AT&T Bell Laboratories

THURSDAY, 9:00 A.M.-10:30 A.M.

Papers: Radiosity

Dallas Convention Center Arena

Chair
Don Greenberg
Cornell University

An Efficient Radiosity Solution for Bump Texture Generation
Hong Chen and En-Hua Wu
Institute of Software, Academia Sinica

Incremental Radiosity: An Extension of Progressive Radiosity to an Interactive Image Synthesis System
Shenchang Eric Chen
Apple Computer, Inc.

Adaptive Radiosity Textures for Bidirectional Ray Tracing
Paul S. Heckbert
University of California at Berkeley

Adaptive Mesh Generation for Global Diffuse Illumination
A.T. Campbell and Donald Fussell
University of Texas at Austin

Panel: Beyond Scientific Visualization: Mapping Information

Dallas Convention Center Theater

The term "scientific visualization" conjures up mental images of molecules reacting or velocity vectors whizzing around. Yet, visualization is migrating beyond the scientific domain because it maps not only numerical, but all data into visual representations.

This panel compares several visualization methodologies and how they have employed advanced computer graphics to map abstract information into meaningful animations and interactive software. Panelists demonstrate how they have organized abstract data or concepts using spatial, quantitative, dynamic, and symbolic techniques to visually communicate maximum information. Examples from linguistics, humanities, education, statistics, engineering, and science are presented.

Chair
Donna J. Cox
NCSA

Panelists
Jim Blinn
California Institute of Technology
Richard Ellson
Eastman Kodak Company
Helga M. Leonardt Hendriks
The Leonhardt Language System

Panel: Interactive Art and Artificial Reality

Dallas Convention Center, East Ballroom C-D

This panel focuses on and addresses the distinctions made between computer art, interactive art, and artificial and virtual realities. Panelists consider how the computer, as a symbol-manipulating, all-purpose machine, is a tool that changes the way art is created and experienced. Panelists argue that this view implies interactivity and possibly trivializes static paintbox computer art by changing the viewer's role from passive observer to active participant. Interactivity is discussed as a step toward artificial or virtual realities and a means to define new possibilities in real-time performance.

Chair
Gregory P. Garvey
The New England School of Art and Design/Northeastern University

Panelists
Myron Krueger
Independent Consultant
Ed Tannenbaum
Independent Artist
Don Ritter
Concordia University
Lillian Schwartz
AT&T Laboratories

Thursday, 10:45 A.M.-12:30 P.M.

Papers: Interaction

Dallas Convention Center Arena

Chair
Richard J. Beach
Xerox PARC

Artificial Reality with Force-Feedback: Development of Desktop Virtual Space with Compact Master Manipulator
Hiroo Iwata
The University of Tsukuba

Rapid Controlled Movement Through a Virtual 3D Workspace
Jock D. Mackinlay, Stuart K. Card, and George G. Robertson
Xerox PARC

Project GROPE—Haptic Displays for Scientific Visualization
Frederick P. Brooks and James J. Batter
University of North Carolina at Chapel Hill
Ming Ouh-Young
AT&T Bell Laboratories
P. Jerome Kilpatrick
IBM Corporation

Extended Free-Form Deformation: A Sculpturing Tool for 3D Geometric Modeling
Sabine Coquillart
Institut National de Recherche en Informatique et en Automatique

Panel: Hand Tools or Head Tools?

Dallas Convention Center Theater

Designers in large-firms use computers where production as well as concept is an important part of the budget. In comparison, small firms where services like typesetting have often been done outside the firm, use computer tools less widely.

In effect, designers have been offered tools for production "tools for the hand"—whereas "tools for the head" would enable them to design better, rather than simply allowing them to produce work faster. This panel discusses the effects of the present generation of computer tools, the organization's approach to working, and the design process. It considers how universities, design firms, and hardware and software manufacturers might work together to develop design

tools of the future so computers can be used to their full potential.

Chair
Robin Baker
Royal College of Art

Panelists
Alison Black
Reading University
Gillian Crampton Smith
Royal College of Art
Bill Verplank
ID Two
Marc Canter
MacroMind

Panel: New Methods, New Artforms: 3D Applications in Sculpture

Dallas Convention Center, East Ballroom C-D

Many artists use computer modeling and animation tools for creating, editing, and presenting sculptural works. Some artists design for the 3D virtual space—others use computers to control 3D output devices to create holograms and other illusory 3D environmental works. Stereolithography and other new technologies offer artists output devices to enhance, extend, and enrich 3D visual communication.

Panelists discuss the effect computers have in the development of new artforms and their views on potential directions, including collaborative works, inter-disciplinary and cross-disciplinary projects, and curriculum revisions in sculpture education.

Chair
Barbara Mones-Hattal
George Mason University

Panelists
Ken Snelson
Independent Sculptor
Rita Starpattern
Art in Public Places, City of Austin
Sally Weber
Independent Artist
Charles Csuri
The Ohio State University
Tony Longson
California State University, Los Angeles

THURSDAY, 1:45 P.M.-3:15 P.M.

Papers: Non Photo Realistic Rendering
Dallas Convention Center Arena

Chair
Robert L. Cook
Light Source Computer Images, Inc.

Comprehensible Rendering of 3D Shapes
Takafumi Saito and Tokiichiro Takahashi
NTT Human Interface Laboratories

Paint By Numbers: Abstract Image Representations
Paul Haeberli
Silicon Graphics Computer Systems

Direct WYSIWYG Painting and Texturing on 3D Shapes
Pat Hanrahan
Princeton University
Paul Haeberli
Silicon Graphics Computer Systems

Special Session: "Hip, Hype and Hope—The Three Faces of Virtual Worlds"

Dallas Convention Center Theater

By now, almost everyone in computer graphics has read, seen, or experienced virtual worlds—"artificial realities" generated by computers which surround the user. Virtual-world systems are the focus of the media, grist for the TV mill, and everyone's pick as "The Big Idea of the 90s." But what does it all mean? Is virtual-worlds technology really that important? Panelists address the artificial reality controversy and suggest the future of professional and personal computer use.

Chair

Bob Jacobson
University of Washington

Panelists

John Barlow
Author and Songwriter

Nolan Bushnell
Aaps, Inc.

Esther Dyson
Editor, Release 1.0, Analyst

Timothy Leary
University of Pittsburgh

Tom Furness
Human Interface Technology Lab

Warren Robinette
University of North Carolina

Randall Walser
Autodesk

Thursday, 3:30 p.m.-5:00 p.m.

Papers: Animation
Dallas Convention Center Arena

Chair
Loren Carpenter
Pixar

Reusable Motion Synthesis Using State-Space Controllers
Michael van de Panne, Eugene Fiume, and Zvonko Vranesic
University of Toronto

Electronic Mask Technology
Lance Williams
Apple Computer, Inc.

Fast Animation and Control of Nonrigid Structures
Andrew Witkin and William Welch
Carnegie Mellon University

Strength Guided Motion
Philip Lee, Susanna Wei, Jianmin Zhao, and Norman I. Badler
University of Pennsylvania

Special Session: "Hip, Hype and Hope—The Three Faces of Virtual Worlds"
Dallas Convention Center Theater

This session is a continuation of the special session beginning at 1:45 p.m. on Thursday. Refer to description on page 61 for more information.

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

Papers: Lighting and Shading
Dallas Convention Center Arena

Chair
Ed Catmull
Pixar

Accurate Rendering Technique Based on Colormetric Conception
Atsushi Takagi, Hitoshi Takaoka, Tetsuya Ohshima and Yoshinori Ogata
Toyota Motor Corporation

A Model for Anisotropic Reflection
Alain Fournier and Pierre Poulin
University of British Columbia

Building Block Shaders
Gregory D. Abram and Turner Whitted
Numerical Design Ltd.

A Language for Shading and Lighting Calculations
Pat Hanrahan
Princeton University
Jim Lawson
Pixar

Panel: What is Happening on the Hill?
Dallas Convention Center Theater

This panel provides important information on public policies affecting computer graphics research grants and helps prepare for future directions. Panelists present public policies having both beneficial and not-so-beneficial ramifications. For example, the "High Performance Computing Initiative," concerns technology industrial incentives trends, the objectives and priorities of funding agencies such as the National Science Foundation and National Endowment for the Arts, as well as trends in technology grants and incentives from the private sector. The primary goal of this panel is to increase SIGGRAPH awareness about decisions being made on Capitol Hill that directly affect future research funds.

Chair
Donna J. Cox
NCSA

Panelists
Larry Smarr
NCSA
Jacob Maizel Jr.
The Laboratory Mathematical Biology, NCI
Rich Hirsh
National Science Foundation

Panel: Getting it Off the Screen and Onto Paper: Current Accomplishments and Future Goals

Dallas Convention Center, East Ballroom C-D

Obtaining satisfactory hardcopy of an image displayed on a color monitor has been the elusive holy grail of computer graphic color reproduction work. Progress has been made in applying the color science principles to this problem, with products now available to provide a colorimetric match between the CRT image and the reflection print produced by the hardcopy device. Further improvement of such equipment will require that designs consider additional aspects of human color perception, such as color adaptation and color contrast. This panel reviews the current state of research and development, discusses problems, and shows how this work is important to other areas of computer graphics.

Chair
Gary W. Meyer
University of Oregon

Panelists
Ricardo J. Motta
Hewlett-Packard Laboratories
Gerald M. Murch
Tektronix Laboratories
Maureen C. Stone
Xerox PARC

FRIDAY, 10:45 A.M.-12:30 P.M.

Papers: Hardware

Dallas Convention Center Arena

Chair
Nick England
Sun Microsystems

The Rendering Architecture of the DN10000VS
Douglas Voorhies and David Kirk
Apollo Systems Division of Hewlett-Packard

The Accumulation Buffer: Hardware Support for High-Quality Rendering
Paul Haeberli and Kurt Akeley
Silicon Graphics Computer Systems

High Speed High Quality Antialiased Vector Generation
Anthony C. Barkans
Hewlett-Packard Company

Real-Time Robot Motion Planning Using Rasterizing Computer Graphics Hardware
Jed Lengyel, Mark Reichert, Bruce R. Donald, and Donald P. Greenberg
Cornell University

Panel: Visualization Technologies as a Tool for Science Education

Dallas Convention Center Theater

Most U.S. high school graduates are technologically illiterate, whether the subject be genetic engineering, computing technology or the large-scale structure of the universe. But the problem is less technological than societal. We conjecture that if teenagers are bright enough to use the technology of arcade games, VCRs, electronic music and laser disks, they can simulate and visualize physical phenomena with the proper tools.

Panelists explore this problem from technological and implementation perspectives: Which visualization technologies are available to teachers and students? How can we incorporate visualization technologies into base science and math curricula?

Chair
Robert Sherman Wolff
Apple Computer, Inc.

Panelists
Thomas A. DeFanti
University of Illinois at Chicago
H. Eugene Stanley
Boston University
Larry Yaeger
Apple Computer, Inc.
Paul Hickman
Belmont High School

Panel: The State of the Animation Industry

Dallas Convention Center, East Ballroom C-D

A few years have passed since the great depression of computer graphics animation companies. New companies formed, a few survived, and the industry seems to be back on its feet. What have we learned from our experience? What will the future bring?

Panelists discuss their company's direction, current projects, their goals and views of the future.

Chair
Carl Rosendahl
Pacific Data Images, Inc.

Panelists
Charlie Gibson
Rhythm & Hues
Michael Wahrman
deGraf/Wahrman, Inc.
Ralph Guggenheim
Pixar
Xavier Nicolas
ExMachina

FRIDAY, 1:45 P.M.-3:15 P.M.

Papers: Surfaces and Volumes
Dallas Convention Center Arena

Chair
Turner Whitted
Numerical Design, Ltd.

Ray Tracing Trimmed Rational Surface Patches
Tomoyuki Nishita
Fukuyama University
Thomas W. Sederberg and Masanori Kakimoto
Brigham Young University

Generalized B-Spline Surfaces of Arbitrary Topology
Charles Loop and Tony DeRose
University of Washington

Rendering and Animation of Gaseous Phenomena by Combining Fast Volume and Scanline A-Buffer Techniques
David S. Ebert and Richard S. Parent
The Ohio State University

Footprint Evaluation for Volume Rendering
Lee Westover
Numerical Design Ltd.

Panel: Color Portability—Reality in the '90s
Dallas Convention Center, East Ballroom C-D

Will the high-quality color found in commercial prepress systems be available at the desktop publishing level? Some say it's impossible; others say it isn't. Panelists address issues such as coordinating the wide range of input, output, and display devices for color computing; bringing high-quality color to the desktop with minimal memory; accommodating the variability of input/output; and using multi-vendor systems. They discuss issues regarding printers and processing, and calibrating hardware devices, and color in relation to printing and imaging.

Chair
Efraim Arazi
Electronics for Imaging

Panelists
John D. Meyer
Hewlett-Packard Lab
James A. Kasson
IBM Almaden Research Center

Friday, 3:30 p.m.-5:00 p.m.

Papers: Pools, Puddles, Stones, Waterfalls and Fire
Dallas Convention Center Arena

Chair
Pat Hanrahan
Princeton University

Light-Water Interaction using Backward Beam Tracing
Mark Watt
Digital Pictures

A Method of Generating Stone Wall Patterns
Kazunori Miyata
IBM Research, Tokyo Research Laboratory

A Lighting Model Aiming at Drive Simulators
Eihachiro Nakamae, Kazufumi Kaneda, and Takashi Okamoto
Hiroshima University
Tomoyuko Nishita
Fukuyama University

Particle Animation and Rendering Using Data Parallel Computation
Karl Sims
Optomystic

Panel: Digital Publication: Status, Opportunities and Problems

Dallas Convention Center, East Ballroom C-D

Digital publications are a reality. High-resolution workstation displays and low-cost mass storage systems create an electronic reading environment that exceeds the capabilities of traditional printed publications. Digital publications include text, line art, still images, and also include sound, video sequences and animations.

However, while the opportunities for digital publication are great, there are many associated problems. This panel addresses the current status of digital publications, its opportunities, problems (such as lack of standards), centralized document database development, documents to workstation distribution, and appropriate user interfaces.

Chair

Dick Phillips
Los Alamos National Laboratory

Panelists

Michael Lesk
Bellcore

Michael Hawley
MIT Media Laboratory

Andries van Dam
Brown University

Richard J. Beach
Xerox PARC

Educators Seminar

Education for Visualization
Dallas Convention Center, East Ballroom C-D
Sunday, August 5
2-6 p.m.

Visualization in science and mathematics is an increasingly important application which requires techniques and skills beyond those normally taught in computer graphics courses. It is a method of enhancing the communication of information, particularly multi-dimensional information, using visual techniques. It entails image synthesis and image understanding, and encompasses techniques in computer graphics, art, design, and the particular data domain. This seminar discusses the techniques, skills and methods necessary for teaching them to students and professionals.

Educators from a range of fields present their experiences in educating undergraduates and research professionals.

Registration is open to anyone with an interest in visualization education.

Co-Chairs
Stephen Cunningham
California State University, Stanislaus
G. Scott Owen
Georgia State University

Lecturers
Brian Cabral
Lawrence Livermore National Laboratories
Thomas A. DeFanti
University of Illinois at Chicago
Sylvie Rueff
California Institute of Technology
Nan Schaller
Rochester Institute of Technology

Fundamentals Seminar

Terminology and First Principles of Computer Graphics

Dallas Convention Center Theater
Sunday, August 5
2-5 p.m.

Again in 1990, SIGGRAPH is hosting a seminar for those who wish to learn about the basic terminology of computer graphics, the salient features of graphics hardware and the software needed to control the hardware.

Graphics hardware is presented in terms of its relation to application needs. Graphics software is discussed from a conceptual viewpoint, rather than in terms of implementation. Generic operations, such as line-drawing, text display, area filling, and geometric transformations, are described without using programming. Particular emphasis is placed on the relationship between software techniques and applications such as engineering design, presentation graphics, CAD, graphic design, fine arts, business, statistics, simulation, and data visualization.

All attendees will be admitted; there is no additional charge.

Chair
R. Daniel Bergeron
University of New Hampshire

Lecturer
R. Daniel Bergeron
University of New Hampshire

WORKSHOPS

Four workshop topics have been selected for one- and two-day small, working group meetings during SIGGRAPH '90. Each workshop is organized around a timely topic and is a discussion of work in progress by people actively pursuing the topic at their jobs or institutions.

To protect the working group flavor, attendance was pre-selected and limited to 15 people. Participants submitted a position statement to the workshop organizer for acceptance.

To provide you with the workshop results:

Special interest group meetings are open to all conference attendees to provide the earliest information about each workshop topic. (See pages 79 to 84.)

A written report on each workshop will be included in a 1991 issue of *Computer Graphics*.

The *SIGGRAPH Video Review* will also contain video sequences from each workshop.

Art Show

Digital Image—Digital Cinema

The SIGGRAPH '90 art show is an international exhibition of computer art which features works created by using the computer in a variety of ways. A jury selects works from thousands of submissions received from artists worldwide and looks for those which demonstrate aesthetic quality and a significant use of the computer. Special attention is given to works which could only have been created on a computer.

The exhibition includes two-dimensional works, sculptures, and computer installations. In some cases, the computer is used in the dynamic generation of the work. In other cases, the computer involves the viewer in interaction with the work or contributes to the presentation environment. Animations and other works on videotapes are selected for the art show in collaboration with the film and video theater jury.

The SIGGRAPH '90 art show is held Monday-Thursday, August 6-9 from 9 a.m.-7 p.m. and Friday, August 10 from 9 a.m.-2 p.m. in East Ballroom A of the Dallas Convention Center.

In addition, a free SIGGRAPH-sponsored exhibition entitled *Digital Image-Digital Photography* is open to the public at the nearby J. Erik Jonsson Central Library Gallery in Dallas from July 26-October 7. Gallery hours are: Monday-Friday, 9 a.m.-9 p.m., Saturday, 9 a.m.-5 p.m., and Sunday, 1-5 p.m. The exhibition, curated by Susan Kirchman, features examples of digital imagery which use photographs as the original source material.

Admission to the art show and one copy of the art show catalog—entitled *Digital Image-Digital Cinema*—are included with courses and papers/panels registration. This year's catalog is once again co-published with *Leonardo,* the journal of the International Society for the Arts, Sciences and Technology. It features juried essays on computer art, as well as high-quality reproductions of select work from the exhibition.

Exhibits registrants are also admitted to the art show, but will not receive a catalog. Art show catalogs can be purchased at the merchandise desk in the registration area of the Dallas Convention Center.

Film and Video Theater

The film and video theater is a highlight of any SIGGRAPH conference, it's the culmination of the year's work in animation. For everyone it's a chance to see the debut of the world's most stunning and sophisticated computer graphics animation. This internationally acclaimed event showcases the year's best work in art, education, science and industry, broadcast, motion pictures, corporate communications, and research. Material for this prestigious event was selected by a jury of experts based on innovation, technical excellence, and audience impact.

There are three showings of the film and video theater in the Dallas Convention Center Arena:

Tuesday, August 7
7:30 to 9:30 p.m.

Wednesday, August 8
7:30 to 9:30 p.m.

Thursday, August 9
7:30 to 9:30 p.m.

A film and video theater catalog and admission to one performance of the film and video theater is included with both courses and papers/panels registration (but not with exhibits registration); only one ticket will be issued per registrant. Additional tickets for all performances are available beginning Tuesday morning at noon, subject to availability. All performances contain the same material.

Animation Screenings

Also judged by jury, the programs in the animation screening areas allow for longer and more specialized selections. Programs are presented in two locations, Monday through Friday in the balcony area above the main entrance and Wednesday through Friday in East Ballroom B of the Dallas Convention Center. Art, entertainment, and scientific visualization are featured. This is an ideal opportunity to review the best of computer graphics in a relaxed atmosphere. A schedule of these programs will be posted in the registration area.

The Open Deck

Video playback systems are available, adjacent to the balcony area above the main entrance of the Dallas Convention Center, to provide a place where individuals can share their material with others. Access is on a first-come, first-served basis.

Hypermedia

SIGGRAPH '90 offers something new to attendees—hypermedia. Hypermedia is a new and important technology that organizes and links computer graphics and desktop publishing with interactive video and sound recordings. This creates an exciting environment that entertains, engages, and educates.

Unlike reading a novel from front to back, in hypermedia you can explore a nonsequential collection of ideas by stepping back and getting an overview, diving in for details, experiencing the sound and images of the real thing on video, and replaying the same thing over and over again at your own pace and in your own style.

The SIGGRAPH '90 hypermedia jury selected the best literature, interactive art pieces, entertainment, educational material, museum installations, and historical retrospectives for display at the conference. Attendees can explore the hypermedia documents by observing, interacting with real examples of this new technology, and experiencing the joy of learning this exciting medium in East Ballroom A of the Dallas Convention Center.

Special Interest Groups

Special interest group meetings are organized around a particular product, topic, or problem. These meetings provide an excellent way for attendees who share a common interest to identify each other and exchange ideas on the topic freely.

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 '90. 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" in the East Exhibit Hall of the Dallas Convention Center.

Sunday, August 5, 1990

ANSI X3H3.6-Window Management
9:00 a.m. - 5:30 p.m.
Dallas Convention Center, Room N222
Georges Grinstein
508-934-3627

Wavefront Users Group
3:00 p.m. - 10:00 p.m.
Dallas Convention Center, Room S414
Rhonda Sanders Olson
602-371-8880

SIGGRAPH Education Committee—Art and Design Section
6:30 p.m. - 9:30 p.m.
Dallas Convention Center, Room W106
Barbara Mones-Hattal
703-620-6210

Monday, August 6, 1990

ANSI X3H3 6-Window Management
9:00 a.m. - 5 30 p.m.
Dallas Convention Center, Room N222
Georges Grinstein
508-934-3627

After-Hours SIG
11 00 p.m. - 4:00 a.m.
Hyatt Regency Dallas, Duncan A&B

Tuesday, August 7, 1990

Digital Pictures, Ad-Hoc Group N15.04/16
9:00 a.m. - 1:00 p.m.
Dallas Convention Center, Room N214
Barry Watts
805-256-4730

AIAA Technical Committee on Interactive Computer Graphics
9:00 a.m. - 4:00 p.m.
Dallas Convention Center, Room N231
Val Watson
415-604-6421

Imax/Omnimax Computer Animation Film Project
10:00 a.m. - 11:30 a.m.
Dallas Convention Center, Room N222
Steven Churchill
619-452-6800

Ex-Evans & Sutherland Employees
6:00 p.m. - 8:00 p.m.
Dallas Convention Center, Room N219
Scott R. Nelson
415-336-3106

After-Hours SIG
11:00 p.m. - 4:00 a.m.
Hyatt Regency Dallas, Duncan A&B

Wednesday, August 8, 1990

Template Graphics Software User's Network (TUN)
8:30 a.m. - 12:30 p.m.
Dallas Convention Center, Room W110
Velva Wood
619-457-5359

Development of Multimedia Applications for the PC Environment
9:00 a.m. - Noon
Dallas Convention Center, Room W113
Lilly Diaz
212-449-2007

Renderman
10:00 a.m. - 11:30 a.m.
Dallas Convention Center, Room N217
Joy Folla
415-258-5100

ASTN/SISEA/TISEA
10:30 a.m. - 12:15 p.m.
Dallas Convention Center, Room W104
Mark Resch
408-745-6270 ext. 263

Workshop Presentation
Teaching Computer Graphics in an Art & Design Environment
10:45 a.m. - 12:30 p.m.
Dallas Convention Center, Room W106
Isaac V. Kerlow
718-636-3489

Computers and Artists
Noon - 1:30 p.m.
Dallas Convention Center, Room W108
Dick Moberg
215-923-3299

SIGGRAPH Education Committee—General Education Meeting
1:00 p.m. - 2:00 p.m.
Hyatt Regency Dallas, Regency Ballroom A
G. Scott Owen
404-651-2245

SIGGRAPH Education Committee—Computer Graphics in Computer Science Education
1:00 p.m. - 2:00 p.m.
Dallas Convention Center, Room W111
Jeffrey J. McConnell
716-888-2434

Workshop Presentation
Computer Graphics Research Topics for Industry/University/Non-Profit Collaboration
1 00 p.m. - 3 00 p.m.
Dallas Convention Center, Room W112
Bob Ellis
415-336-6496

Graphics Performance Characterization
2:00 p.m. - 3 00 p.m.
Dallas Convention Center, Room W114
Ken Anderson
805-581-1184

Molecular Graphics
2 00 p.m. - 3 30 p m.
Dallas Convention Center, Room W106
Michael Pique
619-554-9775

Helios Systems
2:00 p.m. - 4:00 p.m.
Dallas Convention Center, Room N214
Gordon Meyer
408-432-0292

Doré User Group
3:30 p.m. - 5:00 p.m.
Dallas Convention Center, Room W109
Kevin Weiler
408-732-0400 ext. 6343

Workshop Presentation
Software Architectures and Metaphors for Non-WIMP User Interfaces
3:30 p.m. - 5:00 p.m.
Dallas Convention Center, Room W108
Mark Green
403-492-4584

Volume Rendering
4:00 p.m. - 5:00 p.m.
Dallas Convention Center, Room W102
Donna McMillan
919-469-8300

PEX Interest Group
4:30 p.m. - 5:30 p.m.
Dallas Convention Center, Room W114
Randi Rost
415-853-6721

MOVIE.BYU Users Group
5:00 p.m. - 6:30 p.m.
Dallas Convention Center, Room W115
Janine Cooper
801-378-2812

Sun Visualization User Group
5:30 p.m. - 7:00 p.m.
Dallas Convention Center, Room N230
Donna McMillan
919-469-8300

Computer Graphics Pioneers
6:30 p.m. - 9:00 p.m.
Hyatt Regency Dallas, Cascade A
Bert Herzog
313-936-2773

After-Hours SIG
11:00 p.m. - 4:00 a.m.
Hyatt Regency Dallas, Duncan A&B

Thursday, August 9, 1990

Template Graphics Software User's Network (TUN)
8:30 a.m. - 12:30 p.m.
Dallas Convention Center, Room W114
Velva Wood
619-457-5359

Workshop Presentation
Data Structures and Access Software for Scientific Visualization
10:45 a.m. - 12:15 p.m.
Dallas Convention Center, Room E410
Lloyd A. Treinish
914-784-5038

AVS Technical Interest Group
3:30 p.m. - 6:00 p.m.
Dallas Convention Center, Room W109
David W. Robertson
415-486-5778

Ray Tracing
5:30 p.m. - 6:30 p.m.
Dallas Convention Center, Room W115
Eric Haines
607-257-1381

After-Hours SIG
11:00 p.m. - 4:00 a.m.
Hyatt Regency Dallas, Duncan A&B

Friday, August 10, 1990

Template Graphics Software User's Network (TUN)
8:30 a.m. - 12:30 p.m.
Dallas Convention Center, Room W114
Velva Wood
619-457-5359

Executive Committee Meeting

The ACM SIGGRAPH Executive Committee holds an open meeting on Thursday, August 9, at 5:30 to 7:30 p.m. in the Cotton Bowl Room of the Hyatt Regency Dallas Hotel. All ACM SIGGRAPH members are invited to attend.

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Walt Disney Pictures

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John Lasseter
Pixar

Frank Thomas
Animator

Chris Wedge
Blue Sky Productions

EXHIBITION

The SIGGRAPH exhibition—a principal attraction at the conference—enjoys the enviable reputation as the preeminent world showcase for new product introductions. It is also the industry's most comprehensive showplace for computer graphics hardware, software, applications, and systems—where the cutting edge of development meets qualified buyers.

SIGGRAPH '90 is proud to announce that the U.S. Department of Commerce has selected the conference and exhibition to be one of a few select participants in its Foreign Buyer Program.

The number of exhibitors at the SIGGRAPH '90 exhibition has increased threefold since it first met in Dallas in 1981. Over 225 leading designers and manufacturers of the most advanced computer graphics products occupy 110,000 net square feet in the Dallas Convention Center and demonstrate their products to an international audience of over 25,000 people from industry, business, science, and the arts.

The SIGGRAPH '90 exhibition runs Tuesday through Thursday, August 7-9 in the Dallas Convention Center. Registration for courses and papers/panels includes admission to the exhibition. You may register on-site for the exhibits only. Registration for exhibits also includes entrance to the fundamentals seminar, art show, hypermedia, animation screenings, and open deck.

SIGGRAPH '90 exhibition dates and hours are:

Tuesday, August 7
10 a.m. - 6 p.m.

Wednesday, August 8
10 a.m. - 6 p.m.

Thursday, August 9
10 a.m. - 3:30 p.m.

Children under 16 are not permitted to attend the exhibition.

Exhibitors

Abekas
Booth 1618

101 Galveston Drive
Redwood City, CA 94063
415-369-5111; 415-369-4777 (fax)
Paul Hansil
Vice President of Marketing and Sales

A60 Digital Disk Recorder—using an Ethernet port—provides the perfect interface to animation computers for both video transfer and machine control. A SCSI port and CCIR 601 inputs and outputs are also provided. A72 Digital Character Generator and A53-D Digital Special Effects feature SPORT (Special Programs On Remote Terminal) interface.

Academic Press, Inc.
Booth 1053

1250 Sixth Avenue
San Diego, CA 92101
619-231-6616; 619-699-6715 (fax)
Marie Higgason
National Exhibits Coordinator

Academic Press is pleased to present several new additions to its computer graphics list. Among them, Andrew Glassner's *Graphics Gems*—a handbook that compiles the "tricks of the trade" in computer graphics programming. All titles are on display with special conference discounts available.

Addison-Wesley Publishing Company
Booth 1353

Route 128
Reading, MA 01867
617-944-3700; 617-944-8964 (fax)
Pamela Duvall
Senior Marketing Manager

Addison-Wesley, marking 40 years of publishing in computer science, proudly presents its books on computer graphics. You'll be pleased to hear that the book you've been waiting for—*Computer Graphics: Principles and Practice, Second Edition* by leading authorities James Foley, Andries van Dam, Steven Feiner, and John Hughes—is now available.

ADEX Corporation
Booth 1045

1750 Junction Avenue
San Jose, CA 95112
408-436-9700; 408-436-9706 (fax)
David E. Witkowski
Vice President, Sales

ADEX Corporation is introducing its new IBM 8514/A register compatible 1024 x 768 and 1280 x 1024 display controllers and 19" high-resolution monitor. This 1280 x 1024 non-interlaced monitor, based on ADEX's high-performance cockpit displays, exceeds the 1990 DIN Computer Display Ergonomic Standard by generating twice the display illumination of competing PC monitors at a 76Hz vertical refresh rate.

Advanced Imaging
Booth 1063

210 Crossways Park Drive
Woodbury, NY 11797
516-496-8000; 516-496-8013 (fax)
Jacqueline Serra
Vice President

Advanced Imaging is the one and only magazine dedicated to the needs of the imaging professional, with comprehensive coverage of all electronic imaging—the technology, the industry, and the applications.

Advanced Micro Devices, Inc.
Booth 1638

901 Thompson Place, P.O. Box 3453
Sunnyvale, CA 94088-3453
408-732-2400; 800-292-9263 (29K hotline)
Mike Krell
Segment Marketing Manager

Advanced Micro Devices, Inc. provides complete graphics silicon solutions to manufacturers of graphics systems. We are demonstrating AMD's solutions with several customer's products, including the Am29000 RISC microprocessor, based on Apple Computer graphics accelerator and Samsung X Terminal. Some products include the Am29000 RISC microprocessor and Video Compression and Expansion Processor.

Advanced Technology Center
Booth 1816

22982 Mill Creek Drive
Laguna Hills, CA 92653
714-583-9119; 714-583-9213 (fax)
Murray Gillham
Marketing Operations Manager

Advanced Technology Center (ATC) is a leading provider of standards-based graphics development software, including GRAFPAK-GKS, a level 2C GKS subroutine library with performance and functional extensions; GRAFPAK-CGM, a complete subroutine library; and CGM-View, a CGM previewer/print spooler filter/hardcopy output application. Installations already number in the tens of thousands.

AGE
Booth 107

8765 Aero Drive, Suite 226
San Diego, CA 92123
619-565-7373 ext. 112; 619-565-7460 (fax)
Gary Gwin
Marketing Manager

AGE supplies XoftWare, its implementation of the X Window System server software to OEMs, systems integrators, VARs, and distributors. OEM customers that use XoftWare in their X terminals include IBM, Samsung, and Tektronix. AGE also markets X servers as off-the-shelf solutions for workstations and PC hardware running UNIX and DOS.

Alacron Inc.
Booth 1842

980 Broadway, Suite 349
Thornwood, NY 10594
914-948-3145; 914-948-3010
Scott Israel
Director, Marketing

Alacron, a manufacturer of high-speed application accelerators, demonstrates AT-based i860 product and announces VME version. This family of products consists of a 80 Mflop processor, 64MB, and Fast I/O; ideal for the graphic-micro-supercomputing environment.

Alias Research Inc.
Booth 221

110 Richmond Street East
Toronto, Ontario, Canada M5C 1P1
416-362-9181; 416-362-0630 (fax)
Susan Anderson
Trade Show and Events Manager

Alias Research Inc.—a leader in easy-to-use fully integrated 3D computer graphic software for industrial design, visualization, and video animation, produces the complete Alias line of software used by over 300 customers. Alias operates on the Silicon Graphics, Inc. IRIS family of workstations and the new IBM RS6000 workstations.

Alliant Computer Systems Corporation
Booth 1211

1 Monarch Drive
Littleton, MA 01460
508-486-4950; 508-486-1398 (fax)
Terry Holden
Marketing

Alliant provides a wide range of compatible, expandable, high-performance, parallel supercomputers and visualization systems for computationally intense applications in science and engineering. Alliant demonstrates the new standards-based FX/2800 supercomputer, which supports animation, simulation and control, computational chemistry, mechanical design and analysis, computational fluid dynamics, image and signal processing, and advanced problems in math and physics.

American Institute of Physics
Booth 1212

335 East 45th Street
New York, NY 10017
212-661-9260; 212-661-2036 (fax)
Christopher Verdesi
Sales Promotions Coordinator

With exclusive North American distribution rights to all Adam Hilger/Institute of Physics U.K. books and journals, American Institute of Physics is an acknowledged leader in computational physics, neural network, and parallel computing publishing. See our new book titles, and pick up the July-August issue of *Computers in Physics* at the AIP booth.

American Power Conversion
Booth 1443

132 Fairgrounds Road
West Kingson, RI 02892
401-789-5375; 401-789-3710 (fax)
Kara Alexanian
Trade Show Coordinator

American Power Conversion designs and manufactures Uninterruptible Power Supplies (UPSs) which provide clean, steady power demanded by computers. APC increases protection for LANs by offering an array of units designed to protect network nodes and file servers, as well as auto-shutdown interface kits for all major networks.

Amtronics, Inc.
Booth 1260

3012 19th Street
Metairie, LA 70002
504-831-0691; 504-831-0969 (fax)
Donald R. Gay
President

The Amtronics, Inc. HRX (High-Resolution Graphics) System is a host independent 32-bit image processor which supports multiple input and output formats including RGB, NTSC, PAL, SECAM, and HDTV. The system is a flexible high-resolution, high-speed continuous real-time frame grabber that can be tailored to specific applications.

Analog Devices, Inc.
Booth 1635

Two Technology Way
Norwood, MA 02062
617-329-4700; 617-326-8703 (fax)
Vicki Chase
Marketing Promotions Specialist

Analog Devices, Inc. manufactures high-performance integrated circuit components for signal digitization, digital signal processing, and high-resolution displays.

Analogic Corporation
Computer Design & Applications Division
Booth 1818

8 Centennial Drive
Peabody, MA 01960
508-977-3030; 508-977-9220 (fax)
Mike Drumm
Director of Marketing

The CDA Division of Analogic manufactures image processors, signal processors, and data acquisition devices for DEC, SUN, HP, and VME platforms. Primary products are: DASM series of SCSI-based acquisition peripherals for busless workstations; MSP-6C30 VME signal processor (66 MFLOP); MSP-D860 SCSI-based application accelerator (80 MFLOP); and MDP-6C30 image processor.

Androx Corporation
Booth 114

1515 Hancock Street
Quincy, MA 02169
617-770-3450; 617-770-3471
Wayne B. Threatt
Executive Vice President, Marketing and Sales

Androx manufactures image processing systems and subsystems for: Factory automation, medical imaging, electronic pre-press, military/defense, multimedia, and scientific visualization. At SIGGRAPH, Androx demonstrates our new high resolution system and our new ICS-100 intelligent frame grabber.

A.N.L. (Agence Nationale Du Logiciel)
Booth 627

Campus Scientifique
Boulevard des Aiguillettes
P.O. Box 239
Vandoeuvre Cedex, France 54506
33-83-91-21-58; 33-83-27-76-43 (fax)
Jacques Guidon
Manager

A.N.L. is a national French research association that promotes the development and marketing of research-oriented software tools.

Apple Computer, Inc.
Booth 238

10455 Bandley Drive M/S 2-Z
Cupertino, CA 95014
408-974-6597; 408-974-3880 (fax)
Robert Moore/Sunil Chawla

Apple Computer features a wide range of innovative solutions for modeling, visualization, animation, and realistic rendering for design, simulation, presentations, and publishing. Apple highlights both Macintosh II, compact and portable lines of personal computers, as well as a variety of Apple and third-party peripherals and multimedia configurations.

Ariel Communications, Inc.
Booth 459

12710 Research Boulevard, Suite 250
Austin, TX 78759
512-250-1700; 512-250-1016 (fax)
Daviell Frahm
Associate Publisher

Cadence offers tutorials to AutoCAD users at all levels and features articles on applications and third-party hardware and software. *MicroCAD News* provides how-to information for architectural/civil, mechanical, and electrical engineering professionals. Articles address the increased demand for integrating MicroCAD with other departments, applications and processes.

Array Technologies, Inc.
Booth 764

7730 Pardee Lane
Oakland, CA 94621
415-633-3000; 415-633-3006 (fax)
Daniel McAvoy
Sales Manager

Array Technologies presents Array Scanner-One, a high-resolution electronic still camera used as a slide scanner, copystand camera for scanning large format film and reflective copy, and as a tripod-mounted, studio still camera for scanning 3D objects and still scenes. Full-color images are scanned into our software or Adobe photoshop, edited, and output on film or industry standard file formats. Software developer program available. OEM and VAR inquiries invited.

Association for Computing Machinery
Registration Entrance

11 West 42nd Street
New York, NY 10036
212-869-7440; 212-944-1318 (fax)
Michael Seiden
Publications Marketing Manager

ACM is displaying its major journals, including *Transactions on Graphics (TOG)*, Special Interest Group (SIG) newsletters, and conference proceedings. SIGGRAPH newsletters, conference proceedings, and video reviews are featured. Individuals may join ACM, SIGGRAPH or other SIGs at the ACM booth. All new members receive a special gift.

AT&T Graphics Software Labs
Booth 1627

3520 Commerce Crossing, Suite 300
Indianapolis, IN 46240
317-844-4364; 317-575-0649 (fax)
Sara Benken
Exhibits Manager

AT&T Graphics Software Labs offers a variety of high-resolution, full-color software applications including: RIO, 2D design and layout software; RIO Animator, 2D animation software; TOPAS, a 3D solids modeling and animation application; Sable, a feature-rich raster paint package; ImagePaint, image processing software; 35mm Express/GSL and Graphico, business graphics packages; Panorama, image sequencing software; and Logo Editor, an object creation tool.

AT&T Pixel Machines
Booth 201

1 Executive Drive, 3rd Floor
Somerset, NJ 08873
201-563-2283; 201-356-7990 (fax)
Pearl Baldwin
Marketing Communications Support Manager

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

Autodesk, Inc.
Booth 356

2320 Marinship Way
Sausalito, CA 94965
415-332-2344; 415-332-8093 (fax)
Victoria Thuma
Promotions Coordinator

Autodesk previews new technology which builds upon the success of its award-winning Autodesk Animator software, introduced last year at SIGGRAPH. These new tools further establish Autodesk as a leader in multimedia software for low-cost desktop computers. Links to Autodesk's AutoCAD software is also demonstrated.

Autographix Slide Imaging Network
Booth 1418

8150 Brookriver Drive, Suite S-205
Dallas, TX 75247
214-638-0292; 214-638-5046 (fax)
Michael E. Moore
President, Imaging Presentations

The Autographix Slide Imaging Network is a consortium of leading independent service bureaus providing high-resolution slide and viewgraph imaging services from 33 major business locations in the United States, Canada, Europe and Australia. The Network operates licensed "Autographix Imaging Technology" to process popular desktop presentation software including Harvard Graphics, Lotus Freelance Plus, Aldus Persuasion, CA Cricket Presents, Claris MacDraw II, Symantic More II, CA Windows Presents, and many more.

AVC/Audio Visual Communications
Booth 1063

210 Crossways Park Drive
Woodbury, NY 11797
516-496-8000; 516-496-8013 (fax)
Jacqueline Serra
Vice President

AVC is the monthly magazine for corporate management, communication directors and media/production personnel in the fields of audio, video, presentation graphics, and pre- and post-production. The magazine reports on the corporate /industrial, education, scientific/medical, and government/military industries.

AXA Corporation
Booth 1259

17752 Mitchell 'C"
Irvine, CA 92714
714-757-1500; 714-757-1766 (fax)
Abby Joslin
Sales Manager

AXA Corporation introduces QuickCEL, a 2D animation production system based on traditional cel animation processes. QuickCEL provides artists and video professionals the tools to design, create, check, approve, and output true color animation to 1" VTR. Spreadsheet-like exposure sheet for composition, real-time pencil testing and transparent cels are among QuickCEL's main features.

Aztek
Booth 1149

15 Marconi
Irvine, CA 92718
714-770-8406; 714-770-4986 (fax)
Phil Lippincott
President

Aztek offers Azartist, Azchart, Azbrush, Imagizer, Production Manager, Scanlink and color separation program packages. In addition, affordable, high-resolution, DOS-based STUDIO color illustration workstation and SPECTRUM image processing systems packages are available, with a full line of multimedia devices for color print, film, and video applications.

BARCO, Inc.
Booth 838

1000 Cobb Place Boulevard
Kennesaw, GA 30144
404-590-7900; 404-590-8836
Kitty Creque
Sales Administrator

BARCO, Inc., manufacturer and developer of visual display systems, displays its full line of large-screen video/data/graphics projection equipment—including the new BARCOGRAPHICS 800. Also featured are large-screen industrial MultiData monitors, and high-resolution computer display products, including the Calibrator, a self-calibrating display device for color-critical applications.

Brooktree Corporation
Booth 1262

9950 Barnes Canyon Road
San Diego, CA 92121
619-452-7580; 619-452-1249 (fax)
Cathy Batchelor
Marketing Communications Manager

Brooktree designs, manufactures and markets high-performance, mixed-signal and VLSI solutions for applications in computer graphics, imaging and video. Featured ICs include a Color Space Converter, a Genlock Controller, image digitizers and a True-Color RAMDAC designed to support the X Window System standard in a workstation environment.

Byte by Byte Corporation
Booth 836

9442 Capital of Texas Highway. N., Suite 150
Austin, TX 78759
512-343-4357; 512-343-4358 (fax)
Scott A. Peterson
President

Where today's author deals in word sentences, tomorrow's author will deal in visual sentences. Byte by Byte demonstrates Sculpt 3D for Macintosh. The Sculpt series combines sophisticated 3D modeling, texture mapping, animation, and photorealistic rendering, with all-in-one, easy-to-use interface. Sculpt 3D delivers the speed, precision, and freedom needed for visual expression.

Cahners Publishing Company
Booth 1621

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

Cahners Publishing Company offers specialized business magazines. *Electronic Business* is the business magazine for electronics, computer and systems companies worldwide. *Electronic Business Asia* is a magazine for managers in electronics, computers and systems companies in Asia. *Systems Integration* is the leading magazine for systems integration.

Calzone Case Company
Booth 563

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

Calzone Case Company manufactures reusable shipping and storage cases and containers for all types of equipment, including delicate electronic equipment. Markets serviced include computer, video, broadcast, lighting, cinematography, photography, and theater.

Canon U.S.A.
Booth 1269

One Canon Plaza
Lake Success, NY 11042
516-488-6700 ext. 3691; 516-488-6322 (fax)
Graphic Systems Division

Canon U.S.A.'s Color Laser Copier 500 employs an exclusive Digital Image Processing System (DIPS) for high-quality, full-color images. The system's optional Intelligent Processing Unit (IPU) expands memory capability and creative functions. With the IPU, the Canon Color Laser Copier 500 becomes the first copier to offer digital full-color output on plain paper from video and still video equipment, television, and computers.

CELCO
Booth 1145

1150 E. 8th Street
Upland, CA 91786
714-985-9868; 714-982-2464 (fax)
Mitchell Constantine
Sales

The CELCO PROFESSIONAL PLUS, with 16K addressable resolution and 23 second exposure time is the latest addition to the CELCO line of digital color film recorders including the CELCO PROFESSIONAL, CELCO 5000, and CELCO 8000. The PROFESSIONAL PLUS may be configured for any film format from 16mm to 8' x 10'.

Chromatek Inc.
Booth 969

KSP-C-1232, 100-1 Sakado
Takatsu-ku, Kawasaki-shi,
Kanagawa 213 Japan
81-44-819-3477; 81-44-819-3478 (fax)
Yuji Ikushima
Manager, International Sales Division

This Tokyo-based company was established in 1977 for the purpose of developing HDTV-related products. Our newest product; 9120 "Super" Down Converter is capable of converting all kinds of video signals—including HDTV—to NTSC or PAL with one unit.

CIRAD (Centre de Cooperation Internationale En Recherche Agronomique Pour Le Developpement)
Booth 627

42 Rue Scheffer
Paris, France 75116
33-1-47-04-32-15; 648729 F (telex)
Ph. De Reffye
Manager

CIRAD features advanced modeling and growth simulation of plants, with dynamical visualization of computerized flora, gardens and landscapes, including build structures and automatic cartography.

Commodore Business Machines, Inc.
Booth 411

1200 Wilson Drive
West Chester, PA 19380
215-431-9100; 215-431-9156 (fax)
Christopher Kohler
Manager, Video/Graphics Marketing

Commodore Business Machines is featuring Amiga microcomputer systems, graphics and video peripherals, and software. This exhibit includes the latest developments in new models, programs and configurations for graphics applications.

Computer Currents
Booth 1843

17806 Davenport #106
Dallas, TX 75252
214-931-0157; 214-931-0161 (fax)
Susan Plonka
Publisher

Computer Currents, a regional PC newsmagazine for the business and professional user, brings together local buyers and sellers in a distinctive environment. We deliver a unique style of local reporting, features and reviews that is known, read and respected in San Francisco, Dallas/Ft. Worth, Houston (new product), Los Angeles, Boston, and Atlanta, reaching a select market of users in each region through a strategic combination of controlled circulation and free public distribution.

Computer Graphics Review
Booth 853

9221 Quivira
Overland Park, KS 66215
913-541-6626; 913-541-6697 (fax)
John Torrey
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. It reviews essentially any application that deals with digital pictures, images and graphics.

Computer Graphics World
Booth 718

One Technology Park Drive
Westford, MA 01886
508-692-0700; 508-692-0525 (fax)
Robert Holton
Publisher

Computer Graphics World provides focused coverage of significant technological trends and developments within the graphics industry, including firsthand reports on how graphics technology is being applied in manufacturing, business, science, medicine, and the arts. *CGW* is the only international publication that focuses on the application-driven segments of the computer graphics market.

Convex Computer Corporation
Booth 818

3000 Waterview Parkway
Richardson, TX 75080
214-497-4000; 214-497-4848 (fax)
Marketing Department

Convex Computer Corporation demonstrates a new family of products supplying fully integrated visualization solutions utilizing the combination of Convex Supercomputers and X-terminals or graphics workstations. These products provide support to a wide range of computationally intensive engineering and scientific applications, including structural analysis, crash simulation, computational chemistry, seismic processing, and computational fluid dynamics.

Covid, Inc.
Booth 435

2400 W. 10th Place
Tempe, AZ 85281
602-966-2221; 602-966-6728 (fax)
Suzanne M. Jones
Marketing Manager

Covid manufactures high-resolution 100 MHz computer-video interfaces, distribution amplifiers, switches, and umbilical cables. Interfaces link PCs, terminals and graphics workstations to RGB data projectors and monitors for display of computer text and graphics on large-screen displays for group viewing.

CSS Laboratories, Inc.
Booth 1456

1641 McGaw Avenue
Irvine, CA 92714
714-852-8161; 714-852-0410 (fax)
Tom Monroe
Marketing Communications Manager

The MaxSys series of 386 and 486 PCs are exceptional for graphics, engineering, and other applications that require high-performance, large storage capacity, and 12-slot expandability. ColorMagic is a 300 dpi plain paper color laser printer—with 5ppm color, 40ppm black and white, and output up to 11" x 17".

Cyblon - Visual Service
Booth 136

Sedanstrasse 27
Würzburg, West Germany 8700
49-931-450015; 49-931-45001-61 (fax)
Peter Zimmerman

Cyblon is introducing a new software system called BROADCAST. This new system enables cutting and copying of single frames or picture sequences with perfect accuracy for archival, presentation, information advertising, and entertainment applications. BROADCAST insures a user-friendly, professional broadcast-quality recording on an optical disk, addressing the growing needs for interactive multimedia presentations and educational systems.

Data Base Publications
Booth 1047

8310 Capital of Texas Highway, #385
Austin, TX 78731
512-343-9066; 512-345-1935 (fax)
Robb Jameson
Associate Publisher

Data Base Publications specializes in computer magazines serving specific markets. *Workstation News*, covering the UNIX-based workstation market, is a highlight this year. *AViiON News*, a newsletter covering Data General and Unisys equipment, is also available at SIGGRAPH. Users of Wang, Data General and Unisys equipment will find magazines targeting their systems.

Diaquest, Inc.
Booth 1721

1440 San Pablo Avenue
Berkeley, CA 94702
415-526-7167; 415-526-7073 (fax)
Louise R. Ledeen
Director of Marketing

Diaquest demonstrates systems for frame-accurate video animation and digitizing for broadcast production, desktop video, and Ethernet environments. Featured products include: DQ-ANIMAQ —a Macintosh video animation controller; SERIES II—a stand-alone animation controller with RS-232C control from the host computer; and IMAGENODE- a complete animation and digitizing system designed for Ethernet environments.

Digital Arts
Booth 449

7050 Convoy Court
San Diego, CA 92111-1017
619-541-2055; 619-541-2655 (fax)
Sheldon Liebman
Vice President, Sales and Marketing

Digital Arts creates and markets advanced software for 3D modeling, animation, and rendering showing its latest software versions, including the full line of DGS and DGS/386 products for the PC environment.

Digital Equipment Corporation
Booth 801

146 Main Street
Maynard, MA 01754
508-493-5111; 508-493-2501 (fax)
Betty Lynch
Marketing Specialist

See the newly introduced graphics workstations, both VAX/VMS and RISC/ULTRIX. Digital has recently announced its most powerful RISC-based workstation designed for compute-intensive 3D and 2D graphics applications in the ECAD, MCAD, 3D modeling, and animation markets. The DS5000/200 offers a choice of graphics modules, and an open TURBO channel I/O inter-connect. The VAXstation 3100/SPX offers 10 times the graphics processing of previous models and offers a variety of vendor applications.

Digital F/X
Booth 618

755 Ravendale Drive
Mountain View, CA 94043
415-961-2800; 415-961-6990 (fax)

The Paint F/X digital graphics system is a powerful, flexible video paint system that combines the most sophisticated paint, typography, and library tools with real-time digital effects and digital keying. The Paint F/X system can be easily upgraded to the Composium digital production suite.

Dimension Technologies, Inc.
Booth 1827

176 Anderson Avenue
Rochester, NY 14607
716-442-7450; 716-442-7589 (fax)
R. Todd Barber
Account Manager

Dimension Technologies, Inc., develops and markets patented technology autostereoscopic (3D without glasses) LCD-based display devices. The DTI 100M is a 640 x 480 resolution, 16 gray scale 3D display that attaches to IBM PCs and Apple Mac IIs. A color prototype is exhibited.

DIVISION Limited
Booth 665

Quarry Road, Chipping Sodbury
Bristol, United Kingdom BS17 6AX
44-454-324527; 44-454-323059 (fax)
Charles Grimsdale
Managing Director

Parallel Systems Consultancy offers a wide range of design and development services. DIVISION specializes in the development of parallel architectures and algorithms. Particular areas of expertise are custom virtual reality systems, distributed graphics systems, and high-speed distributed communications.

Double M Industries
Booth 1065

P.O. Box 14465
Austin, TX 78761
512-251-4044; 512-251-4807 (fax)
Barry Marks
President

Double M specializes in bulk-load, pin-registered film cameras, with formats that include 35mm, 35mm Cine, 4'x5', 8'x10' and adapt to most film recorders.

Dubner Computer Systems, Inc.
Booth 1811

6 Forest Avenue
Paramus, NJ 07652-5214
201-845-8900; 201-845-8063 (fax)
Evelyn Bronson
Marketing Product Manager

Dubner Computer Systems demonstrates its TURBO full-color paint system, available in NTSC, D1 and D2 format. Comprehensive paint software includes anti-aliased brushes, text generation, image effects, color correction, 2D animation in 3D space, and interface to Abekas A-62, SONY D1 and D2 tape machines. The featured ImagePaint software option automatically renders images into selected classical styles. Other options include Presentation Graphics for creating business data displays and additional font sets.

Du Pont Company
Booth 856

External Affairs, P.O. Box 80016
Wilmington, DE 19880-0016
302-992-5022; 302-992-2581 (fax)
Amy J. Swain
Administrative Assistant

Du Pont brings together high-performance graphics and image processing on several host workstations, targeted for applications in C^3I, remote sensing, GIS, weather and environmental analysis, simulators, and electronic publishing. Du Pont displays 4CAST, which produces a continuous tone, four-color proof that is virtually indistinguishable from a photographic print.

Du Pont Imaging Systems
Booth 1632

65 Harristown Road
Glen Rock, NJ 07452
201-447-5800; 201-447-6946 (fax)

Du Pont Imaging Systems features Mamba, an extremely high-performance, photo-retouching, composing and illustration workstation producing 8" x 10" digital color transparencies. Images are input directly via Crosfield Magnascan and output on the Magnatran color film recorder, at up to 1270 lines per inch. Input/output is also possible via 8mm and 9-track tape.

DYNAIR Electronics, Inc.
Booth 1153

5275 Market Street
San Diego, CA 92114
619-263-7711; 619-264-4181 fax
800-854-2831
Robert Jacobs
Vice President, Sales and Marketing

DYNAIR specializes in high-resolution video switching and distribution equipment in band-widths to 150 MHz. A new line of stand-alone fiber optic transmission equipment for 1280 x 1024 NI RGB raster scan video distribution is introduced. A complete line of fiber optic amplifiers is shown.

Eastman Kodak Company
Booth 1427

343 State Street
Rochester, NY 14650
800-445-6325, ext. 110
Jack A. Brown
Exhibits Manager

Eastman Kodak Company demonstrates a family of color printer products capable of producing color continuous tone hard copies. It features its just-released page size printer, the Kodak XL 7700 Digital Continuous Tone Printer. The printer provides photographic-quality, thermal dye transfer prints and transparencies from digital sources. In addition, Kodak Colorsqueeze Image Compression Software is shown.

Eclectic Systems
Booth 145

8106 St. David Court
Springfield, VA 22153
703-440-0064
James R. Furlong
Head/Software Development

MICRO-MOVIES is a graphic analysis tool that animates images created by applications or user-written programs. An advanced data compression scheme refreshes screens at rates previously only possible on expensive workstations. Useful for scientific analysis and presentations. RAINDROP 300 is an advanced-color and black and white print screen utility for PCs.

Electrohome Limited
Booth 1414

809 Wellington Street N.
Kitchener, Ontario, Canada N2E 1U8
519-744-7111; 519-749-3136 (fax)
800-265-2171
Jeff Ward
Trade Show Coordinator

Electrohome Limited exhibits large screen data/graphics projection systems. These digitally controlled units connect with sources from VCRs to high-resolution workstations. ACON, the first automatic convergence system, is featured.

Electronic Design Magazine
Booth 662

1100 Superior Avenue
Cleveland, OH 44114
216-696-7000 ext. 4281; 216-696-0836 (fax)
Tim Perdion
Marketing Manager

Electronic Design magazine is the leading-edge magazine for 190,000 design engineers and managers. Published twice a month, *Electronic Design* services the technological needs of worldwide engineers and engineering management who are responsible for the design and development of OEM products and systems.

Electronic Engineering Times
Booth 1253

600 Community Drive
Manhasset, NY 11030
516-562-5000
John Cox
National Sales Manager

Electronic Engineering Times is the industry newspaper for engineers and technical management.

Electronics Magazine
Booth 662

1100 Superior Avenue
Cleveland, OH 44114
216-696-7000 ext. 4281; 216-696-0836 (fax)
Tim Perdion
Marketing Manager

Electronics is the first global magazine for electronics management. It's written for 85,000 management subscribers who make technology choices, oversee product development and make vendor selections.

Engineering Mechanics Research Corporation (EMRC)
Booth 418

1607 East Big Beaver Road, P.O. Box 696
Troy, MI 48083
313-689-0077; 313-689-7479
M. Maury Katzman/Smita Wickham
Director, Corporate Development/Strategic Planning

EMRC, a leading U.S. software vendor, offers one of the largest families of totally integrated engineering software available today for static, dynamic, heat transfer, fatigue/fracture, optimization, fluid flow, and composites. Demonstrations of the NISA programs can be seen at EMRC's booth. Brochures and PC demo disks are available.

ETAK
Booth 669

1430 O'Brien Drive
Menlo Park, CA 94025
415-328-3825; 415-328-3148 (fax)

ETAK markets programmer development tools to VARs and integrators used to create navigation and GIS products. Development of state-of-the-art computer mapping applications is accelerated, reducing development costs and shortening time-to-market. ETAK's MapAccess is a set of C-Language libraries, including MapDraw and Geocode, which allow resellers to build custom geographic solutions. The libraries are available for a variety of applications environments.

Evans & Sutherland
Booth 407

540 Arapeen Drive
Salt Lake City, UT 84108
801-582-5847; 801-582-0524 (fax)
Pamela Donaldson
Marketing Support Coordinator

Evans & Sutherland produces state-of-the-art computer graphics systems, including the ESV Workstation series, PS390 graphic terminals, and CDRS industrial design systems. E & S systems are used to create, view and interact with 3D computer-generated models and offer unmatched image resolution. Applications include molecular design, industrial design, CAE, and science/research/mathematics.

Extron Electronics
Booth 1172

13554 Larwin Circle
Santa Fe Springs, CA 90670
213-802-8804; 213-802-2741 (fax)
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 educational material designed for instruction computer interfacing.

F and S, Inc.
Booth 850

1019 14th Street
Columbus, GA 31901
404-324-6308; 404-324-6495 (fax)
Fred Morgan
President

SOFTPRUF software converts Targa RGB color images into SWOP standards for color proofing on the monitor. This revolutionary "What You See Is What You Get, WYSIWYG" technology enables the user to view their work in the highest reproduceable color quality possible. F and S, Inc. is a separation service bureau, providing the highest quality halftone separations to SWOP standards possible from Targa images.

Flamingo Graphics
Booth 1821

19 Bishop Allen Drive
Cambridge, MA 02138
617-661-1001; 617-661-3877 (fax)
Bob Lang
President

Flamingo Graphics provides customized graphics applications and software tools to OEMs on DOS, PC/WINDOWS, Macintosh, and UNIX workstations. Flamingo specializes in anti-aliased text rendering, optical distortions, manipulation of continuous tone images, and spline-based drawing with output to Postscript. Our client/publishers include Truevision (TypeRight), Data Translation (Video Quill), AT&T GSL (RIO), Quark, and Lotus.

Folsom Research, Inc.
Booth 769

526 East Bidwell Street
Folsom, CA 95630
916-983-1500; 916-983-7236 (fax)
Ed Hart
Manager of Sales and Market Development

Folsom Research exhibits its entire line of video scan converter products. FRI's large product offers every converter needed, with both stand-alone and board-level converters. Folsom Research is introducing two new products at SIGGRAPH '90: CGC II, a multiple-input scan converter with enhanced resolution and video output formats; and Video/9U, a new VME board-level product that supports SUN, SGI and other workstations.

Forox Marketing Corporation
Booth 764

250 Clearbrook Road
Elmsford, NY 10523
914-592-7776; 914-592-6148 (fax)
Lelia Thompson/Cynthia Fair
Vice President, Sales & Marketing/AFP Director of Marketing

Forox Marketing presents a low-cost, bulk-load, pin-registered 35mm camera for use on virtually any film recorder. The Film Transport may be detached at the flip of a lever, and users may switch between a film recorder and new Forox Universal Copy System to facilitate photo-composites created by both computer graphics and conventional photography—without loosing a single frame. OEM and VAR inquiries invited.

French Expositions in the U.S., Inc.
Booth 627

810 Seventh Avenue
New York, NY 10019
212-265-5676; 212-315-1017 (fax)
Elizabeth Wolf
Director

French collective exhibit: see individual alphabetical listings.

Gammadata Computer, Inc.
Booth 1051

1350 Busch Parkway
Buffalo Grove, IL 60089-4505
708-541-9119; 708-541-9130 (fax)
Kent Lawson
Graphics Marketing Manager

Gammadata is a multinational designer/manufacturer of color hardcopy solutions for the CAD/CAM, process control, medical, and presentation graphics markets. Gammadata offers a multifunctional print system that offers HP-GL conversion, Postscript emulation, Versatec emulation and video hardcopy—all which may be connected to 16 workstations concurrently from as far as 900 feet away.

General Electric Company, PDPO
Booth 1207

Electronics Park, Building 6-338
Syracuse, NY 13221
315-456-2573; 315-456-0732 (fax)
Maggie Hullar
Marketing Services

General Electric demonstrates the Talaria MP Light Valve Projector for video and data display, and Imager CRT Projectors for display of video, data, and graphics.

Government of Canada
Booth 438

125 Sussex Drive
Ottawa, Ontario, Canada K1A 0G2
613-993-6576; 613-990-9119 (fax)
Keith Munro
Marketing Officer

The Canadian Government and 11 Canadian Computer Graphic companies are represented.

Gretag Image Systems
Booth 218

1301 Armstrong Drive
Titusville, FL 32780
407-269-6680; 407-267-6211 (fax)
Mary Strauss
Marketing Administrator

Gretag Image Systems exhibits its series of large screen display systems including the Esprit 1700 and 2000 with scan rates of 56KHz and 80KHz, respectively. Both feature remote convergence, highlight RS-232 communications, accept a variety of inputs including video RGB, CGA, EGA, VGA, and Super VGA, and exceed 1280 x 1024 pixels for high-resolution applications.

GTCO Corporation
Booth 1805

7125 Riverwood Drive
Columbia, MD 21046
301-381-6688; 301-290-9065 (fax)
Anne Hageman
Graphic Designer

GTCO exhibits the following digitizer lines: SketchMaster, a high-resolution, low-cost digitizer available in both 12" x 12" and 12" x 18" sizes; DIGIPAD Super L SERIES, lightweight, high-resolution digitizers ranging in size from 17" x 24"to 42" x 60"; and Macintizer ADB, a 12" x 12" digitizer compatible with Macintosh SE and II computers.

HCS Inc.
Booth 137

1901 Jameel, Suite 190
Houston, TX 77040
713-690-2744; 713-690-7618 (fax)
Angelique Roger
Executive Assistant

HCS Inc is the exclusive importer of the CATHI 4000 high-resolution film recorder, currently capable of 2K and 4K output. Serving a similar market to the Agfa-Matrix QCR-Z, the CATHI 4000 offers compatibility, throughput, quality, and support.

Helios Systems
Booth 1820

1996 Lundy Avenue
San Jose, CA 95131
408-432-0292; 408-943-1309 (fax)
Gordon Meyer
Director of Marketing

Helios Systems offers the widest range of third-party Sun Microsystems compatible memory and storage products, supporting all Sun 2, 3, and 4 series workstations. Helios also manufactures memory boards for the Apollo DN3500, DN4000, and DN4500 series workstations and a full line of tape and disk subsystems.

Herstal Automation Ltd.
Booth 104

3171 W. 12 Mile Road
Berkley, MI 48072
313-548-2001; 313-548-2010 (fax)
Cathy Melchert

Herstal Automation Ltd. provides a wide range of products for enhancing the performance of HP 1000, HP 3000 and HP 9000 computer systems. Enhancement products include Superclocks, plug-in memory array boards, SCSI devices, streaming tape drives, erasable optical disc drives, and automatic media changers, such as carousels and robotic jukeboxes.

Hewlett-Packard Company
Booth 401

3000 Hanover
Palo Alto, CA 94304
415-857-1501; 415-857-5518 (fax)
Corporate Development

Hewlett-Packard's innovative products and technologies for the computer graphics market provide speed and realism based on industry standards. HP displays a wide range of new workstations, peripherals and software targeted at ME-CAD, image processing, GIS design concept, and animation users. SIGGRAPH is the debut of the HP Apollo 9000 Series 400 workstations and VRX graphics systems.

Howtek, Inc.
Booth 456

21 Park Avenue
Hudson, NH 03051
603-882-5200; 603-880-3843 (fax)
Stephanie Papantonis
Manager of Marketing Communications

Howtek demonstrates its line of digital color scanners, including the new Scanmaster 3, 400 dpi professional color scanner and the new Personal Color Scanner. The new Personal Color Printer, a 300 dpi full-color ink jet printer, also enhances the Personal Color Series—offering affordable solutions for independent workstations and general business offices.

IBM Corporation
Booth 1221

44 South Broadway
White Plains, NY 10601
914-288-2936; 914-686-4527
Mark Curtis
Program Operations Manager

The IBM RISC System/6000, the newest member of the AIX product family, offers the greatest scalability of UNIX solutions from the PS/2 to the powerful IBM 3090-600J Supercomputer. IBM features solutions from IBM Business Partners, technology from IBM Research and a rich set of graphical interfaces to enable applications for the AIX open systems environment.

IEEE Computer Society
Booth 1232

10662 Los Vaqueros Circle
Los Alamitos, CA 90720-1264
714-821-8380; 714-821-4010 (fax)
Heidi Rex
District Manager

The IEEE Computer Society serves its more than 100,000 members through many publications, conferences and workshops. Membership information, magazines and textbooks are on display.

Ikegami Electronics (USA), Inc.
Booth 845

37 Brook Avenue
Maywood, NJ 07607
201-368-9171; 201-569-1626 (fax)
Ray Sooley
Director, Display Monitor Products

Ikegami Electronics exhibits 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. The featured monitor is the new Trinitron CT-20. Also featured is the CN-20 Maxi-Sync multiple-frequency, high-resolution color monitor. Ikegami Electronics presents its line of super projectors and digital scan converters.

Ilford Photo Corporation
Booth 365

W70 Century Road
Paramus, NJ 07653
201-265-6000; 201-265-8107 (fax)
Michele Lanzana
Trade Show Coordinator

See the Ilford Digital Photo Imager, a digital color printer that produces continuous-tone photographic prints, overhead transparencies and 35mm slides directly from computer-based digital input; and the Ilford Cibacopy System 120 Photographic Color Copier, which produces high-quality prints and transparencies directly from full-color originals and 35mm slides.

IMSL, Inc.
Booth 1542

2500 CityWest Boulevard
Houston, TX 77042-3020
713-782-6060; 713-782-6069 (fax)
Lidia Vogelsang
Trade Show Coordinator

Exponent Graphics is a significant advancement in graphics programming, designed specifically to meet the needs of scientists and engineers who solve problems using FORTRAN. Working in conjunction with your existing resources, Exponent Graphics provides powerful plot customization capabilities through GKS-based subroutines, a hierarchical tree data structure and applications-level routines.

Infotronic
Booth 869

Viale Berbera 49
Milan, Italy 02162
39-2-6472441; 39-2-6472445 (fax)
Irene Pfenninger
Marketing Manager

Featured are: high and very high-resolution graphics cards for ISA, EISA, MCA, Nubus; intelligent monochrome and color graphics cards with resolutions up to 1600 x 1280, based on TMS 34020 and TMS 34082; graphic interfaces for MSDOS (TIGA), UNIX (X Windows Interactive and SCO), OS/2 (Presentation Manager); particularly fast display list AutoCAD driver; and special OEM hardware and software developments.

Intel Corporation
Booth 1227

3065 Bowers Avenue, P.O. Box 58126
Santa Clara, CA 95058
408-765-1709; 408-765-1821 (fax)

Intel demonstrates the high-performance graphics and floating point capabilities of the i860 microprocessor. Several i860 CPU-based workstations and supercomputers are featured; Intel demonstrates DVI capabilities.

Intelligent Light, Inc.
Booth 1449

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

Intelligent Light is a leading supplier of scientific visualization software systems for the technical computing community. This year's features include the new IVIEW product line of visualization toolkits based on Stardent's Portable Doré. Applications such as data visualization of 3D CAD models, CFD, and FEA and other scientific data structures are demonstrated. Intelligent Light unveils a new product providing powerful benefits for interactive data visualization applications.

Intergraph Corporation
Booth 469

Huntsville, AL 35894-0001
205-730-2000; 205-730-6445 (fax)
Bev Staley
Trade Show Coordinator

Intergraph supplies integrated hardware and software solutions for diverse applications. For more than 20 years, Intergraph's excellent reputation has attracted customers from virtually every discipline, including mapping and geographic information systems (GIS); architecture, engineering and construction (AEC); electronic publishing; scanning; mechanical and electronic design; manufacturing; and dispatch management.

IRIS Graphics, Inc.
Booth 1265

Six Crosby Drive
Bedford, MA 01730
617-275-8777; 617-275-8590 (fax)
Douglas W. Smith
Vice President, Marketing and In-Direct Sales

IRIS Graphics introduces its small-format (A3), competitively priced, continuous-flow color ink jet printer, designed to provide unattended operation and photo-realistic full-color images. This printer will accommodate the color-hardcopy needs of CAD users, graphic artists, corporate publishing, medical imaging, and, like IRIS's larger-format printers, the color electronic prepress market.

Ithaca Software
Booth 1332

1001 Marina Village Parkway
Alameda, CA 94501
415-523-5900; 415-523-2880 (fax)
Eleanore Rewerts
Sales/Marketing Administrator

Ithaca Software is the maker of the HOOPS Graphics System. HOOPS, a sub-routine library used to create advanced 2D and 3D graphics applications, is the finest graphics development system available for personal workstations. It has been adopted by many leading software makers and is used in science, engineering, business, education, and medicine.

JVC Professional Products Company
Booth 1311

41 Slater Drive
Elmwood Park, NJ 07407
201-794-3900; 201-523-2077 (fax)
Ellin Everson
Manager, Advertising Sales Promotion

JVC is displaying: TK-F7100U Frame Capture Camera, with a high resolution of 1024 x 1024 pixels, fast capture time of 0.4 second and true-color capability; KY-15CIBU Computer Graphic Image Capture Camera, with a high-resolution of 668 x 480 pixels; TK-1070U RGB Frame Capture Camera, featuring horizontal resolution of more than 480 lines; KY-F30CI high-quality camera specifically designed for input to image processing systems; and GD-H3220USL 19" color display monitor.

LAZERUS
Booth 1256

2821 9th Street
Berkeley, CA 94710
415-339-6263; 415-845-1237 (fax and voice mail)
J. P. Culver
CEO

LAZERUS premieres "THE EXPRESSWAY," a multimedia supercomputer-level graphics workstation on a plug-in board for AT, 386 and 486 personal computers. LAZERUS shows *RADIANT* full-function 3D software for workstations and personal computers (which now includes our LazerRays ray-tracing), with animation capabilities and improved user-interface.

Levco Sales
Booth 864

6181 Cornerstone Court, Suite 101
San Diego, CA 92121
619-457-2011; 619-457-2325 (fax)
Gabriel Wilensky
Product Manager

Levco features Pixar's RenderMan imaging software running on the Levco 860i card and the Macintosh. RenderMan is a photo-realistic imaging software program that conforms to the Pixar specification for 3D color scene rendering. The Levco 860i card enhances the performance of the Macintosh II by 30 times. The Levco card is based on the Intel i860 RISC processor.

Litton Systems Canada Ltd.
Booth 1844

25 Cityview Drive
Etobicoke, Ontario, Canada M9W5A7
416-246-2277; 416-246-2763 (fax)
Stephen Weir
Public Relations Officer

Litton Systems Canada exhibits three unique display processor prototypes, demonstrates advanced avionics display processing technologies, and, using generic computer hardware, demonstrates high-performance graphics.

Lyon Lamb Video Animation Systems, Inc.
Booth 1035

4531 Empire Avenue
Burbank, CA 91505
818-843-4831; 818-843-6544 (fax)
Sheldon Pines
Vice President, Sales and Marketing

Lyon Lamb offers MiniVas industry standard animation controller performs field-accurate, single-frame recording and frame grabbing operations from computer graphics systems to standard VTRs. ENC-7, a broadcast quality encoder/sync generator, receives NTSC-compatible RGB output from your computer and provides full bandwidth I and Q outputs including composite video, component video Betacam or M-II, and S-VHS. The RTC state-of-the-art Real Time Scan Converter converts high-resolution workstation output to NTSC video.

Macmillan Publishing Company
Booth 1171

866 Third Avenue
New York, NY 10022
212-702-9881; 212-605-3085 (fax)
Marilyn McMahon
Exhibits Manager

Macmillan displays a variety of college textbooks, including *Computer Graphics* by Francis S. Hill, Jr., 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.

Macro Data, Inc.
Booth 121

1000 S. Park Lane #4
Tempe, AZ 85281
800-331-2834; 602-968-5017 (fax)
Dan Aton
Marketing Manager

Macro Data exhibits the TWINSCAN video scan doubler, which takes standard video and doubles the scan rate to produce an improved definition television image. At SIGGRAPH '90, Macro Data also introduces several other advanced presentation products.

Magni Systems, Inc.
Booth 1359

9500 S. W. Gemini Drive
Beaverton, OR 97005
503-626-8400; 503-626-6225 (fax)
JoAnn Waddell
Product Marketing Manager

Introduced at SIGGRAPH '89, Magni's VGA Producer has rapidly become the professional's choice for VGA-to-video conversion. It offers NTSC and S-VHS output; fading, overlay and other "effects" features; superior signal quality; and compatibility with many popular VGA cards. Take your first step into multimedia with VGA Producer.

Management Graphics, Inc.
Booth 1318

1401 E. 79th Street
Minneapolis, MN 55425
612-854-1220; 612-854-6913 (fax)
Sheri Keep
Marketing Assistant

Management Graphics features VIStar, a full-featured design system for a variety of graphic applications; Solitaire Image Recorder, a high-quality digital film recorder with up to 16K output; LANslide, a set of software programs and hardware which can be used to create, collect and image graphics in the VAX/VMS environment; and QM Network Concentrator, a graphics data collector for imaging a variety of files from PC, Macintosh and other resources.

Mars Microsystems Inc.
Booth 872

101 Bradford Road, Stonewood Commons
Wexford, PA 15090
412-934-1040; 412-934-1060 (fax)
Kevin L. Gonor
Vice President, Marketing

Mars Microsystems Inc. introduces a low-end Sun Microsystems compatible SPARC-based workstation with DOS compatibility. This system is manufactured in Taiwan by Tatung, and was co-developed by Tatung/Mars Microsystems engineering teams. The workstation has a PC/AT compatible bus with four slots and is 100 percent compatible with the existing Sun Microsystems software base.

Matrox Electronic Systems, Ltd.
Booth 1238

1055 St. Regis Boulevard
Dorval, Quebec, Canada HP92T4
514-685-2630; 514-685-2853 fax
Heather Marinos
Assistant Promotions Coordinator

Matrox features the EG3-1280, a high-resolution 3D graphics adaptor for EISA bus computer platforms. Also featured: the M-WIN Series, an 8514/A-compatible graphics adaptor for PC ATs, including a 2K x 1K frame buffer, 1280 x 1024 display resolution producing 256 colors. Also on display are the MP-860, a scalable, single-slot, parallel processor for EISA-based computers, and the MG-128, a high-resolution model for the MG-Series 8514/A graphics controllers.

Maximum Strategy Inc.
Booth 1824

1650-B Berryessa Road
San Jose, CA 95133
408-729-1526; 408-729-7084 (fax)
Neal Murray
Director of Sales

Maximum Strategy premieres the strategy/SZP fault tolerant disk array storage system, providing the most advanced technology in high-performance data storage.

Measurement Systems, Inc.
Booth 1049

121 Water Street
Norwalk, CT 06854
203-838-5561; 203-853-6244 (fax)
Gregory Beckett
Regional Sales Manager

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

Megatek Corporation
Booth 214

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

Megatek is demonstrating the premier line of high-performance PHIGS graphics products, both as Sun-based workstations and as board-level products. The PHIGStation and PHIGSEngine products provide accelerated graphics for the Sun SPARCstation 1 and other VME-based SPARC platforms. Also on display is Megatek's 944 visual simulation image generator.

Mercury Computer Systems, Inc.
Booth 116

600 Suffolk Street
Lowell, MA 01854
508-458-3100; 508-458-9580 (fax)
Cheryl Stevens
Marketing Communications Specialist

Mercury Computer Systems offers high-performance embedded and attached computer systems for compute and I/O intensive applications. Mercury's products, including the MC860 based on Intel's 1860 microprocessor, dramatically enhance floating-point performance in such application areas as medical imaging, signal/image processing and analysis, simulation/training, and seismic analysis.

MERET Optical Communications, Inc., An Amoco Company
Booth 1518

1800 Stewart Street
Santa Monica, CA 90404
213-828-7496; 213-828-7567 (fax)
Dianne Cawthray
Marketing Coordinator

MERET manufactures an extensive line of off-the-shelf fiber-optic communication systems for high-resolution RGB video transmission, closed-circuit television and data links. Applications include HDTV, surveillance systems, supercomputer graphics links, analog instrumentation and telemetry, and high-speed digital interconnects. MERET offers components to rack-mounted turnkey systems, serving a wide variety of markets such as HDTV, military communciations and security, C^3I, medical imaging, supercomputing, CAD/CAM, and factory automation.

Metheus
Booth 1407

1500 NW Compton Drive
Beaverton, OR 97006
503-690-1550; 503-690-1525 (fax)
Julia Bell
Trade Show Coordinator

Metheus provides 2D, 3D, stereographic, and animated graphics solutions for the Architectural Engineering CAD market using AutoCAD, Cadkey, Point Line, and Microstation from VGA to 1280 x 1024 displays.

Microfield Graphics, Inc.
Booth 1066

9825 SW Sunshine Court
Beaverton, OR 97005
503-626-9393; 503-641-9333 (fax)
Sharon L. Kelley
Marketing Administrator

Microfield Graphics displays high-resolution color graphics controllers for IBM AT, PS/2 and bus-compatible machines, including the ultra high-performance V8 Color Graphics Controller, the T8 Color Graphics Controller, and the T8/2 Color Graphics Controller—with Microsoft Windows/386, X Window 11.3 and CGI Libraries software.

Micrografx, Inc.
Booth 1411

1303 Arapaho Road
Richardson, TX 75081
214-234-1769; 214-234-2410 (fax)
800-733-DRAW, ext. 5050

Micrografx, an industry leader in graphics software for personal computers, exhibits Micrografx Designer, Graph Plus, Draw Plus, and 16,000 clipart 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. Graph Plus is a business charting program for creating charts from spreadsheet or database data. Draw Plus is an interactive drawing system for creating professional graphics, flowcharts, forms, and illustrations.

Microtime, Inc.
Booth 1362

1280 Blue Hills Avenue
Bloomfield, CT 06002
203-242-4242; 203-242-3321 (fax)
Norman Pinette
Manager, Advertising and Trade Shows

Microtime designs, manufactures and sells a range of computer graphics and digital video processing equipment for the broadcast, cable, corporate, industrial, and educational markets. At SIGGRAPH '90, Microtime displays the ImagePlus 3D Modeling, Animation and Paint System, and the IMPACT Variable Image Transformer.

Midwest Communications Corporation
Booth 1062

One Sperti Drive
Edgewood, KY 41017
606-331-8990; 606-331-0048 (fax)
Pete Rightmire
Marketing Communications Manager

Midwest, with 54 U.S. offices, is one of the nation's largest broadcast video equipment distributors and systems integrators. Midwest represents over 800 product lines including Ikegami, Commodore, Panasonic, Sony, JVC, Hitachi, and Conrac.

Minc Incorporated
Booth 1150

6755 Earl Drive
Colorado Springs, CO 80918
719-590-1155; 719-590-7330 (fax)
Jeanne Bellamy
MARCOM Coordinator

Minc provides advanced design synthesis tools for designing programmable logic. PLDesigner combines powerful design entry with automatic device selection, design fitting and partitioning to provide a variety of PLD solutions. PGADesigner provides implementation-independent design description methods for targeting PLDs or FPGA devices (or directed combinations thereof).

Minolta Corporation
Booth 1162

101 Williams Drive
Ramsey, NJ 07446
201-818-3517; 201-825-4374 (fax)
John McCasland
National Marketing Manager

Minolta Corporation introduces a new CRT color analyzer that enables objective white balance adjustment of any CRT. The new CA-100 can take quick and accurate measurement of any CRT regardless of phosphor characteristics. The new CA-100 displays chromaticity coordinates (x,y), luminance and correlated color temperature.

Mitsubishi Electric Sales America, Inc.
Booth 1255

800 Cottontail Lane
Somerset, NJ 08873
201-563-9889; 201-563-9196 (fax)
Rob Freedman
National Sales Manager

Mitsubishi's Professional Electronics Division markets a broad variety of high-end professional/industrial products through its dealers nationwide, including monochrome and color video copy processors (printers), projectors, monitors, and VCRs. Most of the products incorporate Diamond Scan technology, which enables automatic adjustment to horizontal scanning rates of video and computer graphics .

Mitsubishi Electronics
Booth 1445

991 Knox Street
Torrance, CA 90502
213-515-3993; 213-324-6466 (fax)
Elaine Nelson
Trade Show Manager

Mitsubishi Electronics offers a full line of color monitors, ranging in size from 14" to 37"; color thermal transfer printers; DOS and Macintosh desktop optical subsystems; desktop scanners; 80286- and 80386-based personal computers; and flexible, rigid, and optical library storage systems.

Mitsubishi International Corporation
Booth 1438

701 Westchester Avenue
White Plains, NY 10604
914-997-4960; 914-997-4976 (fax)
Anna DiPasquale
Marketing Coordinator

Mitsubishi International introduces an addition to its line of Shinko Color Thermal Printers—the CHC-745 which offers cut sheet at 300 dpi. Mitsubishi's range of products include 400 dpi color scanners, Ethernet network servers and a variety of software for multiple platforms.

Montage Publishing, Inc.
Booth 1233

25550 Hawthorne Boulevard #314
Torrance, CA 90505
213-373-9993; 213-373-0639 (fax)
Sandra Seeger
Circulation Manager

Computer Pictures is dedicated to covering computer graphics applications and new technology, with emphasis on use of microcomputer graphics in Fortune 1000 corporations, and applications in architectural and engineering desktop publishing, desktop video, graphic design, medicine, and education.

Morgan Kaufmann Publishers, Inc.
Booth 849

2929 Campus Drive, Suite 260
San Mateo, CA 94403
415-578-9911; 415-578-0672 (fax)
Elizabeth Essex
Marketing Coordinator

Included in Morgan Kaufmann's Series in Computer Graphics are *Geometric and Solid Modeling* by Christoph Hoffmann and *An Introduction to Splines for Use in Computer Graphics and Geometric Modeling* by Richard Bartels, John Beatty and Brian Barsky. New in 1990 is *Making Them Move: Mechanics, Control and Animation of Articulated Figures* edited by Norman Badler, Brian Barsky and David Zeltzer.

Motorola Semiconductor Products Sector
Booth 1075

6501 William Cannon Drive West
Austin, TX 78735
512-891-2039; 512-891-2947 (fax)
Jane Bates - OE314
DSP Business Manager

Motorola features HYPERformance 24-bit fixed-point DSP, 32-bit floating-point Media Processor, and the DSP56ADC16, and 16-bit Sigma-Delta Analog-to-Digital Converter products.

Mupac Corporation
Booth 1069

10 Mupac Drive
Brockton, MA 02401
508-588-6110; 508-588-0498 (fax)
Steven T. Cobb
Marketing Manager

Mupac Corporation offers a full line of system packaging products for VME, Sun, FutureBus+, PC/AT, and MultiBus I & II systems. Mupac also shows enclosures, backplanes, bus analyzers, bus repeaters, 6U/9U adaptors, and wirewrap panels.

National Computer Graphics Association
Booth 1442

2722 Merrilee Drive, Suite 200
Fairfax, VA 22031
703-698-9600; 703-560-2752 (fax)
Martha Filson
Manager, Corporate Sales

Stop by and pick up our material featuring NCGA GIS '90, Houston, August 26-29, NCGA '91, Chicago, April 22-25, 1991, where 27,000 users will meet with over 200 vendors. Experience what is new and exciting. All new conference program and featuring Integrate '91, a live systems demonstration. Also, the just released Graphics Performance Characterization (GPC) Picture Level Benchmark program for measuring graphics performance.

NEC Technologies, Inc.
Booth 638

1414 Massachusetts Avenue
Boxborough, MA 01719
508-264-8000; 508-264-8673 (fax)
800-NEC-INFO

NEC Technologies develops, manufactures, markets, and distributes a wide range of computer and home entertainment products. With the merger of NEC Home Electronics (U.S.A.) and NEC Information Systems, NEC Technologies offers desktop and portable computers, printers, CD-ROM hardware and software, graphics display products, floppy and solid-state disk drives, video games, data projectors, and other presentation equipment.

New Media Graphics Corporation
Booth 1817

780 Boston Road
Billerica, MA 01821
508-663-0666; 508-663-6678 (fax)
Mark Hopper
Sales Engineer

SIGGRAPH '90 is the first public showing of VideoWindows-Hi Res. This product (VME board or separate chassis) works with 1280 x 1024 resolution workstations and displays full-motion, digitized video in a window. Real-time video functions include scaling, zooming, flipping, fading, graphic and text overlays, and color adjustment. It offers near HDTV resolution for multimedia.

Nikon Electronic Imaging
Booth 1465

623 Stewart Avenue
Garden City, NY 11530
516-222-0200; 516-222-0267 (fax)
Robert Jones
National Sales Manager

Nikon Electronic Imaging provides a variety of products used in the computer graphics market, including LS-3500 Film Scanner, CP-3000 Full Color Printer and HQ-1500C HDTV Still Camera System. These are supported for IBM, Macintosh and some UNIX workstations.

Nissei Sangyo America, Ltd.
Booth 353

800 South Street
Waltham, MA 02154
617-893-5700; 617-237-2592 (fax)
Nancilee Franklyn
Director of Marketing Communications

Nissei Sangyo America, Ltd. is exhibiting products from Hitachi's Yokohama Works factory and controllers from Infotronic. Featured from Hitachi is the new CM2187. This multi-scanning color monitor includes a 21" flat screen with an invar mask, A/R panel, dynamic beam focus, micro-processor, and scans 30 to 75KHz. Also exhibited is the Superscan and the Superscript which includes the Infotronic controller. Also displayed is Infotronic, a line of TI 34020-based controllers.

Norick Software, Inc.
Booth 143

5400 N.W. Grand Boulevard, Suite 450
Oklahoma City, OK 73112
405-947-7560; 405-946-7559 (fax)
800-521-3279
Judy O'Dell
Director of Marketing

Norick Software develops PixSure File Pictorial Database, a data imaging system for creation of customized textual databases with high-resolution pictures captured through any NTSC source (TV, VCR, camcorder). Norick offers a library version for existing databases and compiles code through Clipper or Quick "C".

Nth Graphics, Ltd.
Booth 772

1807 West Braker Lane, Suite S
Austin, TX 78758
512-832-1944; 800-624-7552
George MacDonald
OEM Sales Manager

Nth Graphics is showing the new X-Windows acceleration system for the Nth Engine/350 display controller. This full implementation of X11R4 runs entirely on the Nth Engine. Also shown is the NthTV video animation system, which provides direct, simultaneous output to NTSC from 1280 x 960 resolution Nth Engine/550 and 660.

Numonics Corporation
Booth 1404

101 Commerce Drive
Montgomeryville, PA 18936
215-362-2766; 215-361-0167 (fax)
Celeste Cygan Hafler
Exhibits Coordinator

Numonics Corporation, a leading manufacturer of high-quality digitizers, displays a full range of tablets—including the 1/32"-thin GridMaster digitizing mat, the GraphicMaster series of tablets, the pressure-sensitive ZedPEN Plus tablet, and the 6-axis Max system. Numonics also manufactures backlit and translucent versions.

Océ Graphics USA, Inc.
Booth 144

222 West Las Colinas Boulevard, 1650
Irving, TX 75039
214-401-4171; 214-401-4051 (fax)
Therese Davis
Sales Support Engineer

Océ Graphics features true Adobe PostScript color thermal printers in A (8$\frac{1}{2}$" x 11") or B (11" x 17") sizes. All models are Pantone-certified and produce vibrant color prints on paper or transparency film at 300 dpi resolution. Océ also features ScreenRender, a complete printing system that produces hardcopy from screen images.

The Ohio Supercomputer Center
Booth 1826

1224 Kinnear Road
Columbus, OH 43212
614-292-3274; 614-292-7168 (fax)
Michelle Messenger
Project Coordinator

apE is a visualization environment consisting of data formats, user interfaces, documentation, a programming model, and much more. Based around a data-flow model, apE allows users to graphically construct pipe-lines to convert, render and view data. apE is distributed for Sun, HP, SGI, DEC, and other workstations.

Omnicomp Graphics Corporation
Booth 832

1734 West Sam Houston Parkway North
Houston, TX 77042
713-464-2990; 713-827-7540 (fax)
Anthony G. Masraff
President

Omnicomp specializes in designing and manufacturing high-performance graphics systems for systems integrators. Omnicomp's modular families of graphics products provide the systems integrator with an array of graphics display controllers, database managers, and frame grabbers for PC/AT, MultiBus II, VME, and other host independent platforms.

Oxberry
Booth 862

180 Broad Street
Carlstadt, NJ 07072
201-935-3000; 201-935-0104 (fax)
Jim Aneshansley
Director of Marketing

Oxberry manufactures still and motion picture film cameras for off-loading computer graphic film recorders. Also featured are a new line of 70mm overhead projection equipment and a complete line of digitizing stands.

Panasonic
Booths 827, 1027, 1032

Two Panasonic Way
Secaucus, NJ 07094
201 348-7000
Ron Tomczyk
Public Relations Manager

Panasonic Communications and Systems Company (PCSC) Office Automation Group (Booth 827) features computers, printers, and desk-top publishing. The PCSC Audio/Video Systems Group (Booth 1032) features professional/industrial audio/video equipment, including projection systems and still image video. Panasonic Industrial Company (Booth 1027) shows high-resolution OEM monitors, and full-color, green, and high-resolution plasma displays.

Paragon Imaging Inc.
Booth 345

171 Lincoln Street
Lowell, MA 01852
508-441-2112; 508-459-9719 (fax)
Technical Sales Department

Paragon demonstrates Visualization Workbench, a hardware-independent imaging software system for reconnaissance, remote sensing, medical, inspection, and laboratory applications. This product is based on X Windows, C + UNIX, and is available on workstations from SUN, DEC, IBM, Apple, SGI, Stardent, Tektronix, Sony, and more.

Parallax Graphics, Inc.
Booth 1611

2500 Condensa Street
Santa Clara, CA 95051
408-727-2220; 408-980-5139 (fax)
John Ricketson
Vice President, Sales & Marketing

Parallax's boards and software integrate NTSC/PAL video and workstation displays. Viper combines video input and high-resolution display for VMEbus and A Tbus systems. VideoView augments Sun workstation graphics with video input and output. The X Window System is available for Viper; both SunView and Open Windows are available for VideoView.

Peritek Corporation
Booth 745

5550 Redwood Road
Oakland, CA 94619
415-531-6500; 415-530-8563 (fax)
Elyssa Edwards
Sales and Marketing Manager

Peritek displays the new VCT-Q, the first TMS 34020-based Q-bus graphics board for DEC MicroVax and LSI-11 computers. The VCT displays 1280 x 1024 x 24 bits/pixel with a 4-bit overlay. Peritek also demonstrates its X Windows/DECwindows server, medium-resolution display controllers and an encoder which converts RGB signals to the NTSC video signal.

Personal Workstation
Booth 1419

501 Galveston Drive
Redwood City, CA 94063
415-366-3600

Personal Workstation is the only monthly publication exclusively serving the 32-bit workstation market and its principal applications, including CAD/CAM/CAE and high-performance graphics.

Philips Components-Signetics
Booth 632

811 E. Arques Avenue
Sunnyvale, CA 94088-3409
408-991-3615; 408-991-2311 (fax)
Steve Solari
Marketing Manager, Video Components

Philips Components-Signetics debuts the Phixel Family of video digital signal processing integrated circuits, including high-performance integrated circuits, A/D converters, digital video color decoders, digital color space converters, and programmable logic devices.

Photron Limited
Booth 1169

Dogenzaka 2-8-7
Shibuyaku, Tokyo 150, Japan
81-3-486-3471; 81-3-486-8760 (fax)
Hideo Osato
Manager, International

The FSC-64000AL Frame Scan Converter takes high-res graphics signals (RGB) from graphics workstations and converts them into the NTSC television signal.

Pixar
Booth 1249

1001 West Cutting Boulevard, Suite 200
Richmond, CA 94804
415-236-4000; 415-236-0388 (fax)
Joy Folla
Marketing Communications Coordinator

Pixar debuts RenderMan applications for end-users who wish to create impressive 3D pictures; Finishing Touch, for high-impact image detailing by moving lights, objects and applying appearances; Appearance Fonts; a library of surfaces; and Clip Objects, photo-realistic objects for image enhancement. These products are complimented by Pixar's MacRenderMan powerful rendering software which produces photorealistic images.

Pixel Magazine
Booth 140

2 rue du Faubourg Poissonniere
Paris, France 75010
33 145233981; 33 142470873 (fax)

Pixel, France's exciting computer graphics magazine, showcases outstanding computer-generated images created by innovative artists from across the globe. *Pixel* is a sister publication of *ZOOM* magazine.

Pixelworks, Inc.
Booth 953

7 Park Avenue
Hudson, NH 03051
603-880-1322; 603-880-6558 (fax)
Rattan Dhar
President

Pixelworks, Inc., a leader in high-performance, high-resolution graphics, is demonstrating the family of Ultra Clipper Graphics Controllers. With resolutions of 1280 x 1024 and 1024 x 768, and industry-leading performance, these products can be seen running AutoCAD, VersaCAD, CADKEY, and Personal Designer on both PC AT and Micro Channel computers. Products also run under UNIX, X Windows and Windows.

Polhemus Incorporated
Booth 759

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

The 3SPACE Tracker, Digitizer, and Isotrak all provide real-time measurement of a sensor's position and orientation in 3D space. 3SPACE has the natural and intuitive interface solution to collect data for 3D CAD programs, to control and manipulate graphic objects, or to measure motion for artificial reality applications.

Prentice Hall
Booth 142

College Division
Englewood Cliffs, NJ 07632
201-592-2000

Prentice Hall features college textbooks and manuals.

Presentation Business News
Pacific Magazine Group
Booth 762

513 Wilshire Boulevard, Suite 344
Santa Monica, CA 90401-1444
213-455-1414; 213-393-5222 (fax)
Adrienne Miller
Trade Show Manager

Presentation Business News is designed to help dealers understand and profit from the presentations market, with coverage of the many products used to create, produce and deliver presentations such as computer graphics, audio-visual and video. Copies of the publication and subscription forms are available at the booth.

Presentation Products Magazine
Pacific Magazine Group
Booth 762

513 Wilshire Boulevard, Suite 344
Santa Monica, CA 90401-1444
213-455-1414; 213-393-5222 (fax)
Adrienne Miller
Trade Show Manager

Presentation Products Magazine is written for those individuals in corporations and institutions responsible for the selection of products needed to create, produce and deliver presentations. Each issue provides a monthly guide to products and services available, including information on computer graphics, video, audio, hardware, software, and production houses. Copies of the magazine and subscription forms are available at the booth.

QMS, Inc.
Booth 1614

One Magnum Pass
Mobile, AL 36618
205-633-4300; 205-633-0013 (fax)
Dan Widger
Marketing Services

QMS exhibits its entire line of Adobe PostScript-based monochrome laser printers and color thermal transfer printers.

Rainbow Technologies, Inc.
Booth 1354

9292 Jeronimo Road
Irvine, CA 92718
714-454-2100; 714-454-8557 (fax)
800-852-8569
Karen Tacy
Marketing Services Coordinator

Rainbow Technologies is displaying its Software Sentinel family of software protection devices, utilized by software developers to prohibit the unauthorized distribution of their software. These execution control devices attach easily to parallel printer ports and are compatible over a wide range of computer platforms such as IBM PCs and compatibles, Macintosh, NEC and Xenix/UNIX-based computer systems.

Ramtek Corporation
Booth 1401

1525 Atteberry Lane
San Jose, CA 95131
408-954-2714; 408-954-0118 (fax)
Karen L. Smith
Manager, Marketing Communications

Ramtek's Millennium Visualization System provides 80 MegaFLOPS of floating-point processing power, 10 MIPS of graphics, 16 Mbytes of system memory, 2K by 1K resolution, live video in a window, and X Window acceleration. The Ramtek Millennium is the first imaging solution that offers an imaging standard—and it connects to any workstation.

RasterOps Corporation
Booth 1624

2500 Walsh Avenue
Santa Clara, CA 95051
408-562-4200; 408-562-4065 (fax)
Carrie Coppe
Marketing Communications Specialist

RasterOps manufactures color video technology for high-performance workstations supporting Macintosh, Sun and IBM. RasterOps displays 1024 MC, the first 24-bit True Color microchannel board for the IBM; Sun SPARC Card TC, which offers 24-bit True Color forSun Sparc Stations; SPARC Card TC PIP, which offers 24-bit display as well as live video and frame capturing; and Video Colorboard 364, a 24-bit display board with the ability to bring in live video.

Raytheon Company Submarine Signal Division
Booth 973

1847 West Main Road
Portsmouth, RI 02871
401-847-8000; 401-847-8002 (fax)
John A. Lorea
Marketing Manager, Production Components

TDU Thermal Display Unit hard copy recorders in free-fall and flat-bed configurations are demonstrated. These recorders display true grey shades at high speeds and, with high resolution, produce recordings of near-photographic quality. The division also exhibits various standard electronic modules.

Redlake Corporation
Booth 1841

15005 Concord Circle
Morgan Hill, CA 95037
408-779-6464; 408-778-6256 (fax)
Cindy Adams
Sales Administrator

Redlake Corporation exhibits its line of digital video board products which display full motion video on PC screens. Redlake's boards are key components in interactive and multimedia PC computing systems. Also exhibited are device drivers and custom software applications which display board product capabilities.

RGB Spectrum
Booth 462

2550 Ninth Street
Berkeley, CA 94710
415-848-0180; 415-848-0971 (fax)
Dan O'Brien
Vice President, Sales

RGB Spectrum manufactures videographic products for integrating computers and video, with applications such as visualization, imaging, interactive video disc training, teleconferencing, and CAD/CAM. The RGB/Videolink scan converter transforms computer graphics to television format (NTSC or PAL). The RGB/View video windowing system displays live video on the computer monitor. RGB Spectrum also performs custom engineering in video/computer integration.

Ricoh Corporation
Booth 1834

5150 El Camino Real, Suite C-20
Los Altos, CA 94022
415-962-0443; 415-962-0441 (fax)
Catherine Swanson
Marketing Support Specialist

Ricoh offers a complete line of removable media products including rewritable optical, WORM optical and a 50mb removable cartridge hard disk drive. Products are sold to OEMs, VARs and system integrators that design and provide solutions for applications requiring manipulation of large amounts of data.

Sampo Corporation of America
Booth 656

5550 Peachtree Industrial Boulevard
Norcross, GA 30071
404-449-6220; 404-447-1109 (fax)
George Korzeniewski
Vice President

Sampo exhibits its own brand of monitors—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; and resolutions up to 1600 x 1280. Also, Sampo shows 14' and 20' multi-frequency color monitors, 80286 and 80386 personal computers, and graphic add-on boards.

Scitex Corporation Ltd.
Booth 1265

P.O. Box 330
Herzlia B. Israel 46103
972-052-549311; 972-052-559810 (fax)
Aharon Nizani

Ron Scott Inc.
Booth 1828

1000 Jackson Boulevard
Houston, TX 77006
713-529-5868; 713-529-9370 (fax)
Karla West
Program Administrator

The QPR Matrix/Solitaire film recorder driver makes high-resolution slides look sharper, better defined. QFX and Hi-Res QFX image processing/special effects packages can sharpen images; adjust contrast, brightness, color; and add special effects to any size TGA images. QLIC prints any size TGA image files to HP LaserJet and compatibles.

Seiko Instruments USA, Inc.
Booth 1218

1130 Ringwood Court
San Jose, CA 95131
408-922-5800; 408-922-5840 (fax)
Cheryl Landman
Marketing Communications Manager

Seiko Instruments is showcasing its family of desktop color printers which produce high-quality A and B size color output on paper or transparency film, 300 dpi. Video, parallel and network interfaces allow connections to workstations, PCs and the Macintosh. Also demonstrated is ColorPoint PS, a PostScript language-compatible desktop color printer.

SGS-THOMSON Microelectronics, Inc.
Booth 1432

1000 East Bell Road
Phoenix, AZ 85022
602-867-6235; 602-867-6290 (fax)
Jason Yang
Technical Liaison Engineer

The IMSG3XX family of highly integrated, flexible, fully programmable color video controllers permits design of real-time graphics systems compatible with most processors and monitors. Built-in PLL, VTG, cursor, triple 8-bit LUT and Video DACs enable up to 24-bit color and allow video rates up to 125 MHz.

Sharp Electronics Corporation
Booth 866

Sharp Plaza
Mahwah, NJ 07430
201-529-8200; 201-529-9637 (fax)

Sharp Electonics Corporation showcases the JX-100 hand-held scanner, the JX-600 commercial scanner with 600 dpi resolution, the JX-300 business scanner, and Sharp's JX-450 professional scanner. The JX-730 ink jet printer prints in 16.8 million vivid colors. Sharp's new CX-7500 color copier reproduces the color printed output at 7.5 copies per minute, up to 11" x 17", on plain bond paper and transparency film.

Shima Seiki USA, Inc.
Booth 1235

22 Abeel Road
Cranbury, NJ 08512
609-655-4788; 609-655-3989 (fax)
Helen Estakhrian
Sales Manager

SGX SYSTEMS are high-resolution paint systems with an 8K by 8K maximum size frame buffer. They feature full antialiasing, high-speed airbrush, soft-edge mask, interpolation resizing, and rotation. Options include 3D polygon/mapping, hard disk/optical disk and magnetic tape storage.

SIGGRAPH '91
Registration Entrance

Conference Co-Chairs:
Michael Bailey
Carol Byram
Exhibits Chair:
Norm Abelson

SIGGRAPH '91 will be held 28 July-2 August 1991 in Las Vegas, Nevada. For details on how you can contribute to the success of this conference, please see the "Call for participation" section at the end of this program or pick one up at the SIGGRAPH '91 booth. Posters, pins, and contributor packets are also available. For conference information, call 312-644-6610. For exhibition information, call 212-752-0911.

SIGGRAPH Education Committee
Registration Entrance

Mathematics/Computer Science
Georgia State University
Atlanta, GA 30303
404-651-2245
G. Scott Owen
Chair

The ACM SIGGRAPH Education Committee furthers the role of computer graphics education and computer graphics in education. The committee has several on-going projects, including curriculum projects in art, computer science and engineering. Other projects involve ways to support educators in graphics, such as materials development and communication with other educators.

SIGGRAPH Local Groups

Registration Entrance

491 McLean Avenue
Yonkers, NY 10705
212-684-7400
Scott Lang
Booth Coordinator

The SIGGRAPH local groups booth is concerned with promoting the activities and benefits of belonging to a SIGGRAPH local group. The local groups are based in cities and areas throughout the United States and the rest of the world. They hold meetings and events throughout the year. To find out about the local group nearest you, stop by.

SIGGRAPH Show Daily

Booth 718

One Technology Park Drive
Westford, MA 01886
508-692-0700; 508-692-0525 (fax)
Robert Holton
Publisher

The *SIGGRAPH '90 Show Daily* covers show news, technical program highlights, product news, the art show, the film and video theater, workshops, and the hypermedia exhibit. The *Show Daily* also provides a listing of exhibitors, a floor plan, and an entertainment and restaurant guide for the city of Dallas.

SIGGRAPH Video Review

Registration Entrance and Booth 453

c/o 1st Priority
Box 576
Itasca, IL 60143-0576
800-523-5503; 708-250-0038
Ouside USA 800-523-5503
Customer Service & Tape Order Department

The internationally distributed *SIGGRAPH Video Review* is the premier videotape publication illustrating the latest concepts in computer graphics and interactive techniques. There are 60 issues which profile artistic, commercial, educational, scientific, and application-oriented computer graphics. Special issues present the latest developments in volume visualization, HDTV and the Quest for Virtual Reality.

Sigma Electronics, Inc.
Booth 127

P.O. Box 448, 1184 Enterprise Road
East Petersburg, PA 17520
717-569-2681; 717-569-4056 (fax)
Kent Porter
Vice President, Operations

Sigma Electronics showcases wide-band switching and distribution equipment for high-resolution graphics applications and RBG/NTSC encoding and decoding products.

SigmaSoft and Systems, Inc.
Booth 651

17000 Dallas Parkway, Suite #207
Dallas, TX 75248
214-380-6187
Clay D. Montgomery
President

SigmaSoft's new product, Maverick graphics processor, connects to any host via SCSI. It provides 2/8 MB of video memory and 4/16 MB of display list memory, with 1280 x 1024 x 4/8 resolution. It also includes 25 MHz MC68020, MC68882, 25MFLOP DSP32C, 27 MIPS drawing processor. Sigma*CGI is a comprehensive implementation of the ANSI Computer Graphics Interface. AutoCAD and FastCAD drivers are also available.

Silicon Graphics Computer Systems
Booths 421, 821

2011 N. Shoreline Boulevard
Mountain View, CA 94039-7311
415-960-1980; 415-961-0595 (fax)
Kay Robertshaw
Trade Show Specialist

Silicon Graphics is a leading manufacturer of high-performance workstations and computing systems for visual processing applications. These workstations are used by engineers, scientists and creative professionals in the design, analysis, manufacture, and simulation of 3D products. From low-cost Personal IRIS to high-end IRIS POWER Series, Silicon Graphics offers the most complete family of binary-compatible products in the industry.

SOFTIMAGE Inc.
Booth 1607

3510, boul. St-Laurent, Suite 214
Montreal, Quebec, Canada H2X 2V2
514-845-1636; 514-845-5676 (fax)
Char Davies
Vice President of Visual Research

SOFTIMAGE, a worldwide leader in high-end, interactive, 3D computer animation and rendering software, presents the latest version of the SOFTIMAGE Creative Environment. Version 2.0 includes powerful new tools for modeling and industrial design, animation and rendering.

Software Security, Inc.
Booth 659

1011 High Ridge Road
Stamford, CT 06905
203-329-8870; 203-329-7428 (fax)
Jan Norman
Director of Marketing Communication

Software Security's patented Activator products are user-transparent hardware keys for IBM and compatible PCs and Macintosh computers that prevent unauthorized use of software. The user can make unlimited copies, but the software is executable only when the key is attached.

Sony Corporation
Booth 207

3 Paragon Drive
Montvale, NJ 07645
201-930-1000; 201- 930-4752 (fax)

Sony Corporation of America, now celebrating 30 years in America, built its reputation by leading the industrial electronics markets with the introduction of new and innovative products. The corporation now holds a commanding position in professional video, OEM, microsystems, imaging, mass storage, and graphic display monitors.

Spatial Systems, Inc.
Booth 125

900 Middlesex Turnpike; Building #8
Billerica, MA 01821
508-670-2720; 508-670-2720 (fax)
Ian Roberts
President

Spaceball is the leading-edge graphics control device from Spatial Systems, Inc. A hand-sized ball, resting on an ergonomically designed base, simultaneously senses all forces and torques applied to manipulate graphics images on your computer screen. It runs on all major graphics platforms including Silicon Graphics, Apollo/HP, DEC, Sun, Stardent, and Intergraph.

Springer-Verlag
Booth 962

175 Fifth Avenue
New York, NY 10010
212-460-1601; 212-473-6272 (fax)
Fauzia Subhani
Exhibits Assistant

You've seen fractals before. Yes, they are everywhere. But have you seen L-Systems? The fractal is to natural landscapes as the L-System is to living plants. Now, for the first time, see the landmark book on L-Systems, *The Algorithmic Beauty of Plants*, by Przemyslaw Prusinkiewicz and Aristid Lindenmayer. The author is at our booth to answer questions.

Stardent Computer Inc.
Booth 227

95 Wells Avenue
Newton, MA 02159
617-964-1000; 617-964-8749 (fax)
Sharon Cullina
Manager, Exhibits and Promotions

Stardent Computer exhibits systems which combine the computational power, high-performance graphics and easy-to-use visualization software required for interactive visualization. Rapidly becoming adopted as the industry's dominant visualization standard, AVS lets end users build complex visualization applications without graphics programming and become quickly familiar and productive with the benefits of visualization. Doré is the most complete, easy-to-use, 3D graphics library available today.

Star Technologies, Inc.
Booth 642

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

Star Technologies, Inc. is a leading producer of image generators for simulation, training and research. The Graphicon 2000 IG is the price/performance leader for real-time (30-60 Hz) image generation using photo-derived texture and 4 x 4 subpixel antialiasing.

StereoGraphics Corporation
Booth 614

2171 H East Francisco Boulevard
San Rafael, CA 94901
415-459-4500; 415-459-3020 (fax)
Dennis K. Hale
Show Manager

StereoGraphics Corporation produces professional stereo 3D viewing devices for computer graphics, video and large screen projection systems. Stereo 3D viewing is beneficial because it increases productivity, provides high-impact presentations, and effectively communicates information. Stereo 3D viewing is used in modeling, MCAD, AEC, simulation, and scientific visualization.

Summagraphics Corporation
Booth 414

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

Summagraphics Corporation exhibits its full line of input and output devices including: SummaSketch II, and recently introduced SummaSketch II with Animator template, Microgrid III, Summagraphics LCL, and Surface Lit Microgrid. Also shown are the Houston Instrument JetPro printer/plotter, the Image Maker desktop pen plotter, the DMP-60 DL Series of drafting plotters, and the LDS 4000 wide-format scanner.

Sun Microsystems, Inc.
Booth 1201

2550 Garcia Avenue, PAL 1-507
Mountain View, CA 94304
415-960-1300; 415-969-9131 (fax)
Carrie Dillon
Public Relations Specialist

Sun Microsystems is demonstrating a wide range of graphics functions on the GX, GXP and CXP family of graphics workstations. The GX allows very fast rendering of color, 8-bit 2D/3D vectors, while the CXP offers 8-bit color and 3D solids modeling. The GXP provides 24-bit color and 3D solids modeling. Also featured are Sun's visualization and image processing accelerators, software, and a broad range of graphics software libraries, such as XGL, SunPHIGS and SunGKS.

Suntech Journal
Booth 560

80 Elm Street
Peterborough, NH 03458
603-924-0100; 603-924-6972 (fax)
Roger Strukhoff
Publisher

Suntech Journal is the leading monthly publication devoted to the Sun Microsystems and compatibles market. *Suntech* has a circulation of 35,000 copies and is published by IDG Communications, with offices in Redwood City, California and in Peterborough, New Hampshire.

Supercomputing Review
Booth 1825

8445 Camino Santa Fe
San Diego, CA 92121
619-452-4242; 619-452-4224 (fax)
Sarah Smalley
Circulation Manager

Supercomputing Review is the award-winning, leading magazine for high-performance computer graphics and animation. The monthly publication presents the latest information about developments in this rapidly changing industry, with colorful graphics and in-depth articles on applications, hardware, systems and software. Pick up your copy and see why *Supercomputing Review* is *the* publication for this exclusive community.

Symbolics, Inc.
Booth 814

8 New England Executive Park East
Burlington, MA 01803
617-221-1000; 617-221-1009 (fax)
Joe Plonski
Director of Graphics Marketing

Symbolics' state-of-the-art animation systems provide advanced 2D animation, 3D animation and paint capabilities for professionals in the video and post-production, corporate, broadcast, and engineering markets. For the emerging HDTV market, Symbolics recently introduced Framethrower, the first commercially available, high-definition videographics processor, and the XL400 High-Definition Colorstation, the industry's first high-definition workstation.

TEAC America, Inc.
Booth 949

7733 Telegraph Road
213-726-0303
David Oren
National Sales Manager

TEAC Recordable Videodisc Division products are marketed for multiple application in cross-industry environments. They are used for image archiving; bio-medical image recording; computer-controlled still-step animation sequence recording; and disc-based film and video editing. TEAC offers a full line of color, mono-chromatic record/playback, playback-only, and RGB processor products.

Techexport, Inc.
Booth 110

One North Avenue
Burlington, MA 01803
617-229-6900; 617-229-7706 (fax)
James G. 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 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 Images/CG News Europe
Booth 660

11 bis, rue du Colisée
Paris, France 75008
331 42 86 97 48; 331 46 36 99 47 (fax)
Christopher Dietrich
Publisher

Tech Images, published in France, is Europe's leading professional magazine for image processing and computer graphics, an indispensable reference for engineers, marketing specialists, technicians, and artists. *CG News Europe*, launched at SIGGRAPH '90, is positioned as Europe's leading computer graphics industry newsletter for Europe, U.S. and world news.

Tech-Source Inc.
Booth 749

442 S. North Lake Boulevard #1008
Altamonte Springs, FL 32701
407-830-8301; 407-339-2554 (fax)
Richard E. Bendfelt
Director of Sales

Tech-Source manufactures high-performance, high-resolution VME graphics controllers designed to fit the requirements of several vertical markets. Tech-Source introduces the latest X Windows accelerator graphics controllers: Hammerhead, a 1280 x 1024 multiple display graphics controller, and GDS-3950, a 2048 x 2048 high-resolution graphics controller.

Tektronix, Inc.
Booth 807

P.O. Box 1000
Wilsonville, OR 97070
503-682-3411; 503-682-7178 (fax)
Donna Loveland
ITD Public Relations Manager

Tektronix is demonstrating new products in an unprecedented integration of graphics, video and imaging technologies. Featured are new XD88 Series graphics superworkstations; new interactive visualization software; new TekXpress X terminals; new color printers—multitasking, X Windows printing, for workstations/Macs/PCs; new stereoscopic/liquid crystal color shutter displays; and many application solutions.

Telex Communications, Inc.
Booth 951

9600 Aldrich Avenue South
Minneapolis, MN 55420
612-884-4051; 612-884-0043 (fax)
Ron Taylor
Director of Advertising

Telex exhibits its full line of presentation products including LCD computer projections panels, 35 mm slide projectors and video projectors. Special introductions are the Magnabyte models 6000 full color (RGB) LCD panel and model 2001 single lens video projector.

Template Graphics Software, Inc.
Booth 1426

3510 Dunhill Street
San Diego, CA 92121
619-457-5359; 619-452-2547 (fax)
Kristy Benner
Marketing Communications Manager

Template Graphics Software, Inc., a subsidiary of Liant Software Corporation, specializes in development systems for generating portable graphics applications. TGS provides powerful graphics functionality across a wide range of the industry's leading computer platforms, from workstations to supercomputers. TGS products are used in a broad customer base, including Fortune 500 companies, software application developers, the government, and universities.

Ten X Technology, Inc.
Booth 138

4807 Spicewood Springs Road, Bldg. 3, Suite 3200
Austin, TX 78759
Margarette Williams
Manager, Product Marketing

Ten X exhibits the Opti-Win and Opti Xchange optical disk subsystems. The Opti Xchange supports both WORM and Erasable media. The systems are compatible with a variety of computers, operating systems and SCSI host bus adapters. No software drivers are required for integrating these subsystems into computer systems.

Texas Instruments
Booth 1245

P.O. Box 809066
Dallas, TX 75380
800-336-5236
Customer Response Center

Texas Instruments features PC and workstation imaging and graphics applications based on high-performance graphics processors, including TMS340 graphics system processors and accompanying 34082 floating-point coprocessors; TMS320 digital signal processors; and 1-Megabit video RAM memory devices. Also featured is a demonstration of 3D display technology developed by Texas Instruments.

Texas Memory Systems, Inc.
Booth 635

9888 Bissonnet, #470
Houston, TX 77036
713-771-8200; 713-771-8187 (fax)
Hope Marcotte
Exhibits Coordinator

Texas Memory Systems displays Real-Time Machines—SAM-1000/2000/3000 memory systems allow fast, real-time processing with 1 GB memory, 500 MB/sec. bandwidth, 16 I/O ports and 2000 MFLOPS processing power. They interface to Sun, VMEbus, DEC, and Concurrent systems for high-performance applications such as image processing, data acquisition, medical imaging, and simulation.

Texnai Inc.
Booth 1642

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

Texnai is exhibiting a high-quality color image station FBX-Studio/AT using the Color Laser Copier 500; CLC-Master, a general purpose controller for the Canon Color Laser Copier 500 (Macintosh Version); and FBX24VF/AT and FBX32/SUN, newly developed videographic boards.

Thomson Digital Image
Booth 1214

1270 Avenue of the Americas
New York, NY 10020
212-247-1950; 212-247-1957 (fax)
Denis Schlumberger
President, TDI America

Break away from the crowd with TDI Explore V2.3, interactive software for 3D animation. Explore delivers six animation modes, 2D mapping, 3D texturing, fast rendering, and more. The most intuitive tool for computer-aided industrial design (CAID) is TDI's Explore Designer, featuring NURBS-based modeling and extensive CAD/CAM interfaces.

Time Arts Inc.
Booth 1435

1425 Corporate Center Parkway
Santa Rosa, CA 95407
707-576-7722; 707-576-7731 (fax)
Laura Malone
Director of Marketing

Time Arts presents image creation software: LUMENA for the PC platform, and OASIS, for the Macintosh. With eight years' experience in the development of computer graphics software for professionals in the graphic and design arts, Time Arts invites end users, resellers and OEMs to see the future of image creation for print, film and video applications.

Toshiba America Electronic Components, Inc.
Booth 232

One Parkway North, Suite 500
Deerfield, IL 60015-2547
708-945-1500; 708-945-1044 (fax)
Craig Westcott
Assistant Manager, Sales and Marketing

Toshiba is exhibiting high-resolution color monitors and CRTs. This year, Toshiba introduces a 21" FLAT SQUARE (FS) Multi-scan color monitor for the distribution/dealer marketplace [VGA through 1600 (H) x 1280 (V)]. The FS Invari mask and flatter faceplate achieve superior ergonomics. A new 17" FS color monitor [VGA through 1280 (H) ax 1024 (V)] is also displayed.

TOYO Spectrum & Team Systems
Booth 714

2934 Corvin Drive
Santa Clara, CA 95051
408-720-8877; 408-720-9643 (fax)
George Stoeppel
President

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 1601

7340 Shadeland Station
Indianapolis, IN 46256
317-841-0332; 317-576-7700 (fax)
800-858-TRUE

Truevision demonstrates its award-winning videographics cards in conjunction with various third-party software developers to present the latest in professional quality multimedia/video applications. Exciting new additions to Truevision's product line are also demonstrated.

Uniras, Inc.
Booth 432

5429 LBJ Freeway, Suite 650
Dallas, TX 75240
214-980-1600; 214-991-1860 (fax)
Clay Harris
National Marketing Manager

Uniras, Inc. represents scientific data visualization software including 2D/3D interactive charting and graphing, interactive 2D/3D mapping, interactive object-oriented editing, and interactive CGM interpretation/graphic composition. Uniras software interfaces with X Windows version 11, generates Postscript output and is available on all popular workstation, mainframe and supercomputing platforms.

University of Lowell
Booth 653

One University Avenue
Lowell, MA 01854
508-934-2630; 508-458-8289 (fax)
Frank Drake
Research Manager

The University of Lowell is exhibiting software and hardware in the areas of: image processing (Imaging Kernel System, Optical Character Recognition); computer graphics (GKS, X Window System); joint university/industry technology developments; user interface tools (OSF/MOTIF); multimedia environments and applications; and visualization (Exvis).

Univision Technologies, Inc.
Booth 1254

Three Burlington Woods
Burlington, MA 01803
617-221-6700; 617-221-6777 (fax)
Bonnie Shields
Corporate Communications Manager

Univision designs and develops high-resolution graphic controllers,supplying controllers that allow images of 1280 x 1024 and greater to be displayed on screen. Univision offers a range of products on IBM PC, DEC, Sun Microsystems, and VME plat-forms that support resolution as high as 2K x 2K.

UNIX Review Magazine
Booth 950

500 Howard Street
San Francisco, CA 94105
415-397-1881; 415-995-2487 (fax)
Joyce Schroeder
Administrative Manager

UNIX Review magazine is devoted to the computer industry and other business professionals involved in the design, development, implementation, purchase, use,or assessment of UNIX or UNIX-like systems. Feature articles focus on analysis of technologies while the magazine's department sections cover industry news, corporate developments and products.

UNIXWorld Magazine
Booth 1804

444 Castro Street
Mountain View, CA 94041
415-940-1500; 415-967-1257 (fax)
Robert Billhimer
Publisher

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

Van Nostrand Reinhold
Booth 124

115 Fifth Avenue
New York, NY 10003
212-254-3232; 212-254-9499 (fax)
Deborah Emin/Dianne Littwin
Product Manager/Editor

Van Nostrand Reinhold publishes professional and reference books in computer graphics, including *Green's Digital Image Processing, Second Edition*, and *Computer Graphics for Designers and Artists* by Kerlow/Rosebush.

Vicom Systems, Inc.
Booth 1421

46360 Fremont Boulevard
Fremont, CA 94538
415-498-3284; 415-498-3325 (fax)
Sandy Stausenbiel
Marketing and Communications Manager

Vicom introduces the MASTER Series of image processors, with up to 896MB of image memory, an internal bus rate of 160 MB/second, full X Window implementation for network image processing, and a capability of up to 3-1600 x 1280 x 60 Hz non-interlaced display monitors. Also featured, the Pixar Image Computer and its software packages Electronic Light Table, Electronic Darkroom, ChapReyes, and ChapVolumes for volume and surface rendering.

Videographics Corporation
Booth 460

212 West Superior, Suite 403
Chicago, IL 60610
312-642-6652; 312-642-6608 (fax)
Patricia Moffitt
Director of Marketing

Videographics Corporation specializes in integrating professional quality Macintosh hardware and software systems. Videographics features high-end graphics products, 2D and 3D animation packages and paint and archiving software, that are not readily available through video dealers or authorized Apple dealers. In addition, Videographics offers comprehensive consulting, training and technical support services.

Videomedia
Booth 646

211 Wedell Drive
Sunnyvale, CA 94089
408-745-1700; 408-745-6721 (fax)
Stan Sult
Products Manager

Videomedia offers "Animation +" V-Lan-based, frame-accurate animation control for VTRs plus a full-featured A/B Roll editing system (Micron) "V-Lan" industry standard frame accurate transport control network.

Video Systems
Booth 853

9221 Quivira
Overland Park, KS 66215
913-541-6626; 913-541-6697 (fax)
John Torrey
Publisher

Video Systems shows video professionals the latest techniques and technologies, including ways to establish direct links between productions and an improved bottom line.

Videotex Systems Inc.
Booth 751

8499 Greenville Avenue, #205
Dallas, TX 75231
214-343-4500; 214-348-3821 (fax)
Bob Gillman
President

Videotex Systems unveils the latest versions of its productivity software for TARGA and video capture boards. Products displayed include: T-BASE for picture databases; T-SEP for color separations; T-EGA for TARGA to VGA conversions; T-SCAN for desktop publishing; SCAN-T for PC to TARGA conversions; and the new T-TOOLS, a collection of powerful TARGA tools.

Viewpoint Animation Engineering, Inc.
Booth 1645

140 South Mountainway Drive #1
Orem, UT 84058
801-225-1905; 801-225-2084 (fax)
John Thomas
General Manager

Viewpoint is a full-service animation company specializing in creation of 3D objects. With over six years' animation experience, Viewpoint is a leader in the field of accident reconstruction animation, concept visualization and entertainment. Using at least four different digitizing systems, we digitize any object for 3D use.

VisionBase, Inc.
Booth 559

380 Foothill Road
Bridgewater, NJ 08807
201-218-0900; 201-707-1454 (fax)
Kevin Moran
Account Executive

VisionBase features ANIMAX, a PC-based presentation system combining TV-quality video with CD-quality sound, allowing you to create and display real-time animation effects directly from your hard disk; and ZEPHYR, a powerful PC-based pictorial database system providing flexible creation, storage, and retrieval of text and photographic images.

Vision Technologies
A Division of Everex Systems
Booth 445

48431 Milmont Drive
Fremont, CA 94538
415-683-2900; 415-657-0601 (fax)
Dana Kim
Trade Show Coordinator

Vision Technologies exhibits its line of image capture and VGA to video boards; announces new products for the multimedia market; and demonstrates exciting new third-party software. The Vectrix division of Everex demonstrates its TIGA compatible high-resolution display cards.

Visualization Technologies, VT Inc.
Booth 135

23500 Mercantile Road
Cleveland, OH 44122
216-831-6782; FAX: 216-831-3444
Wasi Tjan
Vice President, Research & Development

Visualization Technologies, VT Inc. develops software tools for the visualization of scientific and engineering data. Quantitative Flow Visualization (QFV) is a unique 3D interactive software package for visulization of experimental and computational data. QFV integrates interpolation, environmental modeling, display, animation, and calculation of scalar and/or vector fields into a user-friendly program.

VITec (Visual Information Technologies)
Booth 427

3460 Lotus Drive
Plano, TX 75075
214-596-5600; 214-867-4489 (fax)
Karen Rodgers
Marketing Assistant

The VITec Image Computer, integrated into UNIX-based workstations, features full-custom, VLSI-based hardware and the PICES Applications Programming Interface—delivering 300 MOPS of power and performance for high-end imaging and graphics operations. The platform-independent PICES accelerates the creation of commercial, image-based application solutions.

VPL Research
Booth 245

656 Bair Island Road, 3rd Floor
Redwood City, CA 94063
415-361-1710; 415-361-1845 (fax)
George Zachary
Senior Technical Sales Engineer

VPL Research has pioneered the fields of virtual reality (VR) and visual programming languages. Founded in 1985 by CEO Jaron Lanier and President Jean-Jacques Grimaud, VPL is devoted to bringing far-reaching, revolutionary technology to the marketplace at an accelerated pace. VPL's commercial and leadership success has resulted in the RB2 System, Dataglove, and Eyephone VR products.

Wacom, Inc.
Booth 1462

West 115 Century Road
Paramus, NJ 07652
201-265-4226; 201-265-4722 (fax)
Joseph Coyne
Vice President, Marketing

Wacom is exhibiting its SD series of high-precision cordless digitizers. The leading features of these digitizing tablets include a cordless, battery-free stylus and cursor which provides greater comfort and accuracy in drawing and writing. In addition, Wacom's cordless pressure-sensitive stylus enables the user to create brush-like painting and other special effects of professional CG and CAD applications.

Waldmann Lighting Company
Booth 645

9 W. Century Drive
Wheeling, IL 60090
708-520-1060
D. Jones
President

Waldmann Lighting Company features glare-free task lighting for computer workstations.

Wasatch Computer Technology
Booth 1813

123 East 200 South
Salt Lake City, UT 84111
801-575-8043; 801-575-8075 (fax)
Mary M. Ware
Sales and Marketing

Wasatch is exhibiting its Portfolio software, an integrated software package for 386 machines which combines high-resolution paint (8 or 32 bits deep), presentation graphics software, and input/output in one comprehensive package. Input software includes support for slide scanners and flat-bed scanners. Output software includes drivers for digital film recorders, color thermal and laser printers.

Wavefront Technologies, Inc.
Booth 1242

530 East Montecito Street
Santa Barbara, CA 93103
805-962-8117; 805-963-0410 (fax)
Catriona Gaeta
Marketing Communications Coordinator

Wavefront Technologies is a leading supplier of 3D-computer animation and rendering software for the engineering, scientific and entertainment markets, offering a complete family of 3D animation rendering products in the Visualizer Series. These products are based on current standards including UNIX System V and UNIX Berkeley 4.2 operating systems, Ethernet, TCP/IP and standard video output and frame storage formats, offering customers device-independence by running on a variety of hardware platforms.

WaveTracer, Inc.
Booth 1333

289 Great Road
Acton, MA 01720
508-635-9000; 508-635-9777 (fax)
Robert Utzschneider
Director of Marketing

WaveTracer provides advanced software and hardware tools used for solving and visualizing complex problems in the physical sciences, image processing, mathematics, and other areas. These tools include: the Data Transport Computer, a 3D massively parallel computer; pre-programmed software solution tools; multiC, a multidimensional, parallel software development environment; and volume visualization tools. The DTC supports very high-performance pixel- and voxel-based visualization for the study of 2D/3D data fields and volumes.

John Wiley & Sons, Inc.
Booth 964

605 Third Avenue
New York, NY 10158
212-850-6000; 212-850-6088 (fax)
Sharon Nelson
Associate Promotion Manager

John Wiley & Sons publishes professional reference and trade books and journals, including the new international journal, *Visualization &Computer Animation*. New and bestselling titles on display include *High Resolution Computer Graphics using C* by I.O. Angell, *3D Graphics in Pascal* by G. Bielig-Schulz & C. Schulz, *Object Orientation: Concepts, Languages, Databases, User Interfaces* by S. Khoshafian and *Programming the User Interface* by J. Brown & S. Cunningham.

Winsted Corporation
Booth 105

10901 Hampshire Avenue South
Minneapolis, MN 55438-2351
612-944-8556; 612-944-1546 (fax)
Gerald R. Hoska
Vice President

Winsted Corporation features a complete production center with dual keyboards and roll-up rackmount electronic cabinet, part of a full line of integrated system furniture designed for graphics and video applications. Keyboards adjust up and down, tilt and pull-out for user efficiency and convenience. The production center provides a full 72" of table top work space. Dual keyboards offer convenient left- or right-hand operation, and the rack mount cabinet is available in 14" and 19 1/2" rack space options.

Yale Graphics
Both 1837

8220 Northcreek Drive #100
Cincinnati, OH 45236
513-791-YALE; 513-791-0574 (fax)
Chris Komnick
Director

Yale Graphics demonstrates ImageStation, a presentation graphics software package which incorporates powerful drawing features with business and scientific graphing capabilities. Already supporting the Targa 16 and Vision 16 boards, ImageStation now supports the Illuminator 16; RealVision 16E; the Targa 24 and 32; EGA, VGA, an SVGA platforms. In addition to MS-DOS, Yale Graphics announces support for the UNIX operating system.

Yamashita Engineering Manufacture, Inc.
Booth 1165

5925 Beverly
Mission, KS 66202
913-831-0188; 913-831-3427 (fax)
James Grunder
President

Yamashita Engineering Manufacturing features scan converters with conversion of computer RGB signals to a broadcast RS-170A signal; 24-bit real time processing; zoom feature with horizontal and vertical sizing and flicker elimination. Scan converters output to all videotape formats. It offers CVS-900B for computers within the PSII, IBM and MAC range; CVS-950A for all non-interlaced high-resolution workstations.

Yarc Systems Corporation
Booth 851

27489 West Agoura Road
Agoura Hills, CA 91301
818-889-4388; 818-889-2658 (fax)
Harvey J. Raider
Vice President

Yarc Systems produces coprocessor systems which bring supercomputer performance to the desktop. RISC, CISC and Parallel architectures are available with memory up to 40 MBytes for the PC/AT, Macintosh II family and IBM PS/2. Application targets include 3D graphics, ray tracing, animation, CAE, image processing, and any other numerically intensive programs. Yarc offers optimizing compilers for "C" and FORTRAN.

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1214	Thomson Digital Image
1601	Truevision Inc.

Booth	GKS Software
1816	Advanced Technology Center
801	Digital Equipment Corporation
1542	IMSL, Inc.
469	Intergraph Corporation
214	Megatek Corporation
832	Omnicomp Graphics Corporation
1201	Sun Microsystems, Inc.
807	Tektronix, Inc.
432	Uniras, Inc.
653	University of Lowell

Booth	Graphic Digitizers
238	Apple Computer, Inc.
764	Array Technologies, Inc.
1149	Aztek
1721	Diaquest, Inc.
1805	GTCO Corporation
401	Hewlett-Packard Company
1221	IBM Corporation
469	Intergraph Corporation
1844	Litton Systems Canada Ltd.
1465	Nikon Electronic Imaging
1404	Numonics Corporation
632	Philips Components-Signetics
759	Polhemus Incorporated
1841	Redlake Corporation
414	Summagraphics Corporation
110	Techexport, Inc.
807	Tektronix, Inc.
1601	Truevision Inc.
460	Videographics Corporation
751	Videotex Systems Inc.

Booth	Graphic Displays
238	Apple Computer, Inc.
801	Digital Equipment Corporation
1827	Dimension Technologies, Inc.
856	Du Pont Company
1153	DYNAIR Electronics, Inc.
1172	Extron Electronics
218	Gretag Image Systems
401	Hewlett-Packard Company

1221	IBM Corporation
869	Infotronic
469	Intergraph Corporation
1256	LAZERUS
1844	Litton Systems Canada Ltd.
1359	Magni Systems, Inc.
872	Mars Microsystems, Inc.
1238	Matrox Electronic Systems, Ltd.
214	Megatek Corporation
638	NEC Technologies, Inc.
353	Nissei Sangyo America, Ltd.
772	Nth Graphics, Ltd.
832	Omnicomp Graphics Corporation
1611	Parallax Graphics, Inc.
745	Peritek Corporation
1401	Ramtek Corporation
1624	RasterOps Corporation
656	Sampo Corporation of America
1432	SGS-THOMSON Microelectronics, Inc.
207	Sony Corporation
125	Spatial Systems, Inc.
962	Springer-Verlag
110	Techexport, Inc.
807	Tektronix, Inc.
1642	Texnai Inc.
232	Toshiba America Electronic Components, Inc.
1601	Truevision Inc.
1421	Vicom Systems, Inc.
460	Videographics Corporation

Booth	Graphics Aided Drafting
238	Apple Computer, Inc.
1627	AT&T Graphics Software Labs
401	Hewlett-Packard Company
1221	IBM Corporation
469	Intergraph Corporation
1411	Micrografx, Inc.
353	Nissei Sangyo America, Ltd.
772	Nth Graphics, Ltd.
1249	Pixar
656	Sampo Corporation of America
421/821	Silicon Graphics Computer Systems
125	Spatial Systems, Inc.
110	Techexport, Inc.

Booth	Graphics Arts Systems
238	Apple Computer, Inc.
356	Autodesk, Inc.
1259	AXA Corporation
1149	Aztek
836	Byte by Byte Corporation

411	Commodore Business Machines, Inc.
136	Cyblon-Visual Service
449	Digital Arts
618	Digital F/X
1632	Du Pont Imaging Systems
850	F and S, Inc.
401	Hewlett-Packard Company
1221	IBM Corporation
365	Ilford Photo Corporation
469	Intergraph Corporation
1265	IRIS Graphics, Inc.
1256	LAZERUS
864	Levco Sales
1411	Micrografx, Inc.
1362	Microtime, Inc.
1611	Parallax Graphics, Inc.
1249	Pixar
1235	Shima Seiki U.S.A., Inc.
421/821	Silicon Graphics Computer Systems
1607	SOFTIMAGE Inc.
962	Springer-Verlag
1201	Sun Microsystems, Inc.
814	Symbolics, Inc.
110	Techexport, Inc.
807	Tektronix, Inc.
1642	Texnai Inc.
1214	Thomson Digital Image
1435	Time Arts Inc.
1601	Truevision Inc.
460	Videographics Corporation
445	Vision Technologies, A Division of Everex Systems
135	Visualization Technologies, VT Inc.
1813	Wasatch Computer Technology
1242	Wavefront Technologies, Inc.

Booth	Graphics Standards Packages
1816	Advanced Technology Center
238	Apple Computer, Inc.
1149	Aztek
401	Hewlett-Packard Company
1221	IBM Corporation
469	Intergraph Corporation
1332	Ithaca Software
864	Levco Sales
214	Megatek Corporation
638	NEC Technologies, Inc.
745	Peritek Corporation
1249	Pixar
651	SigmaSoft and Systems, Inc.
1201	Sun Microsystems, Inc.
227	Stardent Computer Inc.

749	Tech-Source Inc.
1426	Template Graphics Software, Inc.
1642	Texnai Inc.
653	University of Lowell
1165	Yamashita Engineering Manufacture Inc.

Booth	Hardcopy; Photographs
1260	Amtronics, Inc.
238	Apple Computer, Inc.
1418	Autographix Slide Imaging Network
764	Forox Marketing Corporation
365	Ilford Photo Corporation
862	Oxberry
1828	Ron Scott Inc.
207	Sony Corporation
110	Techexport, Inc.

Booth	Hardcopy; Slides
238	Apple Computer, Inc.
1418	Autographix Slide Imaging Network
1149	Aztek
1065	Double M Industries
764	Forox Marketing Corporation
401	Hewlett-Packard Company
365	Ilford Photo Corporation
1411	Micrografx, Inc.
862	Oxberry
1828	Ron Scott Inc.
110	Techexport, Inc.

Booth	Hardcopy; Video Paper
1260	Amtronics, Inc.
238	Apple Computer, Inc.
1427	Eastman Kodak Company
1051	Gammadata Computer, Inc.
401	Hewlett-Packard Company
1255	Mitsubishi Electric Sales America, Inc.

Booth	High Performance Graphics Processors
1638	Advanced Micro Devices, Inc.
1211	Alliant Computer Systems Corporation
1260	Amtronics, Inc.
1535	Analog Devices, Inc.
1818	Analogic Corporation, CDA Division
238	Apple Computer, Inc.
1627	AT&T Graphics Software Labs
201	AT&T Pixel Machines
1149	Aztek
818	Convex Computer Corporation
449	Digital Arts
801	Digital Equipment Corporation
856	Du Pont Company

1153	DYNAIR Electronics, Inc.
407	Evans & Sutherland
850	F and S, Inc.
401	Hewlett-Packard Company
1221	IBM Corporation
869	Infotronic
1227	Intel Corporation
469	Intergraph Corporation
1256	LAZERUS
864	Levco Sales
1844	Litton Systems Canada Ltd.
1238	Matrox Electronic Systems, Ltd.
214	Megatek Corporation
1407	Metheus
1066	Microfield Graphics, Inc.
1075	Motorola Semiconductor Products Sector
353	Nissei Sangyo America, Ltd.
772	Nth Graphics, Ltd.
862	Oxberry
1611	Parallax Graphics, Inc.
745	Peritek Corporation
632	Philips Components-Signetics
952	Pixelworks, Inc.
1401	Ramtek Corporation
1834	Ricoh Corporation
1432	SGS THOMSON Microelectronics, Inc.
651	SigmaSoft and Systems, Inc.
421/821	Silicon Graphics Computer Systems
642	Star Technologies, Inc.
1201	Sun Microsystems, Inc.
814	Symbolics, Inc.
110	Techexport, Inc.
749	Tech-Source Inc.
807	Tektronix, Inc.
1245	Texas Instruments
460	Videographics Corporation
1254	Univision Technologies, Inc.
1333	WaveTracer, Inc.
851	Yarc Systems Corporation

Booth	High Resolution Graphic Display Systems
1045	ADEX Corporation
1260	Amtronics, Inc.
1635	Analog Devices, Inc.
1818	Analogic Corporation, CDA Division
238	Apple Computer, Inc.
201	AT&T Pixel Machines
1149	Aztek
801	Digital Equipment Corporation
665	Division Limited
1811	Dubner Computer Systems, Inc.

856	Du Pont Company
1632	Du Pont Imaging Systems
1153	DYNAIR Electronics, Inc.
407	Evans & Sutherland
850	F and S, Inc.
218	Gretag Image Systems
401	Hewlett-Packard Company
1221	IBM Corporation
845	Ikegami Electronics (USA), Inc.
869	Infotronic
469	Intergraph Corporation
1256	LAZERUS
121	Macro Data, Inc.
1318	Management Graphics, Inc.
872	Mars Microsystems Inc.
1238	Matrox Electronic Systems, Ltd.
214	Megatek Corporation
1518	MERET Optical Communications Inc.
1066	Microfield Graphics, Inc.
1445	Mitsubishi Electronics
638	NEC Technologies, Inc.
353	Nissei Sangyo America, Ltd.
772	Nth Graphics, Ltd.
832	Omnicomp Graphics Corporation
745	Peritek Corporation
952	Pixelworks, Inc.
1401	Ramtek Corporation
1624	RasterOps Corporation
973	Raytheon Company Submarine Signal Division
462	RGB Spectrum
1834	Ricoh Corporation
656	Sampo Corporation of America
1432	SGS THOMSON Microelectronics, Inc.
651	SigmaSoft and Systems, Inc.
421/821	Silicon Graphics Computer Systems
207	Sony Corporation
962	Springer-Verlag
227	Stardent Computer Inc.
614	StereoGraphics Corporation
814	Symbolics, Inc.
949	TEAC America, Inc.
110	Techexport, Inc.
749	Tech-Source Inc.
807	Tektronix, Inc.
635	Texas Memory Systems, Inc.
232	Toshiba America Electronic Components, Inc.
1601	Truevision Inc.
653	University of Lowell
460	Videographics Corporation

445	Vision Technologies, A Division of Everex Systems
245	VPL Research
1813	Wasatch Computer Technology

Booth	Hypermedia
114	Androx Corporation
238	Apple Computer, Inc.
201	AT&T Pixel Machines
1149	Aztek
411	Commodore Business Machines, Inc.
1721	Diaquest, Inc.
1817	New Media Graphics Corporation
1611	Parallax Graphics, Inc.
1841	Redlake Corporation
814	Symbolics, Inc.
949	TEAC America, Inc.
653	University of Lowell

Booth	Image Processing
1211	Alliant Computer Systems Corporation
1260	Amtronics, Inc.
1635	Analog Devices, Inc.
1818	Analogic Corporation, CDA Division
114	Androx Corporation
238	Apple Computer, Inc.
764	Array Technologies, Inc.
1627	AT&T Graphics Software Labs
201	AT&T Pixel Machines
1149	Aztek
1269	Canon U.S.A.
136	Cyblon-Visual Service
1721	Diaquest, Inc.
449	Digital Arts
801	Digital Equipment Corporation
1827	Dimension Technologies, Inc.
665	Division Limited
856	Du Pont Company
407	Evans & Sutherland
1172	Extron Electronics
850	F and S, Inc.
1821	Flamingo Graphics
769	Folsom Research, Inc.
764	Forox Marketing Corporation
401	Hewlett-Packard Company
456	Howtek, Inc.
365	Ilford Photo Corporation
469	Intergraph Corporation
1256	LAZERUS
864	Levco Sales
121	Macro Data, Inc.
1318	Management Graphics, Inc..

1359	Magni Systems, Inc.
1238	Matrox Electronic Systems, Ltd.
116	Mercury Computer Systems, Inc.
214	Megatek Corporation
1445	Mitsubishi Electronics
1438	Mitsubishi International Corporation
1075	Motorola Semiconductor Products Sector
1817	New Media Graphics Corporation
1465	Nikon Electronic Imaging
143	Norick Software, Inc.
1826	The Ohio Supercomputer Center
832	Omnicomp Graphics Corporation
345	Paragon Imaging Inc.
745	Peritek Corporation
1614	QMS, Inc.
1401	Ramtek Corporation
1841	Redlake Corporation
462	RGB Spectrum
1834	Ricoh Corporation
1828	Ron Scott Inc.
1432	SGS THOMSON Microelectronics, Inc.
866	Sharp Electronics Corporation
421/821	Silicon Graphics Computer Systems
207	Sony Corporation
962	Springer-Verlag
227	Stardent Computer Inc.
614	StereoGraphics Corporation
414	Summagraphics Corporation
1201	Sun Microsystems, Inc.
814	Symbolics, Inc.
110	Techexport, Inc.
749	Tech-Source Inc.
807	Tektronix, Inc.
635	Texas Memory Systems, Inc.
1214	Thomson Digital Image
1435	Time Arts Inc.
1601	Truevision Inc.
653	University of Lowell
1254	Univision Technologies, Inc.
1421	Vicom Systems, Inc.
751	Videotex Systems Inc.
135	Visualization Technologies, VT Inc.
427	VITec (Visual Information Technologies)
1242	Wavefront Technologies, Inc.
1333	WaveTracer, Inc.
1165	Yamashita Engineering Manufacture Inc.
851	Yarc Systems Corporation

Booth	Interactive Graphics Terminals
238	Apple Computer, Inc.
201	AT&T Pixel Machines
411	Commodore Business Machines, Inc.

856	Du Pont Company
407	Evans & Sutherland
401	Hewlett-Packard Company
1221	IBM Corporation
469	Intergraph Corporation
1256	LAZERUS
1238	Matrox Electronic Systems, Ltd.
214	Megatek Corporation
1066	Microfield Graphics, Inc.
353	Nissei Sangyo America, Ltd.
772	Nth Graphics, Ltd.
227	Stardent Computer Inc.
949	TEAC America, Inc.
110	Techexport, Inc.
807	Tektronix, Inc.
1601	Truevision Inc.
245	VPL Research

Booth	Low Cost Graphics Systems
1045	ADEX Corporation
221	Alias Research Inc.
1635	Analog Devices, Inc.
238	Apple Computer, Inc.
1627	AT&T Graphics Software Labs
1149	Aztek
1259	AXA Corporation
836	Byte by Byte Corporation
411	Commodore Business Machines, Inc.
1721	Diaquest, Inc.
449	Digital Arts
1827	Dimension Technologies, Inc.
850	F and S, Inc.
401	Hewlett-Packard Company
456	Howtek, Inc.
1221	IBM Corporation
1256	LAZERUS
864	Levco Sales
214	Megatek Corporation
1066	Microfield Graphics, Inc.
1062	Midwest Communications Corporation
638	NEC Technologies, Inc.
772	Nth Graphics, Ltd.
832	Omnicomp Graphics Corporation
745	Peritek Corporation
1401	Ramtek Corporation
1834	Ricoh Corporation
656	Sampo Corporation of America
421/821	Silicon Graphics Computer Systems
614	StereoGraphics Corporation
1201	Sun Microsystems, Inc.
110	Techexport, Inc.
1642	Texnai Inc.

1601	Truevision Inc.
460	Videographics Corporation
559	VisionBase, Inc.

Booth	Manufacturing Systems
1153	DYNAIR Electronics, Inc.
1332	Ithaca Software
832	Omnicomp Graphics Corporation
1201	Sun Microsystems, Inc.
1601	Truevision Inc.

Booth	Mechanical CAD/CAM/CAE
221	Alias Research Inc.
1211	Alliant Computer Systems Corporation
238	Apple Computer, Inc.
1627	AT&T Graphics Software Labs
836	Byte by Byte Corporation
818	Convex Computer Corporation
801	Digital Equipment Corporation
407	Evans & Sutherland
1051	Gammadata Computer, Inc.
401	Hewlett-Packard Company
1221	IBM Corporation
469	Intergraph Corporation
1332	Ithaca Software
872	Mars Microsystems Inc.
214	Megatek Corporation
1407	Metheus
1411	Micrografx, Inc.
1438	Mitsubishi International Corporation
638	NEC Technologies, Inc.
353	Nissei Sangyo America, Ltd.
772	Nth Graphics, Ltd.
832	Omnicomp Graphics Corporation
745	Peritek Corporation
952	Pixelworks, Inc.
759	Polhemus Incorporated
651	SigmaSoft and Systems, Inc.
421/821	Silicon Graphics Computer Systems
125	Spatial Systems, Inc.
227	Stardent Computer Inc.
614	StereoGraphics Corporation
414	Summagraphics Corporation
1201	Sun Microsystems, Inc.
814	Symbolics, Inc.
807	Tektronix, Inc.
1214	Thomson Digital Image
1601	Truevision Inc.
135	Visualization Technologies, VT Inc.
1242	Wavefront Technologies, Inc.

Booth	Monitors
1045	ADEX Corporation
238	Apple Computer, Inc.
838	BARCO, Inc.
1827	Dimension Technologies, Inc.
401	Hewlett-Packard Company
845	Ikegami Electronics (USA), Inc.
869	Infotronic
469	Intergraph Corporation
1311	JVC Professional Products Company
1062	Midwest Communications Corporation
1255	Mitsubishi Electric Sales America, Inc.
1445	Mitsubishi Electronics
638	NEC Technologies, Inc.
353	Nissei Sangyo America, Ltd.
827/1027/ 1032	Panasonic
745	Peritek Corporation
1624	RasterOps Corporation
656	Sampo Corporation of America
207	Sony Corporation
110	Techexport, Inc.
807	Tektronix, Inc.
951	Telex Communications
232	Toshiba America Electronic Components, Inc.
460	Videographics Corporation
445	Vision Technologies, A Division of Everex

Booth	Numerical Control (NC, CNC, DNC)
469	Intergraph Corporation
862	Mars Microsystems Inc.
745	Peritek Corporation

Booth	Printers, Plotters, and other Hardcopy Devices
238	Apple Computer, Inc.
1149	Aztek
1456	CSS Laboratories, Inc.
801	Digital Equipment Corporation
856	Du Pont Company
1427	Eastman Kodak Company
850	F and S, Inc.
1051	Gammadata Computer, Inc.
401	Hewlett-Packard Company
456	Howtek, Inc.
1221	IBM Corporation
365	Ilford Photo Corporation
469	Intergraph Corporation
1265	IRIS Graphics, Inc.
1255	Mitsubishi Electric Sales America, Inc.

1445	Mitsubishi Electronics
1438	Mitsubishi International Corporation
638	NEC Technologies, Inc.
1465	Nikon Electronic Imaging
1404	Numonics Corporation
144	Oce' Graphics USA, Inc.
862	Oxberry
827/1027/ 1032	Panasonic
1614	QMS, Inc.
973	Raytheon Company Submarine Signal Division
1218	Seiko Instruments USA Inc.
866	Sharp Electronics Corporation
414	Summagraphics Corporation
714	Team Systems
110	Techexport, Inc.
807	Tektronix, Inc.
1642	Texnai Inc.
714	Toyo Spectrum

Booth	Projectors
238	Apple Computer, Inc.
838	BARCO, Inc.
218	Gretag Image Systems
845	Ikegami Electronics (USA), Inc.
121	Macro Data, Inc.
1255	Mitsubishi Electric Sales America
862	Oxberry
827/1027/ 1032	Panasonic
207	Sony Corporation
614	StereoGraphics Corporation
951	Telex Communications

Booth	Publications
1053	Academic Press, Inc.
1353	Addison-Wesley Publishing Company
1063	Advanced Imaging
1212	American Institute of Physics
238	Apple Computer, Inc.
459	Ariel Communications: Cadence Magazine MicroCAD News Magazine
Entrance	Association for Computing Machinery
1063	AVC/Audio Visual Communications
1621	Cahners Publishing Company: Electronic Business Electronic Business/Asia Systems Integration
1843	Computer Currents
853	Computer Graphics Review

718	Computer Graphics World
1212	Computers in Physics
1047	Data Base Publications: AViiON News Workstation News
662	Electronic Design Magazine
1253	Electronic Engineering Times
662	Electronics Magazine
850	F and S, Inc.
1232	IEEE Computer Society
1171	Macmillan Publishing Company
1233	Montage Publishing, Inc.: Computer Pictures
849	Morgan Kaufmann Publishers, Inc.
660	OG News Europe
762	Pacific Magazine Group: Presentation Business News Presentation Products Magazine
1419	Personal Workstation
140	Pixel Magazine
142	Prentice Hall
Entrance	SIGGRAPH Local Groups
718	SIGGRAPH Show Daily
827/1027/ 1032	Panasonic
962	Springer-Verlag
560	Suntech Journal
1825	Supercomputing Review
660	Tech Images
950	Unix Review Magazine
1804	UnixWorld Magazine
124	Van Nostrand Reinhold
853	Video Systems
964	John Wiley & Sons, Inc.

Booth	Research Systems
114	Androx Corporation
818	Convex Computer Corporation
665	Division Limited
407	Evans & Sutherland
1221	IBM Corporation
1449	Intelligent Light, Inc.
1332	Ithaca Software
1256	LAZERUS
872	Mars Microsystems Inc.
1826	The Ohio Supercomputer Center
1611	Parallax Graphics, Inc.
759	Polhemus Incorporated
227	Stardent Computer Inc.
814	Symbolics, Inc.
1214	Thomson Digital Image
653	University of Lowell

245	VPL Research
851	Yarc Systems Corporation

Booth	Robotics
114	Androx Corporation
1332	Ithaca Software
1256	LAZERUS
759	Polhemus Incorporated
125	Spatial Systems, Inc.
614	StereoGraphics Corporation

Booth	Scientific Visualization
221	Alias Research Inc.
1211	Alliant Computer Systems Corporation
1260	Amtronics, Inc.
114	Androx Corporation
238	Apple Computer, Inc.
Entrance	Association for Computing Machinery
1627	AT&T Graphics Software Labs
201	AT&T Pixel Machines
836	Byte by Byte Corporation
818	Convex Computer Corporation
1721	Diaquest, Inc.
801	Digital Equipment Corporation
1827	Dimension Technologies, Inc.
665	Division Limited
856	Du Pont Company
1153	DYNAIR Electronics, Inc.
145	Eclectic Systems
407	Evans & Sutherland
1051	Gammadata Computer, Inc.
401	Hewlett-Packard Company
1221	IBM Corporation
1449	Intelligent Light, Inc.
1332	Ithaca Software
1256	LAZERUS
1824	Maximum Strategy Inc.
214	Megatek Corporation
772	Nth Graphics, Ltd.
1826	The Ohio Supercomputer Center
345	Paragon Imaging, Inc.
1611	Parallax Graphics, Inc.
745	Peritek Corporation
759	Polhemus Incorporated
1401	Ramtek Corporation
1432	SGS THOMSON Microelectronic, Inc.
421/821	Silicon Graphics Computer Systems
1607	SOFTIMAGE Inc.
125	Spatial Systems, Inc.
962	Springer-Verlag
227	Stardent Computer Inc.
614	StereoGraphics Corporation

1201	Sun Microsystems, Inc.
814	Symbolics, Inc.
749	Tech-Source Inc.
807	Tektronix, Inc.
1426	Template Graphics Software, Inc.
635	Texas Memory Systems, Inc.
1214	Thomson Digital Image
1601	Truevision Inc.
432	Uniras, Inc.
653	University of Lowell
135	Visualization Technologies, VT Inc.
245	VPL Research
1242	Wavefront Technologies, Inc.
1333	WaveTracer, Inc.

Booth	Software
1053	Academic Press, Inc.
1353	Addison-Wesley Publishing Company
1816	Advanced Technology Center
107	AGE
221	Alias Research Inc.
1211	Alliant Computer Systems Corporation
1212	American Institute of Physics
1260	Amtronics, Inc.
238	Apple Computer, Inc.
Entrance	Association for Computing Machinery
201	AT&T Pixel Machines
356	Autodesk, Inc.
1259	AXA Corporation
1149	Aztek
836	Byte by Byte Corporation
136	Cyblon-Visual Service
449	Digital Arts
801	Digital Equipment Corporation
669	ETAK
850	F and S, Inc.
1821	Flamingo Graphics
401	Hewlett-Packard Company
1221	IBM Corporation
1542	IMSL, Inc.
1449	Intelligent Light, Inc.
469	Intergraph Corporation
1332	Ithaca Software
1256	LAZERUS
864	Levco Sales
1318	Management Graphics, Inc.
872	Mars Microsystems Inc.
214	Megatek Corporation
1411	Micrografx, Inc.
1150	Minc Incorporated
1438	Mitsubishi International Corporation
1075	Motorola Semiconductor Products Sector

772	Nth Graphics, Ltd.
1826	The Ohio Supercomputer Center
345	Paragon Imaging Inc.
745	Peritek Corporation
1828	Ron Scott Inc.
651	SigmaSoft and Systems, Inc.
1607	SOFTIMAGE Inc.
227	Stardent Computer Inc.
814	Symbolics, Inc.
110	Techexport, Inc.
807	Tektronix, Inc.
1426	Template Graphics Software, Inc.
1642	Texnai Inc.
1214	Thomson Digital Image
432	Uniras, Inc.
653	University of Lowell
1421	Vicom Systems, Inc.
460	Videographics Corporation
751	Videotex Systems Inc.
1645	Viewpoint Animation Engineering, Inc.
559	VisionBase, Inc.
445	Vision Technologies, A division of Everex Systems
135	Visualization Technologies, VT Inc.
1813	Wasatch Computer Technology
1242	Wavefront Technologies, Inc.

Booth	Tablets
238	Apple Computer, Inc.
1627	AT&T Graphics Software Labs
401	Hewlett-Packard Company
469	Intergraph Corporation
1404	Numonics Corporation
414	Summagraphics Corporation
110	Techexport, Inc.
807	Tektronix, Inc.
460	Videographics Corporation

Booth	Turnkey Systems-Hardware
1260	Amtronics, Inc.
238	Apple Computer, Inc.
1259	AXA Corporation
1149	Aztek
411	Commodore Business Machines, Inc.
1721	Diaquest, Inc.
801	Digital Equipment Corporation
665	Division Limited
407	Evans & Sutherland
401	Hewlett-Packard Company
469	Intergraph Corporation
1256	LAZERUS
864	Levco Sales

1318	Management Graphics, Inc.
1518	MERET Optical Communications Inc.
1834	Ricoh Corporation
1235	Shima Seiki U.S.A., Inc.
814	Symbolics, Inc.
110	Techexport, Inc.
1214	Thomson Digital Image
460	Videographics Corporation

Booth	Turnkey Systems-Software
1260	Amtronics, Inc.
238	Apple Computer, Inc.
1627	AT&T Graphics Software Labs
1259	AXA Corporation
1149	Aztek
1721	Diaquest, Inc.
449	Digital Arts
801	Digital Equipment Corporation
665	Division Limited
407	Evans & Sutherland
401	Hewlett-Packard Company
469	Intergraph Corporation
1256	LAZERUS
864	Levco Sales
1318	Management Graphics, Inc.
1235	Shima Seiki U.S.A., Inc.
1607	SOFTIMAGE Inc.
814	Symbolics, Inc.
110	Techexport, Inc.
1214	Thomson Digital Image
460	Videographics Corporation
1813	Wasatch Computer Technology

Booth	Video or Film Recorders
238	Apple Computer, Inc.
1149	Aztek
1145	CELCO
136	Cyblon-Visual Service
1721	Diaquest, Inc.
764	Forox Marketing Corporation
401	Hewlett-Packard Company
365	Ilford Photo Corporation
1311	JVC Professional Products Company
1318	Management Graphics, Inc.
1062	Midwest Communications Corporation
1255	Mitsubishi Electric Sales America, Inc.
827/1027/ 1032	Panasonic
949	TEAC America, Inc.
110	Techexport, Inc.
460	Videographics Corporation
646	Videomedia

Booth	Video Projectors
238	Apple Computer, Inc.
838	BARCO, Inc.
1414	Electrohome Limited
1207	General Electric Company-PDPO
218	Gretag Image Systems
845	Ikegami Electronics (USA), Inc.
121	Macro Data, Inc.
1255	Mitsubishi Electric Sales America, Inc.
827/1027/ 1032	Panasonic
207	Sony Corporation
614	StereoGraphics Corporation
951	Telex Communications
1813	Wasatch Computer Technology

Booth	Video Technology
1045	ADEX Corporation
1260	Amtronics, Inc.
238	Apple Computer, Inc.
Entrance	Association for Computing Machinery
1627	AT&T Graphics Software Labs
1259	AXA Corporation
1149	Aztek
836	Byte by Byte Corporation
969	Chromatek Inc.
411	Commodore Business Machines, Inc.
136	Cyblon-Visual Service
1721	Diaquest, Inc.
449	Digital Arts
618	Digital F/X
1153	DYNAIR Electronics, Inc.
1172	Extron Electronics
1821	Flamingo Graphics
769	Folsom Research, Inc.
1051	Gammadata Computer, Inc.
401	Hewlett-Packard Company
845	Ikegami Electronics (USA), Inc.
869	Infotronic
1227	Intel Corporation
1449	Intelligent Light, Inc.
1311	JVC Professional Products Company
1035	Lyon Lamb Video Animation System Inc.
121	Macro Data, Inc.
1359	Magni Systems, Inc.
1238	Matrox Electronic Systems, Ltd.
1518	MERET Optical Communications Inc.
1062	Midwest Communications Corporation
1255	Mitsubishi Electric Sales America, Inc.
638	NEC Technologies, Inc.
1817	New Media Graphics Corporation
772	Nth Graphics, Ltd.

827/1027/ 1032	Panasonic
1611	Parallax Graphics, Inc.
745	Peritek Corporation
632	Philips Components-Signetics
1401	Ramtek Corporation
1624	RasterOps Corporation
1841	Redlake Corporation
462	RGB Spectrum
127	Sigma Electronics, Inc.
421/821	Silicon Graphics Computer Systems
207	Sony Corporation
227	Stardent Computer Inc.
814	Symbolics, Inc.
110	Techexport, Inc.
807	Tektronix, Inc.
1245	Texas Instruments
1601	Truevision Inc.
460	Videographics Corporation
646	Videomedia
445	Vision Technologies, A Division of Everex Systems
1165	Yamashita Engineering Manufacture Inc.

Booth	Miscellaneous
	3D Design Software
221	Alias Research Inc.
	3D Digitizers
759	Polhemus Incorporated
1645	Viewpoint Animation Engineering, Inc.
	3D, Massively Parallel Computer; 3D Volume Visualization
1333	WaveTracer, Inc.
	3D Modeling and Rendering
836	Byte by Byte Corporation
	A/E/C/,CAE/CAD/CAM, Scanning Systems
469	Intergraph Corporation
	Annual Computer Graphics Trade Show and Conference; Association
1442	National Computer Graphics Association
	Array Processors
635	Texas Memory Systems, Inc.

Attached Processors

116 Mercury Computer Systems, Inc.

Autostereoscopic 3D Display Systems

1827 Dimension Technologies, Inc.

Backplanes; Enclosures

1069 Mupac Corporation

Bulk Load Film Cameras for Film Recorders

1065 Double M Industries

Cathode Ray Tubes

232 Toshiba America Electronic Components, Inc.

CD-ROM Equipment

638 NEC Technologies, Inc.

CGI Software

651 SigmaSoft and Systems, Inc.

CGM Interpretor/CGM Generator

1816 Advanced Technology Center

College Textbooks

1171 Macmillan Publishing Company

Color Laser Copiers

1269 Canon U.S.A.

Color Laser Copier Application Systems

1642 Texnai Inc.

Color Scanners

866 Sharp Electronics Corporation

Computer Aided Industrial Design (CAID)

221 Alias Research Inc.

Computer Graphic Image Capture Cameras and Frame Capture Cameras

1311 JVC Professional Products Company

Computer Graphic Maintenance

137 HCS Inc.

Computer-Video Interfacing

435 Covid, Inc.

1172 Extron Electronics

Compute Servers
818 Convex Computer Corporation

Convert High Resolution Computer Graphics to Standard NTSC Video (TV) Format
769 Folsom Research Inc.

CRT Color Analyzer; Light Meters
1162 Minolta Corporation

Desktop Presentation Software
1418 AT&T Graphics Software Labs

Desktop Presentations; Service Bureau
1724 Autographix Slide Imaging Network

Desktop Supercomputing
851 Yarc Systems Corporation

Digital Disk Recorder; Digital Character Generator; Digital Special Effects
1618 Abekas

Disk and Tape Storage Systems and/or Subsystems
1820 Helios Systems
1445 Mitsubishi Electronics

Display Processors
1844 Litton Systems Canada Ltd.

DSP and A/D Integrated Circuits
1075 Motorola Semiconductor Products Sector

Education
Entrance SIGGRAPH Education Committee

Fiber Video Systems; High Resolution RGB Video Graphic Link
1518 MERET Optical Communications Inc.

File Servers
1456 CSS Laboratories, Inc.

Flow Visualization
135 Visualization Technologies, VT Inc.

Genlock Hardware
1359 Magni Systems, Inc.

RGB Switching Equipment; NTSC Encoder/Decoder

127 Sigma Electronics, Inc.

Scan Converters

769 Folsom Research Inc.
1035 Lyon Lamb Video Animation Systems, Inc.
1169 Photron Limited
462 RGB Spectrum
1165 Yamashita Engineering Manufacture Inc.

Scientific Engineering; FORTRAN Graphics

1542 IMSL, Inc.

Security Devices

1354 Rainbow Technologies, Inc.

Signal Routing and Distribution

1153 DYNAIR Electronics, Inc.

Software Protection Devices

659 Software Security, Inc.

Standard Electronic Modules (SEMs)

973 Raytheon Company Submarine Signal Division

Stereo Viewing Devices

614 StereoGraphics Corporation

Supplies/Paper/Ribbon

638 NEC Technologies, Inc.

Support Services;Optical Mass Storage

401 Hewlett-Packard Company

Switching and Distribution Systems—120 MHz

1172 Extron Electronics

Systems Packaging Products

1069 Mupac Corporation

Templates

414 Summagraphics Corporation

Universal Copy Systems

764 Forox Marketing Corporation

Video Animation Controllers

1721 Diaquest, Inc.

Video Disc Recorders and Players

949 TEAC America, Inc

Video Distribution (Fiber Optics)

1153 DYNAIR Electronics, Inc.

Videographics; Video Editing

110 Techexport, Inc.

Video Scan Doublers

121 Macro Data, Inc.

Video Windowing Systems

462 RGB Spectrum

Virtual Reality

759 Polhemus Incorporated

245 VPL Research

VTR Control; Multimedia Control

646 Videomedia

X Window System Software

107 AGE

Art Show Works on Videotape Credits

Puzzle Museum
Flavia Alman

Radio Taxi
Flavia Alman

The Robots Nightmare
George Z. Elyjiw

A Memory of Moholy-Nagy
John Halas and Tamas Waliczky

0:01:16
Patricia Hoffman

Ray-Gami
Ann Jacobs

Nature Morte (Stille Life)
Georges Le Piouffle

Visual Ideas
Ruedy W. Leeman

Iggy's Dream No. 74
Michael O'Rourke

Abstract Landscape #327
Natash M. Samant

Ignorance is Bliss!
M. Shan Yeung

Acknowledgements

Slides
SIGGRAPH '90 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.

Pre-conference Slides
Stokes Imaging Presentations, Inc., Dallas, TX

On-site
Impress Imaging Presentations, Inc., Dallas, TX
Kodak, Rochester, NY

Film and Video Theater
SIGGRAPH '90 and the film and video theater chair wish to thank the following companies for their valuable support.

3D Magic
The Post Group
Wavefront Technologies
Silicon Graphics Computer Systems

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 '90. Also, thank you to employees of contractors who put in long hours and extra effort to make SIGGRAPH '90 happen.

Call for Participation

SIGGRAPH 91
18th International Conference
On Computer Graphics And
Interactive Techniques

Where Advanced Technologies Inspire
Tomorrow's Realities

Conference:
28 July-2 August 1991

Exhibition:
30 July-1 August 1991

Las Vegas, Nevada

You're invited to Participate in SIGGRAPH '91

ACM SIGGRAPH's 18th international conference on computer graphics and interactive techniques will attract 25,000-30,000 enthusiasts to Las Vegas in late July and early August 1991. For six informative days, they'll observe and absorb a comprehensive, world-class program on computer graphics:

- Technical papers
- Panels
- Courses
- Workshops
- Electronic theatre
- Art and design show
- Special interest groups
- Hypermedia exhibit
- Virtual reality demonstrations
- Educators' program
- Manufacturers' and developers' exhibits

Because the annual SIGGRAPH conference is the international forum for exploring the frontiers of computer graphics, it attracts engineers, scientists, artists, designers, personal computer users — everyone involved with computer graphics — from novices to experts. It's the world's premiere conference for describing, discussing, and displaying your work and the work of others with interests like yours.

At SIGGRAPH '91, extra-curricular activities promise as much excitement as the conference itself. Las Vegas, the entertainment capital of the world, offers a wide variety of unique experiences for the entire family.

In and around Las Vegas, you can:

Learn about the old west at the Natural History Museum. Tour Hoover Dam — the eighth wonder of the modern world. Enjoy a myriad of water sports at Lake Mead. Step back in time to a medieval castle with King Arthur, Sir Lancelot, and a cast of magical characters, or zoom down Der Stuka, the highest water slide in the world. See Liberace's piano and jewel collection, hundreds of antique automobiles, or daring trapeze artists. Sample the sweets at Ethel M's chocolate factory. Laze by a sparkling blue pool. Or dazzle your sensations at the Omnimax Theatre.

Photo opportunities abound: Red Rock Canyon, white Bengal tigers, a simulated volcano, and fascinating flora and fauna. Las Vegas also offers championship golf courses, indoor and outdoor tennis, and racquetball courts.

The organizers of SIGGRAPH '91 hope that you'll join us in Las Vegas, 28 July through 2 August. And we invite you to participate. Here's how you can get involved.

You're invited to Submit a Technical Paper

The SIGGRAPH conference is the preeminent forum for the presentation and publication of scholarly papers on computer graphics. Presentations at SIGGRAPH attract leaders from industry and academia, and conference papers are 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.

The papers committee is looking for well-written research, systems, or applications papers which contain significant, previously unpublished results. Full length papers contain at most 20 double-spaced manuscript pages. Short papers (less than five manuscript pages) may also be submitted. Possible topics include (but are not limited to):

- Algorithms
- Animation
- Applications
- Art
- CAD/CAE/CAGD/CAM
- Color
- Computational geometry
- Geometric modeling
- Graphics hardware
- Graphics systems
- Hypermedia
- Image analysis
- Image synthesis
- Interactive techniques
- Multimedia systems
- Two-dimensional graphics
- User interface systems
- Visualization
- Virtual reality
- Volume rendering

Prospective authors must request a contributor's packet from:

SIGGRAPH '91
Conference Management Office
401 N. Michigan Avenue
Chicago, IL 60611
312-644-6610

The contributor's packet provides submission guidelines, ACM publication standards, and the SIGGRAPH reviewing process.

Submit six copies of each paper and six copies of any associated graphics. Submissions must be received by the papers chair by *Wednesday, 9 January 1991.*

This deadline is firm. Faxed or e-mailed papers will not be accepted. The papers chair will notify authors of acceptance by mid-March 1991. Final camera-ready papers will be due 1 May 1991.

The tight review and production schedule makes SIGGRAPH one of the most timely publication forums for research results. It also means papers will be accepted or rejected based on the paper as submitted.

Send paper submissions to:

Thomas W. Sederberg
SIGGRAPH '91 Papers Chair
368 Clyde Building
Brigham Young University
Provo, UT 84602
801-376-2811
801-378-2478 (fax)
tom@adam.byu.edu

Papers Committee

Alan H. Barr
California Institute of Technology
Richard J. Beach
Xerox PARC
Jim Blinn
California Institute of Technology
Loren Carpenter
Pixar
Edwin E. Catmull
Pixar
Hank Christiansen
Brigham Young University
Elaine Cohen
University of Utah
Robert L. Cook
Light Source Computer Images, Inc.
John Dill
Simon Fraser University
Michel Gangnet
Digital Equipment Corporation, Paris

Andrew Glassner
Xerox PARC
Donald P. Greenberg
Cornell University
Leo Guibas
Massachussetts Institute of Technology
Pat Hanrahan
Princeton University
Jeffrey Lane
Digital Equipment Corporation
Greg Nielsen
Arizona State University
Eihachiro Nakamae
Hiroshima University
Dan Olsen
Brigham Young University
Alyn Rockwood
Silicon Graphics Computer Systems
Jim Rhyne
IBM
Robert Sproull
Sutherland, Sproull and Associates
Wolfgang Strasser
University of Tübingen
Turner Whitted
Numerical Design, Ltd.
Jane Wilhelms
University of California, Santa Cruz
Andy Witkin
Carnegie Mellon University

You're invited to Propose a Panel or Special Session

Panels at the annual SIGGRAPH conference present interesting techniques and applications in a manner that illustrates different viewpoints or introduces subject areas not adequately represented elsewhere in the conference. Special sessions are alternative forums for subjects that don't fit into other conference venues. Selection of panels and special sessions will be based on how well each proposes to meet the following criteria:

- Covers important issues in the computer graphics community.
- Appeals to a broad audience of computer graphics professionals.
- Presents new insights or raises new questions for the audience.
- Provides an effective format for presenting the material.

Appropriate panel topics for SIGGRAPH '91 include:

- Virtual reality
  Desktop multimedia
- Scientific visualization
- Medicine, engineering, and the basic sciences
- Computer graphics in graphic design/advertising
- Computer art
- Graphic workstations and window systems
- Computer animation
- Interactive techniques
- Current controversies
- Future directions
- History of computer graphics
- Emerging concepts in software and hardware

Panels will be presented in parallel with the papers. They 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 panel sessions will be recorded, transcribed, and made available to paper and panel attendees after the conference, so all panel members must agree, prior to the session, to publication of their remarks and visuals.

Proposals for panels or special sessions are invited from computer graphics scientists, engineers, artists, educators, animators, practitioners, or anyone else who can make an enlightening contribution to the industry.

For complete information on panels and special sessions, request a panel contributor's packet from:

SIGGRAPH '91
Conference Management Office
401 N. Michigan Avenue
Chicago, IL 60611
312-644-6610

Submit five copies of each panel or special session proposal so that they are received by *Wednesday, 9 January 1991*. No late submissions will be considered. Panel proposers will be notified of acceptance by 31 March 1991.

Send panel or special session proposals to:

Robert L. Judd
SIGGRAPH '91 Panels Chair
Los Alamos National Laboratory
C-6 Computer Graphics MS-B272
Los Alamos, NM 87545
505-667-7356
505-665-4361 (fax)
bj@lanl.gov

Panels Committee
Bruce Brown
Oracle Corporation
Chuck Hansen
Los Alamos National Laboratory
Alyce Kaprow
The New Studio
Mike Keeler
Kubota Computer Inc.
Peter Pathe
Stonehand, Inc.
Dick Phillips
Los Alamos National Laboratory
Vibeke Sorenson
California Institute of the Arts
Mary Whitton
Sun Microsystems, Inc.

You're invited to Propose a Course

LEARN, LEARN, LEARN. That's one of the primary goals of SIGGRAPH attendees: to learn about all aspects of computer graphics. SIGGRAPH courses address that need with a set of seven-hour classes on a full array of topics.

If you have a topic to teach, we want to hear from you. Course content ranges from the basics of graphics to the latest areas of development, from beginning material for newcomers to advanced courses for seasoned SIGGRAPH veterans.

In keeping with SIGGRAPH's evolutionary tradition, course proposals on the following topics are especially welcome for SIGGRAPH '91:

- Multimedia
- Virtual reality
- Volume visualization

The course committee is also looking for a few course proposals that each cover a multitude of topics. The idea is to cover many topics lightly instead of a single topic in depth.

Notes for each course presented at SIGGRAPH '91 will be available at the conference. Course notes may also be available for purchase after the conference.

Proposing a course is fun and exciting. Proposals should include a brief description of the course and its objectives, an outline of course topics, time allotted for each topic, and proposed speakers. Presentation techniques should also be included. Innovative ways of increasing audience interest and participation, varying from live demonstrations to hands-on experience, will be considered.

The course proposal is critical, because it is the only information the committee has available as it decides which courses will be taught. To insure that your proposal represents your course accurately and appropriately, request a course contributor's packet. The packet contains further information on the format of the proposal and the review process.

Request a contributor's packet from:

SIGGRAPH '91
Conference Management Office
401 N. Michigan Avenue
Chicago, IL 60611
312-644-6610

Submit five copies of your proposal so that they are received by *Wednesday, 12 December 1990.*

Notification of acceptance will be by the end of February 1991.

Send proposals to:

Rich Ehlers
SIGGRAPH '91 Courses Chair
Evans & Sutherland
540 Arapeen Drive
Salt Lake City, UT 84108
801-582-5847
801-582-9413 (fax)
ehlers@dsd.es.com

Courses Committee
Mark Henderson
Arizona State University
Nan Schaller
Rochester Institute of Technology
Dino Schweitzer
United States Air Force Academy
Deborah Sokolove
George Mason University

You're invited to Propose a Workshop

SIGGRAPH conference workshops offer an important technical, scientific, and creative forum for the interchange of ideas in the international computer graphics community. In structured, small-group workshop discussions, participants define issues, compare their work, discuss unresolved problems that require further research or development, and explore solutions. All workshops are summarized in finished reports for publication in *Computer Graphics*.

Appropriate workshop topics include current research in the academic or industrial sector, current development for a project or product, or a topic of current interest, such as emerging standards. The workshop committee invites proposals from anyone who would like to organize a group to discuss these areas. Workshop organizers are expected to invite participants, plan an agenda, lead a one- or two-day workshop, and produce a report of the group's results.

Topics that relate to education in computer graphics will be excluded from the workshops. These topics should be proposed as an educators' activity.

One- or two-page proposals from prospective workshop organizers must be received by the workshops chair by *9 January 1991*. By late January, the workshops committee will review the proposals and select workshop topics. The committee will then publish a call for workshop participants in various technical publications.

People interested in one of the topics must submit a two- to four-page position paper to the workshop organizer. The committee will review position papers and select participants. Just before the conference, participants who have been selected will send supplemental documents to the workshop organizer for distribution to other participants in that workshop.

The workshop contributor's packet provides further details about contributor guidelines and the responsibilities of workshop organizers and participants.

Request a contributor's packet from:

SIGGRAPH '91
Conference Management Office
401 N. Michigan Avenue
Chicago, IL 60611
312-644-6610

Submit workshop proposals to:

Ed Brabant
SIGGRAPH '91 Workshops Chair
Megatek Corporation
9645 Scranton Road
San Diego, CA 92121
619-455-5590 ext. 2639
619-453-7603 (fax)
brabant@megatek.uunet
uunet!megatek!brabant
ucsd!megatek!brabant

You're invited to Submit Films, Videos, or Alternate Media

SIGGRAPH's annual conference is a premier showcase for the world's most advanced, uniquely creative, and innovative computer animations for film, video and alternative media. As in the past, the goals of the show are technical excellence, innovation, aesthetic quality, and audience impact.

At SIGGRAPH '91, the electronic theatre, gallery, and showcase will continue the tradition of excellence established in previous years with an additional dimension: a thematic component. Without restricting the scope or creativity of the entries, the electronic theatre jury is especially encouraging submission of films, videos, and alternate media that focus on environmental concerns and ideas. We hope to demonstrate how these media can promote the healthy survival of the world and its peoples.

The Electronic Theatre
Culminating a year of work in computer animation, the electronic theatre is a highlight of every SIGGRAPH conference. For old friends, peers, and those new to the industry, it's a chance to enjoy the world's most stunning and sophisticated computer graphics animation. It's an international celebration of outstanding computer animation in art, television, motion picture, corporate communications, education, industry, research, and science.

The Electronic Gallery
With a uniquely designed setting, the electronic gallery enlarges our show to include media beyond traditional film and video: HDTV, large-screen formats, multi-monitor systems, 3D stereoscopic display, and interactive animation systems. Unlike the theatre, the gallery displays works according to categories in their original media.

The Electronic Showcase
The electronic showcase provides an environment designed to display longer animations, newly completed works, and historical footage.

The committee is looking for pioneering works which will make this electronic forum a dynamic cross-section of many disciplines. We encourage entries from the widest possible range of people who

use computer animation. A jury of industry professionals will select the entries for the electronic theatre, the gallery, and the showcase.

Film and video animations must be submitted to the jury by *1 May 1991*. Proposals for formats other than film and video must be submitted by *12 December 1990*. The electronic theatre contributor's packet provides helpful information about length, acceptable media, and the jury process. Request a contributor packet from:

SIGGRAPH '91
Conference Management Office
401 N. Michigan Avenue
Chicago, IL 60611
312-644-6610

Submit proposals and film and video to:

Carol Chiani
The Computer Workshop
503 Broadway
New York, NY 10012 USA
212-925-9256
212-925-8910 (fax)
cchiani@pratt.bitnet

Electronic Theatre Jurors
Pascal Chesnais
MIT Media Lab
Joan Collins
Joan Collins & Associates
Roy A. Hall
Cornell University
Maureen Nappi
Maureen Nappi Inc.
Jo anne Tolkoff
Nexus Productions
Dean Winkler
Post Perfect Inc.

You're invited to Submit Art, Design, and Critical Essays

The SIGGRAPH '91 art and design show continues the tradition of selecting and exhibiting works in which the use of computer graphics technology is original, substantial, and meaningful. The 1991 show will be juried in two separate categories: fine arts and design. A separate group of experts will jury each of the categories.

The art and design show committee is especially interested in fine art and design works that:

- Could not have been created without the use of a computer.
- Are critically related to computer graphics technology and possess a strong aesthetic value.
- Use the computer in more ways than just as a production tool.
- Approach artistic creation and design in original ways.

In the fine arts category, artists may submit a maximum of three 35 mm slides/videos representing a maximum of three visual and spatial works created between January of 1989 and the 1991 deadlines. This includes, but is not limited to, the following:

- Two-dimensional works entirely or partially computer generated. A wide variety of media are eligible, ranging from frame buffers, photographs, and computer printouts to collages, paintings, and mixed media.
- Three-dimensional works designed and/or produced with computer technology. A wide variety of formats are eligible, ranging from sculptures in traditional materials to computer-controlled environments.
- Non-commercial animations entirely or partially computer generated and intended for gallery viewing.
- Interactive installations that require user interaction and a "live" computer graphics system.

In the design category, designers may submit illustration, graphic design, and/or industrial design projects created between January of 1988 and the 1991 deadlines. An actual sample of each two-dimensional printed entry must be submitted. Three-dimensional projects and interactive systems may be submitted in 35 mm slide and/or video format. This includes, but is not limited to, the following:

- Two-dimensional works created and/or produced with computer technology. A wide variety of graphic design, illustration, and advertising projects in which computer graphics tools played an integral part are eligible. These projects may include typefaces, symbols, charts and diagrams, all kinds of publications and printed materials, posters, covers and jackets, and print advertising campaigns.
- Three-dimensional works created and/or produced with computer technology. A wide variety of industrial design, applied arts, and architecture projects in which computer graphics tools played an integral part are eligible. These projects may include products and utilitarian objects, models, and visualizations of architectural spaces.
- Interactive information systems that require computer-human interaction.

The art and design show committee is also interested in critical essays that examine the influence of computer graphics technology on the development of current artistic and design movements and trends. These critical essays should employ the methods of art and design criticism, theory, history, and aesthetics. They should include a 100-word abstract and be no longer than 4,000 words (or 20 double-spaced typewritten pages).

The SIGGRAPH '91 art and design show contributor's packet contains submission forms, further details, entry guidelines, and a description of the SIGGRAPH '91 art and design show reviewing process.

Request a contributor's packet from:

SIGGRAPH '91
Conference Management Office
401 N. Michigan Avenue
Chicago, IL 60611
312-644-6610

Submit critical essays and proposals for interactive installations by *Wednesday, 9 January 1991.*

Submit slides and samples of two- and three-dimensional works by *Wednesday, 27 February 1991.*

Submit videotapes of animation by *Wednesday, 1 May 1991.*

Send art and design show entries to:

Isaac Victor Kerlow
SIGGRAPH '91 Art and Design Show Chair
Department of Computer Graphics
Pratt Institute
200 Willoughby Avenue, PS 24
Brooklyn, NY 11205
718-636-3489
718-622-6174 (fax)

You're invited to Submit Technical Slides

The SIGGRAPH slide sets represent the state of the art in computer graphics and are highly regarded throughout the industry. The slide sets committee is eager to receive your images for use in SIGGRAPH '91. Please submit your 35 mm slides of computer-generated images that:

- Document new applications areas in computer graphics.
- Demonstrate emerging techniques, algorithms, and procedures.
- Reflect improvements over previous works.
- Are outstanding in their visual content.

Images selected by the slide sets committee will appear in the SIGGRAPH '91 slide sets. Three-dimensional slide submissions are encouraged for consideration in the slide sets or a possible separate stereoscopic 3D slide set. The slide sets will be sold at the SIGGRAPH '91 conference and afterward as documentation of the year in computer graphics. Images will also be selected for other SIGGRAPH promotional purposes, which may include posters, brochures, catalogs, or proceedings covers.

Before submitting your slides, please review the slide sets contributor's packet. A slide submission form will also be published in *Computer Graphics*, Volume 25, Number 1, January 1991.

Two original 35 mm slides of each image must be submitted together with a slide submission form to the slide sets committee chair by *Wednesday, 20 March 1991*.

Request a slide sets contributor's packet from:

SIGGRAPH '91
Conference Management Office
401 N. Michigan Avenue
Chicago, IL 60611
312-644-6610

Send slide sets submissions to:

Eric Bosch
SIGGRAPH '91 Slide Sets Chair
Department of Clinical Epidemiology and
Biostatistics
McMaster University
1200 Main Street West, Building 74
Hamilton, Ontario, Canada L8N 3Z5
416-525-9140 ext.84-4095
eric@cebnet.mcmaster.ca

You're invited to Organize a Special Interest Group

Observing only the constraints of legality, morality, and practicality, SIGGRAPH '91 welcomes and encourages groups to convene around virtually any subject related to computer graphics. Anyone may request to have such a gathering scheduled. The conference will provide meeting space, publicity (if you want it), and basic audio/visual equipment — all free of charge, to which your group may add food catering, specialized audio-visual components, and any other elements for which you are willing to pay.

Many such sessions have become an annual tradition at the SIGGRAPH conference, so you may want to consult the programs from previous years to determine if the subject in which you are interested is likely to be covered. If there is any question in your mind, though, the best advice is to request space. If people make overlapping requests, we will make you aware of each other and give you an opportunity to coordinate and combine as appropriate.

Remember, no group is too small, no subject too arcane, no gathering too informal to take advantage of this offer. If you are at least willing to admit publicly that you asked for the space in the hope that others with similar curiosities might join you, then you are eminently qualified to request a special interest group meeting. We will do everything we can to see that your needs are met.

Send inquiries about special interest group meeting space to:

John E. French, Jr.
SIGGRAPH'91 Special Interest Groups Chair
GeoQuest Systems, Inc.
5858 Westheimer, Suite 800
Houston, TX 77057
713-952-2100
713-952-2420 (fax)

You're invited to
Submit a Prospectus for a Hypermedia Document

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 environments. Previous submissions have included hypermedia literature, interactive art pieces, entertainment, educational material, museum installations, interactive proposals, and historical retrospectives.

Unlike reading a novel from front to back, in hypermedia you can explore a non-sequential collection of ideas by stepping back and getting an overview, diving in for details, experiencing the sound and images of the real thing on video, and replaying the same thing over and over again at your own pace, in your own style.

Submit a prospectus for your self-guided hypermedia document or participatory interactive information environment. The hypermedia jury will select innovative and creative submissions and run them continuously at the conference.

The prospectus must be submitted by *Wednesday, 9 January 1991*. It should be two to five pages in length and must contain:

- Title, creators, and contact person.
- A 150-word abstract suitable for the conference program.
- A description of innovative and creative features.
- The equipment configuration that you will provide to run your document.
- The document's completion date.

To enable the jury to experience and experiment with your document, please send a demo disk or a videodisk, if available, with your prospectus. At the very least, send us a videotape of the system in action.

For complete information on how to prepare a prospectus for a hypermedia document, request a contributor's packet from:

SIGGRAPH '91
Conference Management Office
401 N. Michigan Avenue
Chicago, IL 60611
312-644-6610

The committee will notify authors of selected hypermedia documents or interactive environments by late March 1991. Authors will need to submit completed documents or demonstrate the final environment in early June so that we can confirm the equipment configuration for the conference.

Send prospectuses to:

Richard J. Beach
SIGGRAPH '91 Hypermedia Chair
Xerox PARC
3333 Coyote Hill Road
Palo Alto, CA 94304
415-494-4822
415-494-4022 (fax)
beach.pa@xerox.com

You're invited to Submit a Virtual Reality Proposal

The concepts of virtual reality based applications have evolved from esoteric concepts introduced in the SIGGRAPH art show a few years ago to innovative software and hardware that reveal how computers might be used in the next decade for applications ranging from entertainment and education to design and engineering. Virtual reality technology cannot be fully appreciated until it is personally experienced. Watching someone else realistically navigate within a virtual reality is not at all the same as actually being there yourself!

For the SIGGRAPH '91 virtual reality applications gallery, you are invited to submit reliable, useful virtual reality environments in which attendees can actually grab the 3D mice, joysticks, trackballs, and forceballs; strap on the headgear, stereo eyewear, gloves, and suits; and enter a virtual space, interact with the computer in innovative ways, and perform real-world useful applications.

Proposals will be reviewed for innovation, technical merit, application significance, quality of experience (including attention to the total human factors problem), ease of use of the basic virtual reality features, and the degree to which the entire user interface can be accessed without extensive training. Power and floor space will be provided, but additional requirements should be specified in the proposal. Accepted projects will need to include all necessary equipment.

Specifically, our goal in these virtual reality demonstrations is to help attendees interact with objects and environments that move or change their apparent characteristics. Visual cue generation and real-time interaction (10-60 updates per second) are minimum requirements. Additional cue generation is encouraged, such as touch, sound, motion, smell, wind, etc. We are particularly interested in such techniques as:

- Moving through and optionally interacting with virtual worlds. These applications could also show training and education uses.
- Interactively shaping, building, or sculpting objects.

- Interactively assembling and manipulating systems of parts simulating real-world applications, using aids that give feedback on real-world geometric and application constraints.
- Multiple users interacting in the same virtual world.
- Interaction technologies, environment control, monitoring stimulus generation (semi-automatic participants, AI behaviors generation), and user interfaces that are significant subsystems in enhancing the usability, productivity, and effectiveness of a virtual reality system through enhancing realistic control and navigation through a 3D virtual world and its contents.

Submissions of projects that represent virtual reality work in manufacturing and entertainment industries, academia, and government organizations are encouraged.

Before preparing your proposal, please review the virtual reality application gallery contributor's packet. It includes complete details on the kinds of projects that the jury hopes to review and select.

Request a contributor's packet from:

SIGGRAPH '91
Conference Management Office
401 N. Michigan Avenue
Chicago, IL 60611
312-644-6610

Proposals must be received by *9 January 1991*.
Virtual reality demonstrations must be provided by *1 May 1991*.

Send proposals to:

Steve Tice
SimGraphics
1137 Huntington Drive
South Pasadena, CA 91030-4563
213-255-0900
213-255-0987 (fax)
Applelink: simgraphics

You're invited to Propose an Educators' Activity

SIGGRAPH '91 offers educators an expanded forum to explore computer graphics education in the arts, computer science, engineering, and other disciplines. You are invited to propose an educators' activity—a paper, a panel, a discussion group, a course, or another activity that will be of interest to computer graphics educators. Those within the computer graphics industry who are concerned about educational issues as well as educators themselves are encouraged to submit proposals. In order to broaden the program's point of view, we hope to receive proposals from a variety of countries.

Possible topics for educators' activities include, but are not limited to:

Computer graphics curricula and laboratories.
- Creative cross-disciplinary collaborations.
- Program development and funding.
- Student activities.
- Career planning and development.
- Interfaces among education, industry and government.
- Co-op programs and internships.

We are looking for topics of general interest to one or more disciplines or areas of computer graphics education. Multi-disciplinary activities are especially interesting, since one of our goals is to expand contact and collaboration among various disciplines in computer graphics.

The educators' program will run from Wednesday noon through Friday afternoon, 31 July through 2 August 1991. We will run a single track of activities in several formats, so we want activities that will interest as many educators as possible. These activities will be presented as:
- Paper sessions of 20 minutes each.
- 90-minute panels with up to four speakers. 90-minute discussion groups with up to six pre-scheduled discussants.
- Half-day courses.

Other formats are possible based on individual discussions between the SIGGRAPH '91 education chair, or a member of the educators' program committee, and potential proposers. Appropriate

SIGGRAPH support for slides and video will be available for presenters.

The educators' program committee will select almost three days of activities. We hope to present a rich mix of events, formats, and topics. Activities will be chosen for their potential contribution to educators' knowledge of the field and their ability to teach computer graphics creatively and effectively.

For further information, request an educators' program contributor's packet from:

SIGGRAPH '91
Conference Management Office
401 N. Michigan Avenue
Chicago, IL 60611
312-644-6610

All proposals for educators' program activities must be received by the SIGGRAPH '91educators's program chair by *9 January 1991*. Late proposals cannot be considered.

Send proposals to:

Steve Cunningham
SIGGRAPH '91 Educators' Program Chair
Computer Science Department
California State University, Stanislaus
Turlock, CA 95380
209-667-3176
209-667-3333 (fax)
rsc@altair.csustan.edu

Educators' Program Committee
Judith R. Brown
The University of Iowa
Barbara Mones-Hattal
George Mason University
Gregory M. Nielson
Arizona State University
Robert S. Wolff
Apple Computer, Inc.

You're invited to Reserve Exhibit Space

The annual SIGGRAPH conference presents an unparalleled opportunity to reach the leaders and decision makers of the computer graphics industry. It is the world's premier showcase for displaying and seeing the very latest in computer graphics hardware, software, applications, systems, and ideas. For exhibitors, there is no better opportunity to communicate with those who are directly involved in the computer graphics industry's latest conceptual advances, technology breakthroughs, new techniques, and leading-edge issues.

At SIGGRAPH '91, over 250 exhibitors will demonstrate their products and services to an international audience of 25,000-30,000 people from industry, government, and the arts. Because it will convene in Las Vegas, SIGGRAPH '91 will have particular appeal to representatives of the film and high-tech industries in Los Angeles and San Diego and the large population of computer graphics professionals in northern California and the Pacific Northwest.

The conference will occupy the entire 470,000 square feet of the ultra-modern Las Vegas Convention Center's East Hall. The convention center is located in the heart of Las Vegas, just 3.5 miles from McCarran International Airport and a10-minute walk from over a dozen major hotel complexes.

In 1991, as always, the SIGGRAPH conference will bring exhibitors together with qualified decision makers, buyers, and specifiers in an environment where, surveys show, attendees make more buying decisions in three days than they do during the entire year.

Request a SIGGRAPH '91 exhibitor prospectus from:

SIGGRAPH '91
Exhibition Management Office
Robert T. Kenworthy, Inc.
866 United Nations Plaza
New York, NY 10017
212-752-0911
212-223-3034 (fax)

Norm Abelson
SIGGRAPH '91 Exhibits Chair

You're invited to Be a Student Volunteer

The SIGGRAPH '91 student volunteer program is your opportunity for a first-hand introduction to the movers and shakers of the computer graphics industry, the latest technologies,and the most advanced applications in art, engineering, and science.

As a student volunteer, you will be eligible for complimentary conference registration in exchange for working 20 to 35 hours during the conference. Out-of-town students who work 35 hours will be eligible for up to five nights' accommodations.

The student volunteer program will provide optimum educational and career benefits. Work schedules will be arranged to allow attendance at one course and one technical session. Volunteers may also attend the electronic theatre, art and design show, exhibits, course luncheons, and receptions during their non-working hours. Special student activities will be planned with SIGGRAPH '91 committee members, contributors, and peers.

As many as 200 student volunteers will be needed to help with all the conference events. Job assignments will range from audio-visual support and design show set-up to registration and ticket taking. For at least a portion of their hours, student volunteers will be assigned to an area that especially interests them. The remaining time will be divided among different positiitions for a fair distribution of duties and a variety of experiences.

All undergraduate or graduate students with an interest in computer graphics are invited to apply. Applications must be postmarked no later than *Wednesday, 17 April 1991*.

Request an application from:

SIGGRAPH '91
Conference Management Office
401 N. Michigan Avenue
Chicago, IL 60611
312-644-6610

Send completed applications to:

Vicki Putz
SIGGRAPH '91 Student Volunteer Program Chair
Vicki Putz Design
395 Quisset Avenue
Falmouth, MA 02540
508-540-3387
vputz@lynx.northeastern.edu

Major Deadlines

All deadlines are firm and will be strictly observed. This allows a fair selection process and time for production of printed materials.

Wednesday, 12 December 1990
- Course Proposals
- Proposals for Electronic Theatre Formats other than Film and Video

Wednesday, 9 January 1991
- Paper Submissions
- Panel Proposals
- Workshop Proposals
- Critical Art and Design Essays
- Interactive Installations Proposals
- Hypermedia Submissions
- Virtual Reality Submissions
- Educators' Activities Proposals

Wednesday, 27 February 1991
- Art and Design Show Slide Submissions

Wednesday, 20 March 1991
- Technical Slide Submissions

Wednesday, 17 April 1991
- Student Volunteers Applications

Wednesday, 1 May 1991
- Electronic Theatre Submissions
- Art and Design Show Videotape Submissions

Friday, 21 June 1991
- Early Registration

For information about the conference contact:
SIGGRAPH '91 Conference Management Office
401 N. Michigan Avenue
Chicago, IL 60611
312-644-6610
312-321-6876 (fax)

For information about the exhibition contact:
SIGGRAPH '91 Exhibition Management Office
Robert T. Kenworthy, Inc.
Hank Cronan, Barbara Voss
866 United Nations Plaza
New York, NY 10017
212-752-0911
212-223-3034 (fax)

SIGGRAPH '91 Conference Committee

Co-Chairs
Michael Bailey
San Diego Supercomputer Center
Carol Byram
Sony Microsystems Company

Conference Coordinator
Molly Morgan-Kuhns

Papers
Thomas W. Sederberg
Brigham Young University

Panels
Robert L. Judd
Los Alamos National Laboratory

Courses
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Evans and Sutherland

Electronic Theatre
Carol Chiani
The Computer Workshop

Art and Design Show
Isaac Victor Kerlow
Pratt Institute

Exhibits
Norm Abelson

Educators' Program
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California State University, Stanislaus

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Xerox PARC

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Association Travel, Inc.

ACM SIGGRAPH Program Director
Lois A. Blankstein
Association for Computing Machinery

ACM SIGGRAPH Vice Chair for Conference Planning
Andrew C. Goodrich
RasterOps

Hotel Information

The following hotels offer special rates to SIGGRAPH '90 attendees and are easily accessible to the Dallas Convention Center. Shuttle bus service is provided between most SIGGRAPH '90 hotels and the Dallas Convention Center. Check for posted schedules in your hotel lobby.

1 **Adolphus**
1321 Commerce St.
Dallas, TX 75202
214-742-8200

2 **The Aristocrat Hotel**
1933 Main St.
Dallas, TX 75201
214-741-7700

3 **Crescent Court**
400 Crescent Court
Dallas, TX 75201
214-871-3200

4 **Dallas Park Plaza**
1914 Commerce St.
Dallas, TX 75201
214-747-7000

5 **Days Hotel**
1011 S. Akard St.
Dallas, TX 75215
214-421-1083

6 **Embassy Suites**
2727 Stemmons Frwy.
Dallas, TX 75207
214-630-5332

7 **Fairmont**
1717 West Akard St.
Dallas, TX 75201
214-720-2020

8 **Holiday Inn-Brook Hollow**
7050 Stemmons Frwy.
Dallas, TX 75247
214-630-8500

9 **Holiday Inn-Downtown**
1015 Elm St.
Dallas, TX 75202
214-748-9951

10 **Holiday Inn Market Center**
1955 Market Center Blvd.
Dallas, TX 75207
214-747-9551

11 **Hyatt Regency Dallas**
300 Reunion Blvd.
Dallas, TX 75207
214-651-1234
Headquarters Hotel

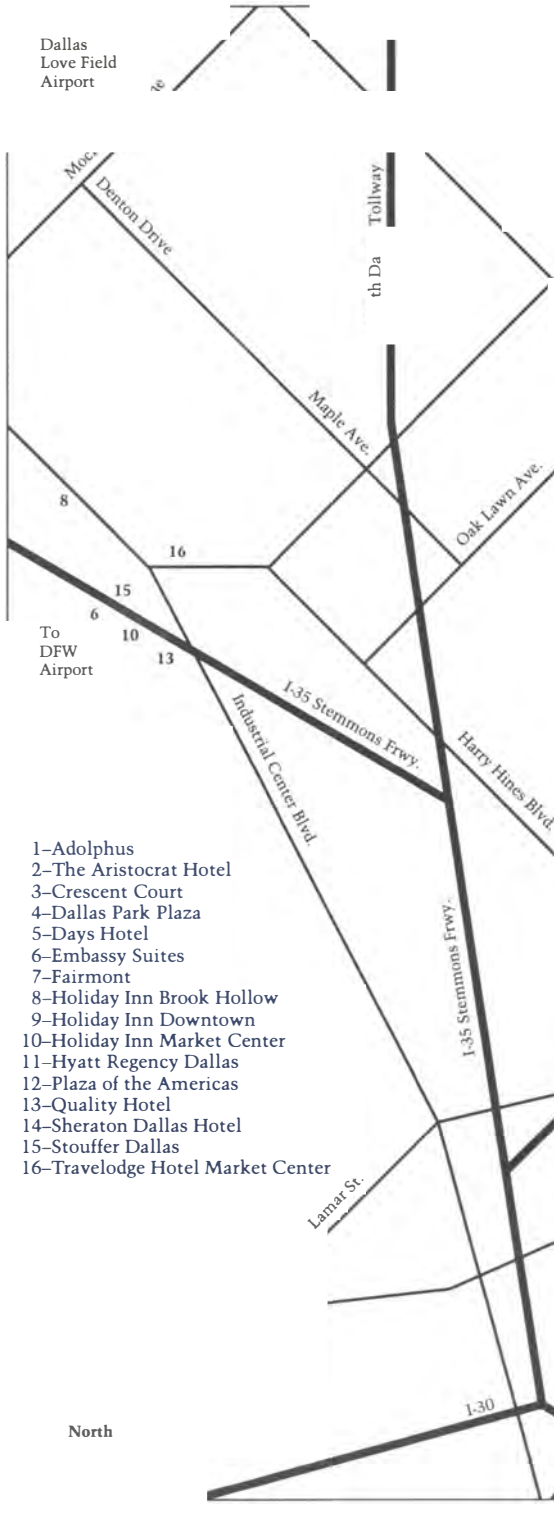
12 **Plaza of the Americas**
650 N. Pearl St.
Dallas, TX 75201
214-979-9000

13 **Quality Hotel**
2015 Market Center Blvd.
Dallas, TX 75207
214-741-7481

14 **Sheraton Dallas Hotel**
400 N. Olive St.
Dallas, TX 75201-4007
214-922-8000

15 **Stouffer Dallas**
2222 Stemmons Frwy.
Dallas, TX 75219
214-631-2222

16 **Travelodge Hotel Market Center**
4500 Harry Hines Blvd.
Dallas, TX 75219
214-522-6650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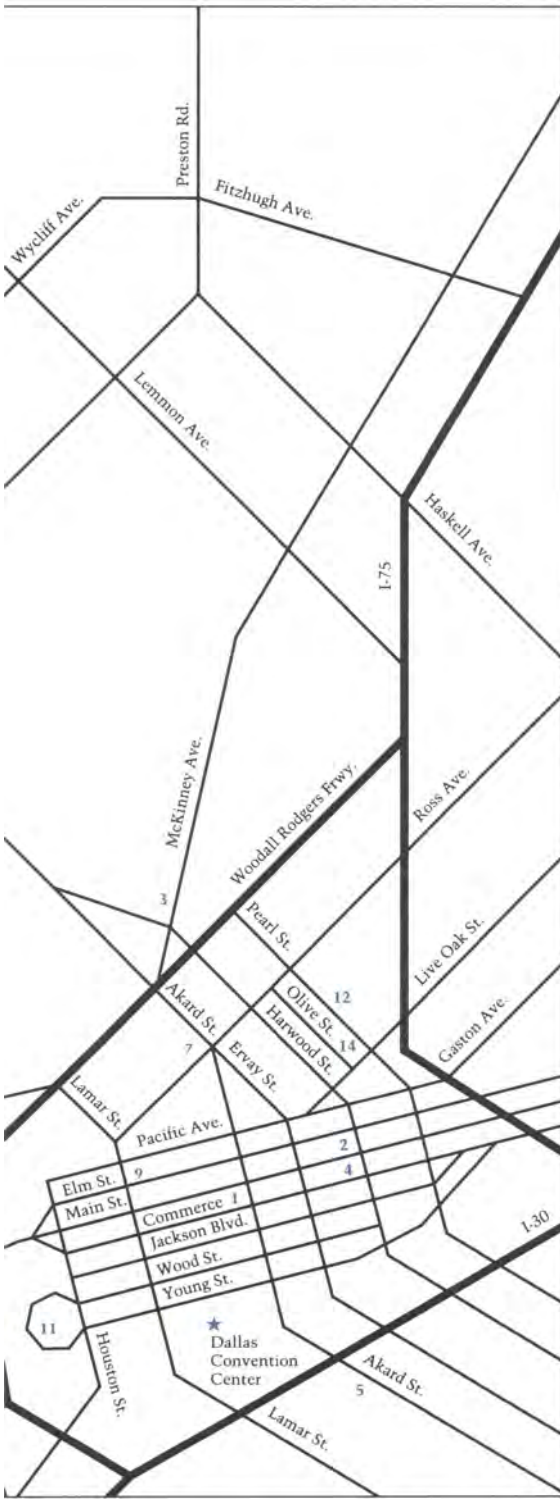
Airport
I-35 Stemmons Frwy.
Industrial Center Blvd.
Harry Hines Blvd.
1–Adolphus
2–The Aristocrat Hotel
3–Crescent Court
4–Dallas Park Plaza
5–Days Hotel
6–Embassy Suites
7–Fairmont
8–Holiday Inn Brook Hollow
9–Holiday Inn Downtown
10–Holiday Inn Market Center
11–Hyatt Regency Dallas
12–Plaza of the Americas
13–Quality Hotel
14–Sheraton Dallas Hotel
15–Stouffer Dallas
16–Travelodge Hotel Market Center
I-35 Stemmons Frwy.
Lamar St.
I-30
North


Preston Rd.
Fitzhugh Ave.
Wycliff Ave.
Lemmon Ave.
Haskell Ave.
I-75
McKinney Ave.
Woodall Rodgers Frwy.
Ross Ave.
Live Oak St.
Gaston Ave.
Pearl St.
Akard St.
Olive St.
Harwood St.
Ervay St.
Lamar St.
Pacific Ave.
Elm St.
Main St.
Commerce
Jackson Blvd.
Wood St.
Young St.
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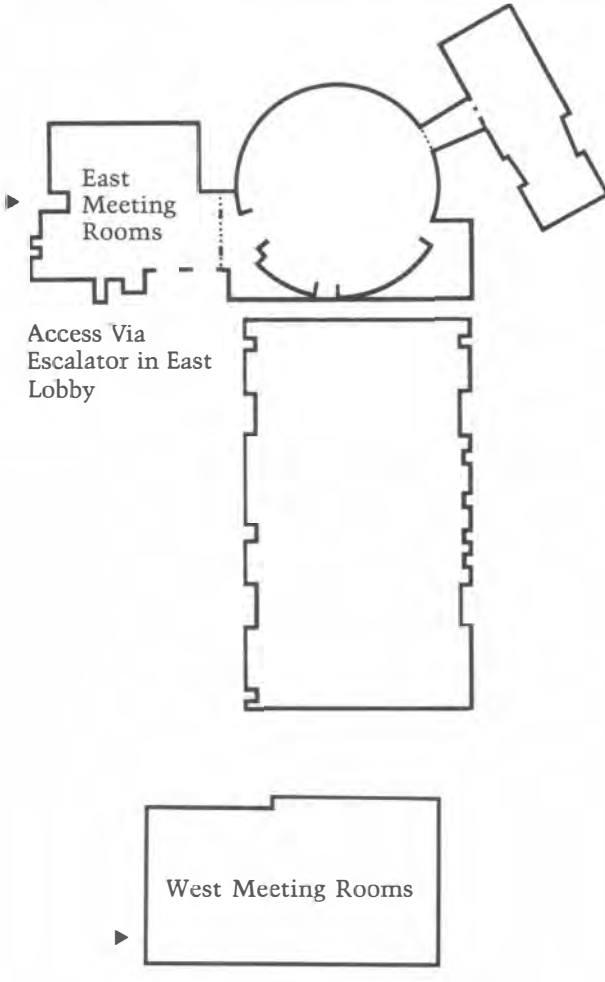
Dallas Convention Center

Level 2

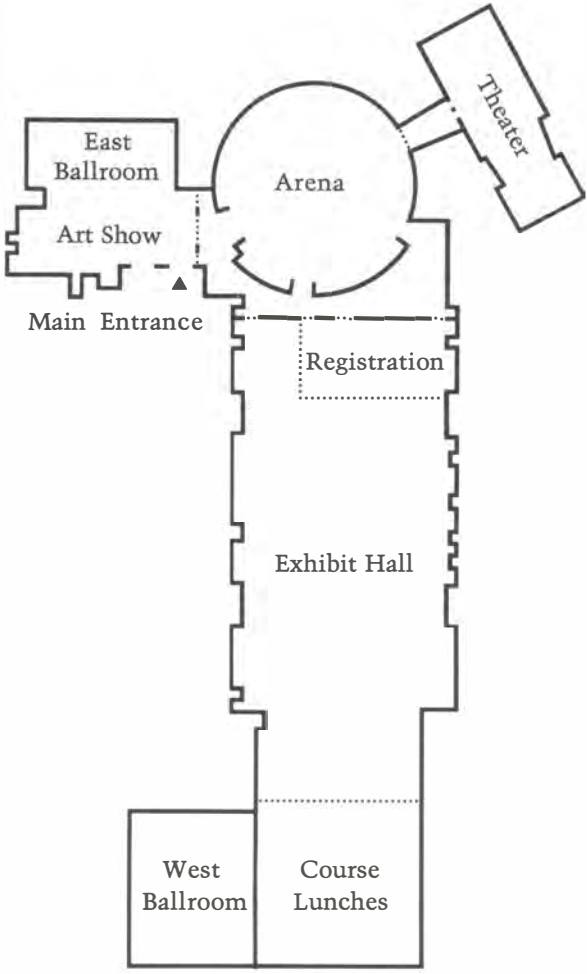


Access from West Outside Entrance or
via Escalator near West Ballroom, Level 3

Special Interest Groups, Private Functions and Other Meetings — Rooms N201-N236

Dallas Convention Center

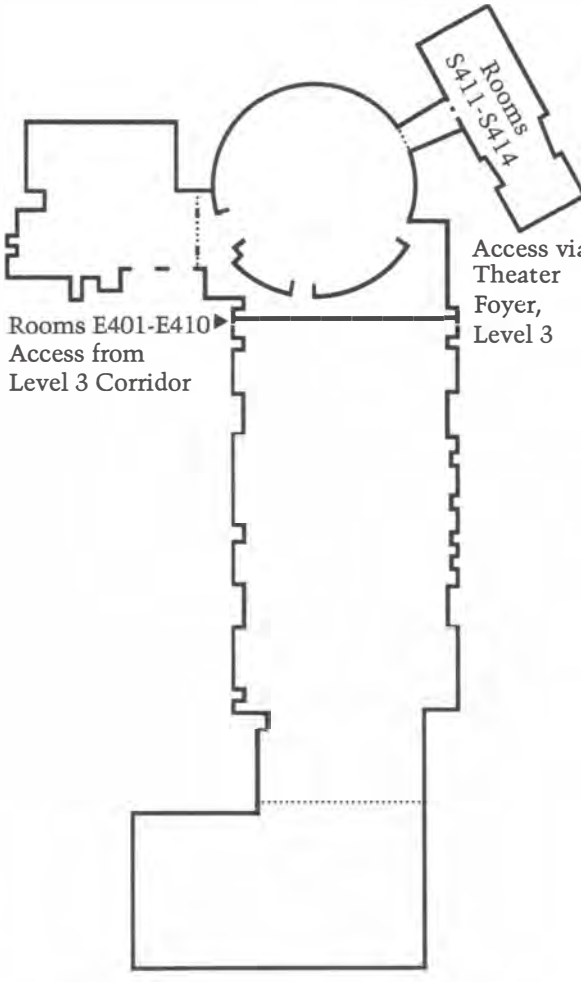
Level 3



Courses	Theater East Ballroom West Ballroom Hyatt Regency Hotel
Papers	Arena
Panels	Theater East Ballroom
Film and Video Theater	Arena
Exhibition	Exhibit Hall
International Business Center	Exhibit Hall
Merchandise	Exhibit Hall

Dallas Convention Center

Level 4



Special Interest Groups, Private Functions and Other Meetings	Rooms S411-S414
Conference Offices	Rooms E401-E410

Future Conference Dates

SIGGRAPH '91
July 28 - 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

Co-Chairs
Maxine Brown
University of Illinois at Chicago
Robert E. Holzman
Jet Propulsion Laboratory

SIGGRAPH '93
August 2-6, 1993
Anaheim, CA

SIGGRAPH '94
August 1-5, 1994
Orlando, FL

For additional information regarding future conferences, contact:

SIGGRAPH Conference Management Office
401 N. Michigan Avenue
Chicago, IL 60611
312-644-6610

Dallas Convention Center Floor Plan

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WHERE ADVANCED TECHNOLOGIES INSPIRE TOMORROW'S REALITIES

18th International Conference

on Computer Graphics and

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28 July–2 August 1991
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212-752-0911

LAS VEGAS

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