

SIGGRAPH '82

July 26-30
Boston





CREDITS

FRONT COVER

Melvin Prueitt, Los Alamos National
Laboratory

This picture was generated on a Cray 1
with a III FR-80 graphics device.

BACK COVER

Upper Left:

Yochiro Kawaguchi, Nippon University
Tokyo, Japan

Lower Left:

Michael Coltery, Cranston-Csuri
Productions, Inc., Columbus, OH

"Pencil City"

This picture was generated using a VAX
11/780 computer and a 640x512x32 frame
buffer.

Upper Right:

**Dave Salesin, Steve Feiner, and Tom
Banchoff**, Brown University,
Providence, RI

A Klein bottle assembled in four-space
in such a way that the projections into three-
space have a self-intersection curve that is
the intersection of two mobius bands.

This picture was generated using a
VAX 11/780 running Unix, and a Ramtek
9400 with a 1280x1024x8 frame buffer.

Lower Right:

Zsuzsa Molnar and Frank Dietrich,
University of Illinois at Chicago Circle,
Chicago, IL

"Snake"

This picture was generated using UV-1,
a micrographics computer system.

DESIGN:

Beth April Smolev, Rochester Institute of
Technology

General Information

EXPOSITION

The SIGGRAPH conference has become the place to see the latest computer graphics hardware, software, peripherals, and services. The exposition is for anyone involved in computer graphics. The John B. Hynes Veterans Auditorium Exhibit Hall is open July 27-29.

All phases of SIGGRAPH have demonstrated remarkable growth since the first conference in 1974. The exposition program has grown from a handful of exhibitors in 1975 to 135 in 1981. More than 140 exhibitors are expected this year.

Even more important is the diversity of the exposition. Vendors will provide demonstrations of products affecting all phases of graphics including:

- Turnkey applications (CAD/CAM, cartography, image processing, etc.)
- Refresh vector, raster, and storage tube displays
- Film and paper hardcopy devices
- Graphical input devices
- Software support packages
- Time-sharing services
- OEM products

USER GROUPS

A number of user groups traditionally meet during the SIGGRAPH conference. Scheduled meeting dates and locations will be available in late June. For further information, contact your user group or John French at 713-965-4084.

VENDOR FORUM

The vendor forum will include two days of vendor presentations of new product lines. Presentations will be held in rooms near the exhibit area at the Sheraton-Boston Hotel. Five different sessions will be held concurrently, with presentations in the areas of Future Applications, Hardware Trends, Business Graphics, CAD/CAM, and Education.

ART SHOW

SIGGRAPH '82 will sponsor a major juried public exhibition of artists' computer-generated works. The show will include exhibits of hardcopy, film, video, and presentations of installations. The selected works will be exhibited in the Sheraton-Boston Hotel during the week of the conference.

FILM/VIDEOTAPE SHOWS

The best audio-visual equipment in ideal projection environments will make SIGGRAPH '82 the graphics connoisseur's delight! High-intensity GE Light Valve video projectors, super-bright slide, 16mm and 35mm motion projectors and high-quality stereo audio will provide the highest bandwidth experience possible.

In addition to the technical program, two evening shows will be held. Tuesday night's show will feature the best of computer-generated films and videotapes of recent years. Wednesday night will be devoted entirely to new material produced within the last year.

Both film programs will be composed of selections reviewed by a panel. The deadline for submissions is May 1. Videotapes will be accepted in 3/4", VHS, Beta and 1" type C format. Films may be 16mm or 35mm. For more information, call Lou Katz at 415-526-1497.

During lunch hour on Wednesday, Thursday and Friday, the A/V equipment in the theater will be available for informal showings. If you'd like to see your work projected on a large screen, we'll be at your service!

COMPUTER MUSIC CONCERT

Friday evening July 30 there will be a computer music concert at Kresge Auditorium at MIT. The concert is the world premiere of approximately 10 works for instruments and computer-processed sound from the MIT Summer Workshop in Computer Music Composition. All SIGGRAPH attendees are welcome. Admission is free.

Courses at a Glance

The courses are divided into two categories: tutorials and seminars. A **tutorial (T)** is an introductory level course where a great deal of emphasis is given to the teaching of fundamental principles. A **seminar (S)** is a special topic course, often presented at a more advanced level.

Please refer to the Map of Boston on the inside back cover for course site locations.

COURSES	MON. JULY 26	TUES. JULY 27	SITE
GENERAL COURSES			
1. Introduction to Computer Graphics (T)			1
2. Low-Cost Graphics (T)			4
3. Computer Graphics Hardware (T)			1
4. The Application of Computer Graphics to Engineering, Scientific, & Design Problems (T)			6
5. Introduction to Raster Graphics (T)			1
6. Psychology for User-Computer Interfaces (T)			1
7. How to Design User-Computer Interfaces (T)			1
8. Device-Independent Graphics Software (T)			1
ANIMATION/VISUAL SYNTHESIS			
9. Two-Dimensional Computer Animation (T)			★
10. Advanced Image Synthesis (S)			6
11. Introduction to TV, Film, Video, Printing (S)			1
12. Three-Dimensional Computer Animation (S)			★
13. State-of-the-Art in Image Synthesis (S)			6

COURSES	MON. JULY 26	TUES. JULY 27	SITE
BUSINESS GRAPHICS			
14. Graphic Design and Information Graphics (S)			10
15. Presentation and Publication Graphics (T)			7
16. Graphics and Data Bases (T)			7
17. Distributed Graphics and Communications (T)			7
18. Business Graphics for Managers (S)			7
19. Introduction to the SIGGRAPH '82 Exhibition (S)			1
20. Computer Graphics in Office Animation and Electronic Publishing (T)			7
21. Demographics: Mapping, Marketing, and Computer Graphics (T)			7
CAD/CAM			
22. Introduction to CAD (S)			11
23. Solid Modelling (S)			11
24. Freeform Surfaces (S)			11

Courses

1

TUTORIAL: Introduction to Computer Graphics
July 26 & 27
WHO SHOULD ATTEND?

This introductory tutorial is aimed at managers, potential users, and technical people who need an overview of the subject. The course requires no background in computer graphics; however, some basic familiarity with computers will be assumed.

CHAIR:

Marceli Wein, National Research Council of Canada

The attendee of this tutorial will be presented with a broad introduction to computer graphics. The tutorial will discuss vector and raster display systems, input devices, hard copy devices, interactive techniques, human factors, the organization and context of graphics packages, and the mathematical background of visible surface processing. Such applications as animation, CAD/CAM, and mapping will be described briefly. The tutorial will close with a discussion of current trends in computer graphics and an overview of the technical sessions at the conference.

LECTURERS:

Marceli Wein, Head, Computer Graphics Section, National Research Council of Canada, Ottawa, Ontario

Ron Baecker, President, Human Computer Resources, Toronto, Ontario

Alain Fournier, University of Toronto, Toronto, Ontario

Peter Tanner, Computer Graphics Section, National Research Council of Canada, Ottawa, Ontario

Marceli Wein is Head of Computer Graphics Section at the National Research Council of Canada. He received his Ph.D. in Physics from McGill University. Following a year as a Research Associate, he joined NRCC. His past and present interests include interactive systems, applications to CAD, graphics standards, computer animation, and display architectures.

2

TUTORIAL: Low-Cost Graphics
July 26 & 27
WHO SHOULD ATTEND?

No previous graphics experience is necessary: all pertinent concepts and terms will be presented in an overview lecture. The course is appropriate for all persons who wish to minimize the cost/benefits of graphics applications. This would include engineers, scientists, managers, and analysts in industry, government, or education.

CHAIR:

Richard L. Phillips, University of Michigan

The theme of the course will be professional applications of low-cost interactive graphics. Graphics hardware ranging in price from less than \$1,000 to \$5,000 will be described and demonstrated. State-of-the-art systems like Apple II and IBM PC will be considered. Graphical input devices and methods of producing graphical hard copy will be discussed as well—all on a scale consistent with a low-cost theme.

LECTURERS:

Richard L. Phillips, Professor of Computer, Information, and Control Engineering, University of Michigan

Thomas DeFanti, Professor of Information Engineering, University of Illinois at Chicago Circle

H. L. Loats, Jr., Vice President of ECO Systems International, Inc., Gambrills, Maryland

Paul Roper, Director of Software Development, Eyring Research Institute, Provo, Utah

and other professionals in the field of low-cost graphics.

Richard L. Phillips is a Professor of Aerospace Engineering and of Computer, Information, and Control Engineering at the University of Michigan. He has been active in computer graphics since 1968, having worked in the areas of computer-aided design, computer graphics information systems, and graphical database management systems. During the last several years, he has been working with the low-cost graphics systems and has established a pilot graphics laboratory consisting of Apple II personal computers.

3

TUTORIAL: Computer Graphics Hardware July 26 & 27

WHO SHOULD ATTEND?

Computer professionals and managers concerned with the use and specification of computer graphic systems, especially high-performance vector and raster graphic work stations.

CHAIR:

John Staudhammer, University of Florida

Characteristics of display devices, display systems, and recording equipment for computer-driven displays will be presented. Hardware requirements, characteristics, limitations, and processor demands will be discussed. Issues related to high-performance interactive displays and to highly accurate recording (photographic) displays will be considered. Characteristics of recording and digital video devices and associated techniques will be discussed.

LECTURERS:

John Staudhammer, Professor of Electrical Engineering and Computer Science, University of Florida, Gainesville, Florida
and others.

John Staudhammer received his Ph.D. in Engineering from UCLA, and is Professor of Electrical Engineering and Computer Science at the University of Florida. He has worked for Systems Development Corporation and the U.S. Army, and has served on the faculty at UCLA, Arizona State University, and North Carolina State University. Dr. Staudhammer has been involved in the development of high-performance computer display systems. His research area is computer graphics systems for handling three-dimensional objects for computer-aided design.

4

TUTORIAL: The Application of Computer Graphics to Engineering, Scientific, & Design Problems July 26 & 27

WHO SHOULD ATTEND?

Technical leaders concerned with the application of computer graphics to solve problems in engineering analysis and design, in industrial design, and in scientific research. Prior knowledge of computer graphics or programming experience is not required. Familiarity with the use of computers to solve technical problems is very desirable.

CHAIR:

Robert Ellis and **David Kasik**, Boeing Computer Services

The reasons for using computer graphics for the solution of technical problems and ways to use computer graphics effectively will be presented. The engineering applications of computer graphics will be illustrated with examples from data analysis, finite element modelling, and technical information presentation. Design and engineering systems will be described by emphasis on application software, mathematical support facilities, data bases, communication, input and output. Industrial design applications will be given with attention to high-resolution shaded images, aesthetic issues, and the importance of user-computer interfaces. Computer graphics in scientific research will be illustrated by examples from water and land resource investigations, analysis of large data sets, nuclear reactor simulation, and acoustic holography.

LECTURERS:

Robert A. Ellis, Boeing Computer Services Company, Tukwila, Washington
David Kasik, Boeing Computer Services Company, Tukwila, Washington
Del Coates, Del Coates Associates, Arlington, Texas
Richard J. Littlefield, Battelle Pacific Northwest Laboratory, Richland, Washington

Robert A. Ellis is Manager of Computer Graphics Applications for the Energy Technology Applications Division of Boeing Computer Services Company. The organization he manages is responsible for the specification, design, and development of specific computer graphics applications using a full range of computer systems and graphics devices.

Courses Continued

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TUTORIAL: Introduction to Raster Graphics **July 26**

WHO SHOULD ATTEND?

Professionals who wish to enter the field of raster graphics. The course requires little or no background or experience in computer graphics.

CHAIR:

Donald Greenberg, Cornell University

This tutorial is intended to be an introduction to the field of raster graphics. As the cost of computer memory continues to decrease, raster graphics will continue to increase in popularity and diversity, ranging from high-quality, realistic image simulations to low-cost, low-resolution displays. The tutorial will introduce the basic principles of image storage, image creation, and image display. Both hardware and software issues will be presented, as well as examples of existing systems and applications. The tutorial should help explain the capabilities, constraints, and difficulties inherent in using raster graphics software and hardware. For the novice, the tutorial should also provide valuable information for the selection and evaluation of graphics display systems.

LECTURERS:

Donald P. Greenberg, Director, Program of Computer Graphics, Cornell University
and others in the Program of Computer Graphics, Cornell University.

Donald Greenberg is the Director of the Program of Computer Graphics and the Computer-Aided Design Instructional Facility at Cornell University. Since 1966, Dr. Greenberg has been researching and teaching in the field of computer graphics. He is primarily concerned with research advancing the state-of-the-art in computer graphics and with utilizing these techniques as they may be applied to a variety of disciplines. His specialities include hidden surface algorithms, geometric modelling, color science, and synthetic image generation. He currently teaches the new computer graphics and computer-aided design sequence in the Department of Computer Science, and he also serves on the faculty of the Departments of Architecture and Structural Engineering at Cornell University.

6

TUTORIAL: Psychology for User-Computer Interfaces **July 26**

WHO SHOULD ATTEND?

System designers and programmers with experience in basic graphics and interactive computing. Attendees should consider the Tuesday companion tutorial, "How to Design User-Computer Interfaces."

CHAIR:

Jack Grimes, ITT

This tutorial covers the application of cognitive psychology, visual perception, and time perception to the design of user-computer interfaces and aspects of the emotional impact of computer system interaction. How people think, learn about, view, and react to computer systems will be discussed. The tutorial will include such topics as when menus are a good technique, what role a CRT display plays, what makes a system friendly, and how interactivity is measured. The emphasis is on pragmatics and application, not on theory. User interfaces to several experimental and commercial systems will be shown and analyzed to illustrate the ideas and concepts.

LECTURERS:

Jack D. Grimes, ITT
and others.

Jack Grimes received his Ph.D. in Electrical Engineering and Computer Science from Iowa State University and recently a master's degree in Psychology from the University of Oregon. From 1971 to 1981 he was employed at Tektronix, Inc., where he was manager of advanced development for desktop computers. Dr. Grimes is currently at ITT in Stratford, Connecticut, where he is Manager of Long-Range Programming R&D. His research interests are in the areas of user-computer interfaces and their role in software development.

7

TUTORIAL: **How to Design User-Computer Interfaces** **July 27**

WHO SHOULD ATTEND?

Systems designers and programmers with experience in basic graphics and interactive computing. Individuals with substantial experience in designing user-computer interfaces will find the lecture pace to be slow. Attendees should consider the Monday companion tutorial "Psychology for User-Computer Interfaces."

CHAIR:

James Foley, The George Washington University

The tutorial will provide requisite background for designers of user-computer interfaces. A top-down design methodology is presented first, followed by a discussion of the interaction devices and interaction techniques which can be used as a part of an interface. Important considerations in the visual presentation of information, such as coding, searching, and structure, are discussed. Design criteria that can be used to evaluate existing or proposed user interfaces are presented and illustrated, and available software tools for implementing user-computer interfaces are described. The lectures will be illustrated with slides and videotapes of interaction devices and techniques.

LECTURER:

James D. Foley, Professor of Electrical Engineering and Computer Science, The George Washington University, Washington, D.C.

Jim Foley is Professor of Electrical Engineering and Computer Science at The George Washington University and is President of Computer Graphics Consultants, Inc. He has previously held positions at Information Control Systems, the University of North Carolina, and the Bureau of the Census. Active in computer graphics since 1966, Dr. Foley has until recently been the editor of Communications of the ACM's Graphics and Image Processing Section, is co-author of "Fundamentals of Interactive Computer Graphics," and is associate editor of Transactions on Graphics. His research interests are computer graphics and user-computer interfaces.

8

TUTORIAL: **Device-Independent Graphics Software** **July 27**

WHO SHOULD ATTEND?

This tutorial is aimed at managers or technical personnel considering the purchase, adoption, or development of a device-independent computer graphics subroutine package. System programmers or those responsible for installation of a graphics package will benefit from this tutorial. Prior experience in computer programming is desirable. Attendees should have a knowledge of computer graphics hardware and software at the level of Course 1.

CHAIR:

Theodore N. Reed, Los Alamos National Laboratory

This tutorial will provide attendees with sufficient information to intelligently evaluate, select, or specify a device-independent computer graphics software package appropriate to their needs. Functional capabilities of graphics software will be reviewed and the terminology and concepts of device-independent graphics software will be presented. A partial list of these concepts include: system architectures, interfaces, device-independent coordinate systems, device drivers, multiple device capabilities, and graphic metafiles. Criteria for evaluation and a methodology for selection of device-independent graphics software will be established.

LECTURERS:

Theodore N. Reed, Los Alamos National Laboratory, Los Alamos, NM

James R. Warner, President, Precision Visuals, Incorporated, Boulder, CO

Peter R. Bono, Vice President, Athena Systems, Incorporated, Pawcatuch, CT

Theodore N. Reed received his M.S. in Computer Science from Montana State University. He is employed by the University of California at the Los Alamos National Laboratory where he has been designing, implementing, and supporting portable device-independent graphics software for the last seven years. He was an active participant in the ACM/SIGGRAPH Graphic Standards Planning Committee and is now Chairman of the ANSI task group specifying national standards for both the device-independent computer graphics metafile and the virtual graphics device interface.

Courses Continued

9

TUTORIAL: **Two-Dimensional Computer Animation** **July 26**

WHO SHOULD ATTEND?

This tutorial is introductory in nature and is aimed at professionals in either the graphics or animation industries, and is highly recommended for professionals considering the installation of animation systems. Some familiarity with raster graphics is desirable but not strictly necessary.

CHAIR:

Marc Levoy, Hanna-Barbera Productions

This tutorial covers the application of digital computer graphics to the automation and enhancement of two-dimensional animation, particularly cartoon animation of the type found in most large American production studios. Topics will include painting programs, video scanning, automatic inbetweening, video and film recording, special effects, and hardware problems typically encountered in the design and implementation of computer animation systems. Attention will be given to the artist/user interface and its effect on the design of interactive animation programs.

LECTURERS:

Marc Levoy, Cornell University and Hanna-Barbera Productions

Chris Odgers, Cornell University and Hanna-Barbera Productions

Bruce Wallace, Cornell University and Hanna-Barbera Productions

Edwin Catmull, Lucasfilm Ltd.

Alvy Ray Smith, Lucasfilm Ltd.

Rodney Stock, Lucasfilm Ltd.

Duane Palco, New York Institute of Technology

Marc Levoy is Director of the Hanna-Barbera Productions Computer-Assisted Cartoon Animation Project. He is a graduate of Cornell University with a bachelor's degree in Architecture and a master's degree in Computer Graphics. He has been on the staff of the Program of Computer Graphics, Cornell University, since 1975, and is currently developing a large-scale computer animation system for Hanna-Barbera Productions in Hollywood, California.

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SEMINAR: **Advanced Image Synthesis** **July 26**

WHO SHOULD ATTEND?

Programmers and researchers in the field will benefit most. Some familiarity with raster graphics and three-dimensional geometry will be assumed.

CHAIR:

Turner Whitted, Bell Laboratories

A survey of techniques for computer image synthesis will be presented. The discussion of visible surface algorithms will include curved surface display algorithms and VLSI implementations of display algorithms. The other elements of the seminar will deal with the production of high-quality images with emphasis on realistic shading and anti-aliasing.

LECTURERS:

Turner Whitted, Bell Laboratories, Holmdel, New Jersey

Frank Crow, Computer and Information Sciences, Ohio State University, Columbus, Ohio

Henry Fuchs, Department of Computer Science, University of North Carolina, Chapel Hill, North Carolina.

Turner Whitted is a member of the technical staff in the Image Processing and Display Research Department of Bell Laboratories. He is a graduate of Duke University and received his Ph.D. in Electrical Engineering from North Carolina State University.

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SEMINAR: Introduction to TV, Film, Video, Printing **July 26**

WHO SHOULD ATTEND?

Managers, users, and engineers responsible for computer graphics hardware and software. A general technical background is desirable, but no mathematics will be needed.

CHAIR:

Stephen R. Levine, Electronic Graphics Associates

This seminar will give the attendees a comprehensive overview of the basics of video, vision, film, and printing. The presentation of computer graphics is always dependent upon one or more of these areas. The following topics will be covered: vision—our own image processor, color and how we respond to color, how a TV works, how videotape recorders and video disks work, black and white film and its properties, color film and its problems, and printing of color images and its problems. The production of a short movie from start to finished product will also be covered.

LECTURERS:

Stephen R. Levine, Electronic Graphics Associates, Livermore, California

Bruce Eric Brown, Vice President, Electronic Graphics Associates, Livermore, California

John Blunden, Lawrence Livermore National Laboratory, Livermore, California

Stephen Levine received his B.S. and M.S. degrees from the University of California at Berkeley in Electrical Engineering and a Ph.D. from Stanford University in Computer Science. He is currently President of Electronic Graphics Associates, a firm specializing in computer graphics consulting and system integration. He also teaches an international short course on computer graphics and has consulted widely on the subject. His previous experience includes eight years with the Lawrence Livermore National Laboratory where he directed the development of new computer graphics hardware and software, three years with Stanford Research Institute, and two years with Singer Simulation Products. Dr. Levine is a Director of SIGGRAPH.

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SEMINAR: Three-Dimensional Computer Animation **July 27**

WHO SHOULD ATTEND?

The target audience includes production and technical people in film and video who wish to understand digital computer animation in depth, computer graphics people who wish to learn about animation techniques, and computer animation people who wish to learn about the state of the art.

CHAIR:

Bill Kovacs, Robert Abel and Associates

The seminar will review current techniques in three-dimensional computer animation. "Three-Dimensional" in this context means operating from data bases with three-dimensional coordinates; three-dimensional or stereo display systems will not be discussed. "Computer Animation" means frame-by-frame film or video generated by digital computers. Emphasis will be placed on specifying and editing motion in three dimensions. The topics include control and animation of articulated figures, motion modelling and simulation, integrating computer graphics with motion control (computer-controlled models and cameras), and animation for television and theatrical release. Film and videotape sequences representing the current technical horizon will be shown.

LECTURERS:

Bill Kovacs, Robert Abel and Associates, Hollywood, California

Lance Williams, New York Institute of Technology, Old Westbury, New York

Norman Badler, The University of Pennsylvania, Philadelphia, Pennsylvania

Craig Reynolds, Information International, Inc., Culver City, California

David Zeltzer, Ohio State University, Columbus, Ohio

Bill Kovacs received his B.S. in Environmental Design from Carnegie-Mellon University and his M.S. in Environmental Design from Yale University. He is the Technical Director at Robert Abel and Associates, Hollywood, California, where he is involved in direction of TV commercials and feature film effects, as well as software development.

Courses Continued

13

SEMINAR: **State-of-the-Art in Image-Synthesis** **July 27**

WHO SHOULD ATTEND?

The seminar will appeal mostly to researchers in the field, but some of the presentations could be appreciated by a more general audience.

CHAIR:

Ed Catmull, Lucasfilm Ltd.

This seminar will present several short informal talks that describe the recent developments in complex image synthesis. The talks will concentrate on aspects of the process that do not ordinarily appear in published papers. The exact content will be kept flexible until the time of the conference to allow inclusion of last minute developments.

LECTURERS:

Ed Catmull, Lucasfilm Ltd., San Anselmo, California

James F. Blinn, Jet Propulsion Laboratory, Pasadena, California

Rob Cook, Lucasfilm Ltd., San Anselmo, California

Loren Carpenter, Lucasfilm Ltd., San Anselmo, California

Rodney Stock, Lucasfilm Ltd., San Anselmo, California

Ed Catmull received his Ph.D. in Computer Science from the University of Utah. He is Director of Research and Development with Lucasfilm Ltd., San Anselmo, California, where he is involved in introducing high technology into the film industry. Dr. Catmull was Director of the Computer Graphics Laboratory at New York Institute of Technology, where he specialized in computer animation.

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SEMINAR: **Graphic Design and Information Graphics** **July 26 & 27**

WHO SHOULD ATTEND?

Researchers, programmers, and managers in all fields of computer graphics. The course is intended for people without a graphic design background.

CHAIR:

Aaron Marcus, Lawrence Berkeley Laboratory

This seminar introduces the concepts and principles of information-oriented graphic design (typography, symbols, color, spatial composition and temporal sequencing) and applies them to the Three Faces of computers. Outer-faces are end products of data processing: texts, tables, forms, charts, maps, and diagrams. Inter-faces are pages and screens of command-control and documentation for the user. Inner-faces are frames of program visualization and software documentation for the builder and maintainer of systems. Extensively illustrated slide lectures will explain how graphic design can improve effective visual communication.

LECTURER:

Aaron Marcus, Staff Scientist, Computer Graphics Group, Department of Computer Science and Mathematics, Lawrence Berkeley Laboratory, University of California, Berkeley, California

Aaron Marcus has a B.A. in Physics from Princeton University and a Master's Degree in Graphic Design from Yale University. He is currently a Staff Scientist at LBL where he is establishing graphic design standards for information graphics and the user interface of a large database management network and researching new visible languages for program visualization. For over 13 years, he has lectured at or consulted with major research and development centers for computer graphics in the USA and abroad. He has also published, taught, and exhibited his graphic design and computer graphics internationally.

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TUTORIAL: **Presentation and Publication July 26** **Graphics**

WHO SHOULD ATTEND?

Anyone interested in the use and production of presentation and publication quality graphics will find interest in this course. No programming knowledge is required.

CHAIR:

Joel Orr, Orr Associates, Inc.

Computer graphics has disappointed graphic artists for the last 15 years. The quality of the output has been the issue. Today there are devices and programs that are capable of producing art of the quality to which graphic arts professionals are accustomed. This tutorial will examine the history of presentation and publication quality graphics, its hardware, its software, and its new-found accessibility.

LECTURERS:

Joel Orr, Orr Associates, Inc.
and noted experts in the computer graphics industry.

Dr. Joel Orr is the President of Orr Associates, Danbury, Connecticut, a management consulting firm specializing in computer graphics and applications. He was previously Project Director for the LAMP project in Nashville, Tennessee, one of the earliest automated municipal land data systems to offer minicomputer-based interactive graphics facilities. Dr. Orr served as the designer of projects for several large manufacturers, the City of Milwaukee, Wisconsin, and for the Ministry of the Interior of Israel. He is currently involved in a wide range of activities spanning all aspects of computer graphics. Joel Orr trained in Mathematics and Computer Science at the State University of New York and at the Hebrew University in Jerusalem.

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TUTORIAL: **Graphics and Data Bases July 27**

WHO SHOULD ATTEND?

People with a background in either computer graphics or data bases will find this tutorial informative. Those with a graphics background will learn about their new management information system responsibilities. Those with a MIS background will see how they have a tool which can help them with data integrity as well as making the data useful to management.

CHAIR:

Doug Neal, Decision Resources

Data bases and graphics have grown up in different traditions; however, with the emphasis on Information Resource Management, graphics is recognized as crucial to both the presentation and the interrogation of information. Graphics becomes the means by which information is presented to the board of directors as well as the technique by which the analyst examines the data in order to determine what to show to the board. Graphics is the way that executives who have paid for all the data bases and associated computing activities can benefit from those expenditures. Both board member and analyst can review information much faster when presented in graphical form. Case studies will be used to demonstrate the benefits and conflicts that occur when graphics and data bases are brought together. Trade-offs between various implementation strategies will be examined. Recent offerings which link graphics and data base systems, such as IDMS and System 2000, will be discussed.

LECTURERS:

Doug Neal, Senior Vice President, Decision Resources
and noted experts on data base management systems.

Doug Neal has extensive experience in both designing large-scale business systems and in performing graphics hardware and software needs assessments for large corporations and U.S. federal agencies. With more than a decade of experience in computer graphics, Mr. Neal has concentrated on the use of business graphics and its integration into the office environment. Currently working on an extensive office automation system for the U.S. Department of Defense, he is particularly interested in developing a uniform user interface which will enable users to invoke many subsystems to perform tasks such as integrating graphics and text in a single document.

Courses Continued

17

TUTORIAL: **Distributed Graphics and July 26** **Communications**

WHO SHOULD ATTEND?

Systems designers, programmers, and managers of graphics systems that are implemented on two or more computers. The tutorial will assume a basic knowledge of computer graphics and interactive computing.

CHAIR:

Griffith Hamlin, Los Alamos National Laboratory

This tutorial will present distributed graphics and communications from the point of view of the researcher, the manufacturer of distributed systems, and the user of distributed graphics applications. The architecture and communications mechanisms of distributed graphics systems will be surveyed. Examples of using distributed graphics systems in a production environment will be given. Some research issues concerning the division of labor between two or more computers will be described. The attendee should be able to evaluate his need and the capability of his site to support distributed graphics applications.

LECTURERS:

Andries van Dam, Professor and Director of the Graphics Laboratory, Brown University, Providence, Rhode Island

David Nelson, Vice President for Systems Development, Apollo Computer Inc., Chelmsford, Massachusetts

William Pford, Head Office Planning Department, Bell Telephone Laboratories, Inc., Whippany, New Jersey

Robert Dunn, President, R. M. Dunn Associates, Woodbridge, Connecticut

David Heriton, Computer Science Department, Stanford University, Stanford, California

Griffith Hamlin received his Ph.D. in Computer Science from the University of North Carolina in 1975. He is currently with the Computer Graphics Group at the Los Alamos National Laboratory, Los Alamos, New Mexico. He has been active in SIGGRAPH and has participated in the GSPC. His current work involves distributed graphics functions on smaller satellite computers connected to a rather extensive computer network at the Los Alamos National Laboratory.

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SEMINAR: **Business Graphics for Managers July 27**

WHO SHOULD ATTEND?

Managers of all levels from the business segment who are considering the introduction or use of computer graphics in their companies. Attendees are not expected to be programmers but should have a rudimentary knowledge of data processing.

CHAIR:

James E. George, Los Alamos National Laboratory and Mesa Graphics

This seminar will examine the critical issues facing a manager considering the introduction of computer graphics into a business environment. The impact of computer graphics upon management productivity will be developed through success and horror stories. Methods for effective justification and implementation of computer graphics into business environments will be developed as a way of enhancing expectations of effective usage. The facilities available in high-quality slide systems will be explained along with a discussion of how these systems are economically justifiable. The advent of reliable, low-cost networks is thrusting computer graphics into the office revolution. This distribution of computer graphics between the workstation and minicomputers will become increasingly important. Examples will illustrate the future of office systems and graphics in accessing data bases and applications via distributed graphics workstations.

LECTURERS:

James E. George, Los Alamos National Laboratory and Mesa Graphics, Los Alamos, New Mexico

Norma Fry, Digital Equipment Corporation, Bedford, Massachusetts

Alan Paller, AUI Data Graphics, Washington, D.C.

Bary Pollack, Datapoint Corporation, Berkeley, California

James E. George is a staff member in the Computing Division at Los Alamos National Laboratory, and a principal in Mesa Graphics. He has taught and lectured extensively in the United States and Europe; he teaches a business graphics course for the American Management Association and the NCGA. He is a Past Chairman of SIGGRAPH.

19

SEMINAR: Introduction to the July 27 SIGGRAPH '82 Exhibition

WHO SHOULD ATTEND?

All users and buyers of computer graphics equipment interested in getting a better understanding of the equipment displayed in the exhibit hall.

CHAIR:

Stephen R. Levine, Electronic Graphics Associates

The novice buyer of computer graphics equipment is bombarded by technical sales literature full of computer graphics jargon. This seminar presents a practical overview. Basic technology and general descriptions of hardware, software, and systems are explained. After completion of this course, the attendee will be equipped to sift through vendor literature and obtain the meaningful and relevant information for a specific application.

LECTURER:

Stephen R. Levine, Electronic Graphics Associates

Stephen Levine received his B.S. and M.S. degrees from the University of California at Berkeley in Electrical Engineering and a Ph.D from Stanford University in Computer Science. He is President of Electronic Graphics Associates, a firm specializing in computer graphics consulting and system integration. He also teaches an international short course on computer graphics and has consulted widely on the subject. His previous experience includes eight years with the Lawrence Livermore National Laboratory where he directed the development of new computer graphics hardware and software, three years with Stanford Research Institute, and two years with Singer Simulation Products. Dr. Levine is a Director of SIGGRAPH.

20

TUTORIAL: Computer Graphics in Office July 27 Animation and Electronic Publishing

WHO SHOULD ATTEND?

Computer graphics professionals and executives interested in the office automation and publishing markets will find this course informative and useful.

CHAIR:

Michael P. Barnett, City University of New York

The office automation and electronic publishing industry is concerned with the computerized production, display, storage, and dissemination of charts, graphs, maps, and diagrams. Attention is also being placed on handling black-and-white, half-tone, and color illustrations. Various applications include teleconferencing; publication of illustrated manuals, reports, books, and magazines; design and analysis of automated office systems; and the design and utilization of pictorial data bases. A panel of industry experts will review the concerns and application areas of office automation and electronic publishing, and alert computer graphics experts to new and expanding potentials for their expertise and skills.

LECTURERS:

Michael P. Barnett, Professor of Computer Science, City University of New York

Robert Thunelius, Director of Systems Development, Resource Dynamics, Inc.

Robert S. Varga, Vice President, Xybion Corp.

Roger S. Tobie, Manager of Composition Systems, ICC GraphCom System, Inc.

Michael P. Barnett is currently a Professor of Computer Science at City University of New York. He has taught at MIT and London University, has worked for IBM and RCA, and has been active in the publishing industry. Dr. Barnett has published several books on computerized typesetting and programming, and is working on several more in the area of computer graphics and personal computers. He received a B.S. in Chemistry and a Ph.D. in Mathematical Physics from Kings College, London University. Dr. Barnett's interests include electronic publishing, computer graphics, high-level languages and molecular chemistry.

Courses Continued

21

TUTORIAL: July 26 **Demographics: Mapping, Marketing, and Computer Graphics**

WHO SHOULD ATTEND?

People interested in applying mapping to business and scientific applications will find this course informative and useful. No programming knowledge is required.

CHAIR:

Robert T. Aangeenbrug, University of Kansas

This tutorial will present the current practices and developments in mapping demographics. Case studies will be used to illustrate the utility of automatic cartography. The successes and pitfalls of mapped representations of demographic data will be demonstrated. The practice of map design, production, and output will be demonstrated. A review of technological aspects of automation will include geometry, data handling, and statistical constraints of mapping social and economic data. A review of available hardware, software, and services is included. A review of the benefits and methods on how to get started will conclude the tutorial session.

LECTURERS:

Robert T. Aangeenbrug, University of Kansas
and noted experts in computer-based cartography

Robert Aangeenbrug, President of DATA, Inc., is a Professor of Geography at the University of Kansas. Dr. Aangeenbrug has been a major contributor in the field of computer mapping and interactive graphics. He served as the first visiting scholar at the U.S. Bureau of the Census. Recently, he directed the Map Information Facility for the Chicago Aerial Survey. A former Ford Fellow in Urban Studies, he holds a Ph.D. from the University of Wisconsin and currently serves the National Academy of Science National Research Council as a member of the U.S. National Committee of the International Geographical Union. Dr. Aangeenbrug has published numerous articles on the use of computers in addressing problems of production, management, and analysis. He is President Elect of NCGA.

22

SEMINAR: July 26 & 27 **Introduction to Computer-Aided Design**

WHO SHOULD ATTEND?

Decision makers, managers, and potential users in such application fields as design, engineering, process piping, mapping, and plant layout. Experience in and/or responsibility for graphics or drafting is desirable; experience in computer graphics or computing is not a prerequisite.

CHAIR:

Bertram Herzog, Herzog Associates, Inc.

This seminar deals with computer-aided design/drafting, CAD, and computer-aided manufacturing, CAM, and emphasizes commercially available products. The seminar lectures and panel discussions will include: general principles so that vendors may present their system's important characteristics efficiently; general structure and uses of CAD systems; interconnection of different CAD systems; engineering analysis; numerically-controlled machining; how to buy a CAD system; solid modelling surface definitions; and what the near-term future holds for users of CAD.

LECTURERS:

Bertram Herzog, President, Herzog Associates, Inc., Boulder, CO
S. H. Chasen, Lockheed Georgia Company, Marietta, GA
R. M. Dunn, President, R. M. Dunn Associates, Woodbridge, CT
Robert Heilman, Ramtek, Inc., Santa Clara, CA
R. M. McElhaney, Vice President, Technology, GRAFTEK, Boulder, CO
Richard F. Riesenfeld, Computer Science, University of Utah, Salt Lake City, UT
Herbert Voelcker, Director, Production Automation Project, University of Rochester, Rochester, NY
David Weisberg, Auto-trol Corporation, Denver, CO
 and representatives of CAD vendors and CAD users.

Bertram Herzog is the President of Herzog Associates, Inc., a firm specializing in technical and management consulting for CAD/CAM, computer graphics, and general technical computing. He has many years of experience in design, computer graphics, and CAD, in industry and at universities. Dr. Herzog served as co-chairman of the SIGGRAPH Graphics Standard Planning Committee.

23

SEMINAR: Solid Modelling **July 26**

WHO SHOULD ATTEND?

Graduate engineers and computer scientists active in CAD/CAM research and system development, and users prepared to delve into underlying principles. A degree in engineering, physical science, mathematics, or computer science, and some programming are strongly recommended. Extensive knowledge of computer graphics is not required.

CHAIR:

Herbert Voelcker and **Aristides A. G. Requicha**,
University of Rochester

This seminar surveys the current state of knowledge in solid modelling and its applications in CAD/CAM. About one-third of the seminar is devoted to underlying principles, high-level representations, important applications and existing systems. Another third addresses the central issues that arise in the core of solid modelling systems. The final third is devoted to user interfaces, new applications, and research issues.

LECTURERS:

Herbert B. Voelcker, Director, Production Automation Project, University of Rochester, Rochester, NY
Aristides A. G. Requicha, Associate Director, Production Automation Project, University of Rochester, Rochester, NY
George Allen, McDonnell Douglas Automation, Cypress, CA
Malcolm Sabin, CAD Centre, Cambridge, UK
Robert Tilove, General Motors Research Laboratories, Warren, MI
Michael Wesley, IBM T. J. Watson Research Center, Yorktown Heights, NY

Co-chairmen Voelcker and Requicha, in addition to their affiliation with the Production Automation Project, are Professor of Engineering and Service Scientist at the University of Rochester, respectively. Dr. Voelcker holds degrees in Mechanical and Electrical Engineering from M.I.T. and a Ph.D. from the Imperial College of Science and Technology. He is a fellow of IEEE and a member of ASME, ACM, SME, and NCS. Requicha earned the Diploma in Electrical Engineering from the Instituto Superior Technico in Lisbon, Portugal, the Ph.D. from the University of Rochester. He is a Senior Member of the IEEE and a member of ACM, AAAS, and Sigma Xi.

24

SEMINAR: Freeform Surfaces **July 27**

WHO SHOULD ATTEND?

The lectures will assume a certain level of calculus background and some familiarity with computer graphics display devices. People involved both managerially and technically with computer-aided design of three-dimensional objects with freeform surfaces should find the course useful.

CHAIR:

Richard F. Riesenfeld, University of Utah

Introductory concepts as well as some specialized current research topics will be presented at an intuitive, tutorial level. An introduction will cover basic interpolation and approximation curve forms leading to polynomial and spline representations. An overview of subdivision techniques and their relation to discrete splines will be given. Lectures describing extensions to surfaces and display algorithms will be included. The last lecture will be on the user interface requirements.

LECTURERS:

Richard F. Riesenfeld, University of Utah
William J. Gordon, Drexel University
Elaine Cohen, University of Utah
Jeffrey M. Lane, Calma/GE
A. Robin Forrest, University of East Anglia, UK

Richard Riesenfeld is Chairman of Computer Science and Head of the Computer-Aided Geometric Design Group (CAGD) in Computer Science at the University of Utah, where he joined the faculty in 1972. He has published and consulted in the area of computer graphics and the academic issues and the industrial applications and motivations in the field. The B-spline method of curve and surface design, which he proposed in his doctoral thesis, is used by many industries in many countries. His major research focus for the last two years has been in discrete splines and their applications in an experimental CAGD system called Alpha-1. This system involves some new modelling ideas that are useful in combining computer graphics, geometry models, and other models.

Technical Programs

WEDNESDAY July 28

9:00-10:00 AM

Opening Session

SIGGRAPH '82 Welcome
Elaine Sonderegger

SIGGRAPH Report
Thomas DeFanti

Technical Program Review
R. Daniel Bergeron, Carl Machover

SIGGRAPH Awards Presentation
Harvey Kriloff

WEDNESDAY July 28

10:15-12 NOON

Image Generation

CHAIR:
James H. Clark, Stanford University

Clamping: A Method of Anti-Aliasing Textured Surfaces by Bandwidth Limiting in Object Space, V. Alan Norton, IBM Thomas J. Watson Research Center, Alyn P. Rockwood and Philip T. Skolmoski, Evans and Sutherland Computer Corporation

A More Flexible Image Generation Environment, F. C. Crow, Ohio State University

Computation for Anti-Aliasing and Geometrical Manipulation, Kenneth Turkowski, Cadlink, Inc.

Light Reflection Functions for Simulation of Clouds and Dusty Surfaces, James F. Blinn, Jet Propulsion Laboratory

10:15-12 NOON

PANEL: The Impact of Graphic Standards

CHAIR:
David Straayer, Tektronix

This panel will discuss the recent progress towards ANSI standards for functional graphics and CAD data transfer. Primary emphasis will be placed on the impact of these standards upon the user.

**WEDNESDAY
July 28**

1:30-3:00 PM

Eurographics Session: Graphics Standards

CHAIR:
Robert Hopgood, Rutherford Appleton Laboratory

The Detailed Semantics of Graphics Input Devices, David Rosenthal, Edinburgh University, et al

A Metafile for Efficient Sequential and Random Display of Graphics, Theodore N. Reed, Los Alamos National Laboratory

ISO Graphics Standards Update, Paul ten Hagen, Mathematisch Centrum

Standardization Prospects for Geometric Modelling, Malcolm Sabin, CAD Centre

1:30-3:00 PM

PANEL: Professional Workstations

CHAIR:
Andries van Dam, Brown University

The panel will examine the evolution of the professional workstation from a time-shared terminal to a powerful graphics-based personal computer connected to a resource-sharing local network. The panelists will speculate on the future evolution of both the hardware/software architecture and end-user environment.

PANELISTS:
James H. Clark, Stanford University
Harvey Kriloff, Boeing Computer Services
David Nelson, Apollo Computer, Inc.
Ed Smith, Dupont

**WEDNESDAY
July 28**

3:15-4:45 PM

Modelling

CHAIR:
Donald Greenberg, Cornell University

A Linearization Algorithm for Geometric Models, Martti Mantyla, Helsinki University of Technology

Generation and Display of Geometric Fractals in 3-D, V. Alan Norton, IBM Thomas J. Watson Research Center

A New General Triangulation Method for Planar Contours, S. Ganapathy, and T. G. Dennehy, University of Michigan

Creating Volume Models from Edge-Vertex Graphs, Pat Hanrahan, University of Wisconsin

3:15-4:45 PM

Presidents' Forum

CHAIR:
Carl Machover, Machover Associates

Presidents of four leading computer graphics companies, representing hardware, software and systems products, will discuss problems and opportunities which confront the rapidly growing computer graphics industry.

PANELISTS:
Donald Fedderson, Applicon
Ralph Linsalata, Lexidata Corp.
Peter Preuss, ISSCO
Richard Spann, Adage, Inc.

Technical Programs Continued

THURSDAY July 29

9:00-10:30 AM

User Interface

CHAIR:

James J. Thomas, Battelle Northwest Laboratories

Flair-User Interface Dialog Design Tool, Peter C. S. Wong and Eric R. Reid, TRW

A User Interface Management System, David Kasik, Boeing Computer Services

The Device Model of Interaction, Ed Anson, Northeastern University

Star Graphics: An Object-Oriented Implementation, Daniel E. Lipkie, Steven R. Evans, Robert L. Weissman, and John K. Newlin, Xerox

9:00-10:30 AM

PANEL: The Graphics CAD/CAM Industry: Financial Perspectives

CHAIR:

Richard Spann, Adage, Inc.

Companies supplying graphics CAD/CAM components and systems form an important high technology business segment. Panelists representing four financial perspectives will discuss market entry, financing, segment performance and shareholder expectations. Development of the graphics CAD/CAM industry in the 80s will be a unifying theme.

PANELISTS:

Frederick Adler, Frederick Adler & Co.

Thomas Kurlak, Merrill Lynch, Pierce, Fenner & Smith, Inc.

Joseph McNay, Essex Investment Management Co.

Margaret Reichenbach, L.F. Rothschild, Unterberg, Towbin

THURSDAY July 29

10:45-12 NOON

Hardware Architecture

CHAIR:

Turner Whitted, Bell Laboratories

The Geometry Engine: A VLSI Geometry System for Graphics, James Clark, Stanford University

A Contour Display Generation Algorithm for VLSI Implementation, Michael Zyda, Washington University

A Rectangular Area Filling Display System Architecture, Daniel S. Whelan, California Institute of Technology

10:45-12 NOON

PANEL: Approaches to Solid Modelling

CHAIR:

Leon Malin, MAGI

Solid modelling systems in current use are based on approaches that are fundamentally different. The panelists will discuss the advantages and disadvantages of the different approaches, especially from the user's point of view.

PANELISTS:

Frank Bliss, Ford Motor Company

William Carmody, IBM Corporation

Robert Johnson, Consultant

Martin Schloessel, Applicon, Inc.

John Swarbrick, General Electric Company

**THURSDAY
July 29**

1:30-2:30 PM

Visible Surface Algorithms

CHAIR:
Kellogg Booth, University of Waterloo

Path Specification and Path Coherence,
Kim L. Shelley and Donald Greenberg,
Cornell University

Special Purpose Automatic Program-
ming for Hidden Surface Elimination,
Chris Goad, Stanford University

1:30-2:30 PM

**PANEL: Voice Recognition as an
Input Technique**

CHAIR:
Richard Rabin, Verbex Div., Exxon

Voice input offers a major potential for
improving the productivity of users of
computer graphics systems. Panelists
will discuss applications in CAD/CAM
and other interactive graphics systems.
Experiences in developing, installing
and operating such systems will be
described.

PANELISTS:
Matthew Peterson, Computervision
Elias Prado, CALMA
Mark Robillard, Sanders Associates
Alan Strauss, General Electric

**THURSDAY
July 29**

2:45-3:45 PM

Data Base Applications

CHAIR:
Bary Pollack, Datapoint

Context-Sensitive Graphic Presenta-
tion, Mark Friedell, Jane Barnett and
David Kramlich, Computer Corporation
of America

Graphical Tools for Interactive Image
Interpretation, David M. McKeown, Jr.
and Jerry L. Denlinger, Carnegie-Mellon
University

Data Base Query Language for Re-
trieval of Geometric Data and its
Graphical Representation, Andre Frank,
Swiss Federal Institute of Technology

2:45-3:45 PM

**PANEL: The Challenge of
CAD/CAM Education**

CHAIR:
Michael A. Melkanoff, UCLA

Since few universities have experience
teaching CAD/CAM, they have difficulty
meeting industry needs for graduates
trained in the use or implementation of
CAD/CAM systems. This panel attempts
to outline the problems in developing
more extensive CAD/CAM emphasis in
education and the role the university can
or should play in addressing industry
needs in this area.

PANELISTS:
Donald Greenberg, Cornell University
Victor Langer, Milwaukee Area
Technical College
Frank Puhl, CADAM INC.
Mark Shepard, RPI
Herbert Voelcker, University of Rochester

Technical Programs Continued

**THURSDAY
July 29**

4:00-5:00 PM

Applications

CHAIR:
Ingrid Carlbom, Schlumberger-Doll

3D Galatea: Entry of Three-Dimensional Moving Points from Multiple Perspective Views, Steven A. MacKay, Richard E. Sayre, and Michael J. Potel, University of Chicago

A Morphological Study of Nature's Form, Yoichiro Kawaguchi, Nippon Electronics College

An Interactive Graphics Environment for Architectural Energy Simulation, Jon H. Pittman and Donald Greenberg, Cornell University

4:00-5:00 PM

PANEL: Graphic Input Interaction Techniques

CHAIR:
James J. Thomas, Battelle Northwest Laboratories

The techniques for communicating with graphics systems including interaction and effective presentation techniques are becoming active research subjects. The SIGGRAPH sponsored workshop on graphic input interaction techniques (June 1982) will be summarized and reviewed.

**FRIDAY
July 30**

9:00-10:30 AM

Curved Surface Display

CHAIR:
Richard Riesenfeld, University of Utah

Ray Tracing Parametric Patches, James T. Kajiya, California Institute of Technology

Advanced Techniques for Complex 3D Object Synthesis Using Surface Patch Intersections, Wayne E. Carlson, The Ohio State University

Scanline Rendering of Parametric Surfaces, Dino Schweitzer and Elizabeth Cobb, University of Utah.

A Generalization of Algebraic Surface Drawing, James F. Blinn, Jet Propulsion Laboratory

9:00-10:30 AM

PANEL: Business Graphics—What is it?

CHAIR:
David Luther, Lexidata Corporation

What really is business graphics? Is it narrowly confined to making slides or does it encompass the full range of information transfer? The panel will present the views of hardware and software vendors and users.

PANELISTS:
Irwin Jarett, Irwin M. Jarett, CPA, Ltd.
Howard Johnson, Digital Equipment Corp.
Jack Russell, General Motors Corp.
John Thompson, Precision Visuals, Inc.

**FRIDAY
July 30**

10:45-12 NOON

Paint and Animation

CHAIR:
Peter Tanner, National Research Council

The Message is the Medium: Multi-process Structuring of an Interactive Paint Program, Richard J. Beach, John C. Beatty, and Kellogg S. Booth, University of Waterloo

Computer Animation with Scripts and Actors, Craig W. Reynolds, Information International Inc.

Color Image Quantization for Frame Buffer Display, Paul S. Heckbert, New York Institute of Technology

10:45-12 NOON

PANEL: The Role of Videotex

CHAIR:
Frank Tompa, University of Waterloo

Interactive Videotex systems may soon emerge as a principal information, entertainment, and communications medium relying heavily on computer graphics. The purpose of this session is to introduce Videotex literature and research to mainstream graphics audiences. Topics include a brief outline of Videotex developments, current architecture, business experiences, alternatives to Videotex and future expectations for Videotex.

PANELISTS:
John Norton, Norpak, Ltd.
David Godfrey, University of Victoria
Andries van Dam, Brown University
Brian Botten, Extel, UK
Lois Schneider, CBS

**FRIDAY
July 30**

1:30-2:45 PM

Raster Systems

CHAIR:
James Michener, Intermetrics

A Language for Bitmap Manipulation, Leo J. Guibas, Xerox PARC, and Jorge Stolfi, Stanford University

A Device-Independent Graphics Imaging Model for Use with Raster Devices, John Warnock and Douglas Wyatt, Xerox PARC

A Conceptual Model of Raster Graphics Systems, James Acquah, James Foley, John Sibert, and Patricia Wenner, The George Washington University

1:30-2:45 PM

PANEL: Health & Safety Issues in Computer Graphics

CHAIR:
Wordie Parr, NIOSH

The increasing use of computer graphics as a production tool requires increased investigation into the possible health and safety effects of prolonged use of CRT devices and other related equipment. This panel will address some of the recent results that have been obtained in this area and will attempt to identify areas that require more study.

Exhibitor List

- Abt Computer Graphics Corp.
 AM ECRM
 ASEA Industrial Systems, Inc.
 Adage, Inc.
 Advanced Color
 Technology, Inc.
 Advanced Electronics
 Design, Inc.
 Altek Corporation
 Analog Technology Corp.
 Apollo Computer
 Apple Computer, Inc.
 Applicon, Inc.
 Aydin Controls
 Benson
 Byte Publications, Inc.
 Cal Comp
 Chroma
 Chromatics, Inc.
 Colorgraphic Communications
 Computer Decisions
 Computer Design &
 Applications
 Computer Design
 Publishing Company
 Computer Graphics World
 Computer Technology Review
 Computerworld
 COMTAL/3M
 Conrac Div./Conrac Corp.
 Cromemco, Inc.
 Cubic Systems
 Datacopy Corp.
 Datacube, Inc.
 Data Design Logic
 Systems, Inc.
 Datamation
 Datamax, Inc.
- Data Technology, Inc.
 Data-Type, Inc.
 DeAnza Systems
 Design Aids, Inc.
 Dicomed Corp.
 Digital Design
 Digital Engineering, Inc.
 Digital Equipment Corp.
 Dynair Electronics, Inc.
 Eigen Video
 Elector
 Evans & Sutherland
 Florida Computer Graphics
 GTCO Corp.
 GTI Corp.
 Genisco Computer Corp.
 Geographic Systems, Inc.
 Graphic Communications
 Graphic Controls Corp.
 Grinnell Systems Corp.
 Hewlett-Packard Company
 Hitachi America, Inc.
 Houston Instrument
 IBM Corporation
 IEEE Computer Society
 Ikegami Electronics, Inc.
 Ikonas Graphics Systems, Inc.
 Imlac Corp.
 Industrial Data
 Terminals Corporation
 Integrated Terminals
 Intelligent Systems Corp.
 Interactive Machines, Inc.
 International Imaging Systems
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 Jupiter Systems
 KMW Systems, Inc.
 Lexidata Corp.
- Logetronics, Inc.
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 Systems, Inc.
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 Nicolet Zeta Corp.
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 Laboratory, Inc.
 The Optical Publishing Co.
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 Orcatech, Inc.
 Peritek Corp.
 Phoenix Computer Systems
 Phoenix Data Systems
 Polaroid Corp.
 Precision Visuals, Inc.
 PrintaColor Corp.
 Quality Micro Systems, Inc.
 Ramtek Corp.
- Raster Technologies, Inc.
 Rubel Software
 SAS Institute, Inc.
 Scherago Associates, Inc.
 Science Accessories Corp.
 Scitex America Corp.
 Seiko Instruments U.S.A., Inc.
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 Systems Division
 Selanar Corp.
 Silicon Graphics, Inc.
 Summagraphics Corp.
 Superset, Inc.
 Tektronix, Inc.
 Terak Corp.
 3M
 Three Rivers Computer Corp.
 Trilog, Inc.
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 Vector General, Inc.
 Versatec, a Xerox Corp.
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 Xerox Corp.

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To register for ACM SIGGRAPH '82 fill out the registration form on the opposite page.

To take advantage of the early registration fee, be sure to mail by June 11, 1982.

Mail to:
ACM SIGGRAPH '82
P.O. Box 7030
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(312) 644-6610

COURSE SELECTION

SIGGRAPH '82 will offer 24 concurrent courses by noted experts. Courses are either one or two days long. You may register either for one two-day course, or for one or two single-day courses. Seating will be limited, so you are requested to make first, second, third and fourth choices.

Be sure to register early to guarantee placement in the course(s) of your choice. You will be notified prior to the conference into which course you have been enrolled.

COURSE NOTES

Included in the Course registration fee is one set of Course Notes for each course for which you are registered. Additional Course Notes can be purchased or picked up on-site at the Conference Registration Area. Course Notes for individual courses will be available for \$10 each; complete sets of Course Notes for all 24 courses will be available for \$200 per set.

PROCEEDINGS

A copy of the Conference Proceedings is included in the Technical Program registration fee. Additional copies of the Conference Proceedings will be available on-site at the Conference Registration Area for \$25 per copy.

EXHIBITION, FILM SHOWS, AND ART SHOW

Admission to the Exhibition is included in both the Course and Technical Program registration fees. Additional Exhibition tickets may be purchased on-site at the Conference Registration Area for \$10 each.

Both the Course and Technical Program registration fees include admission to the Oldies But Goodies Film Show Tuesday evening, the State-of-the-Art Film Show Wednesday evening, the Art Show Monday evening through Friday, and a copy of the Art Show Catalog.

SOCIAL ACTIVITIES

A Course reception will be held on Monday evening, July 26, at the Sheraton-Boston Hotel. One complimentary ticket is included in the course registration fee. Additional tickets may be purchased on-site at the Conference Registration Area for \$35 each. The course registration fee also includes a luncheon for each course day registration.

A Technical Program reception will be held on Thursday evening, July 29, at the Museum of Science. One complimentary ticket is included in the Technical Program registration fee. Additional tickets may be purchased on-site at the Conference Registration Area for \$40 each.

REGISTRATION MATERIALS

Registration materials will be available at the Conference Registration Area in the Hynes Auditorium beginning Sunday, July 25.

Pre-registered course attendees who are unable to pick up their registration materials in the Hynes Auditorium prior to the first day of their course must pick up their registration materials at the actual course location. For those with courses at the Sheraton-Boston Hotel or the Hynes Auditorium, registration materials must be picked up at the Conference Registration Area in the Hynes Auditorium.

All on-site registration **must be** processed at the Conference Registration Area in the Hynes Auditorium.

COOPERATIVE SOCIETIES AND CONFERENCES

SIGGRAPH '82 is being held in cooperation with the IEEE Technical Committee on Computer Graphics, Eurographics, Harvard Graphics Week, and the Summer Institute of Media Arts. Members or attendees of the above may register for SIGGRAPH '82 for the member registration fee.

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Complete Sides 1 & 2 of this Registration Form. Print in ink or type.

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TECHNICAL PROGRAM REGISTRATION FEE

Wednesday, July 28
through Friday, July 30

Fee includes Conference Proceedings

Member	\$135	\$	[]
Student	\$ 30	\$	[]
Non-member	\$175	\$	[]
Late charge (postmarked after June 11, 1982)	\$ 75	\$	[]
Subtotal		\$	[]

IEEE

COURSE SELECTION

Monday, July 26 and Tuesday, July 27

See Courses at a Glance for course numbers. For **each choice** fill in either COLUMN A **OR** B

COLUMN A
Two-day Courses
Monday & Tuesday

COLUMN B
Single-day Courses
Monday/Tuesday

Course Number

Course Number

1st Choice	<input type="text"/>	OR	<input type="text"/>	/	<input type="text"/>
2nd Choice	<input type="text"/>	OR	<input type="text"/>	/	<input type="text"/>
3rd Choice	<input type="text"/>	OR	<input type="text"/>	/	<input type="text"/>
4th Choice	<input type="text"/>	OR	<input type="text"/>	/	<input type="text"/>

COURSE REGISTRATION FEE

Fee includes Course Notes for assigned Course

Two-day Course	\$195	\$	<input type="text"/>
Two Single-day Courses	\$195	\$	<input type="text"/>
One Single-day Course	\$130	\$	<input type="text"/>
Student Fee for two days	\$ 75	\$	<input type="text"/>
Student Fee for one day	\$ 50	\$	<input type="text"/>
Late charge (postmarked after June 11, 1982)	\$ 75	\$	<input type="text"/>
Subtotal		\$	<input type="text"/>

ADDITIONAL COURSE NOTES/PROCEEDINGS

To be picked up on-site at Conference Registration Area

Complete set(s) of Course Notes (all 24 Courses) at \$200 per set	\$	<input type="text"/>
Additional copy(ies) of Conference Proceedings at \$25 per copy	\$	<input type="text"/>
Subtotal	\$	<input type="text"/>

TOTAL

Total payment enclosed (Technical Program registration fee, Course registration fee, and Course Notes/Proceedings)

Total \$

Please check the following:

This is my first ACM SIGGRAPH Conference

Please send me information on ACM SIGGRAPH Membership

Do not include my name and address on published list of attendees

Do not include my phone number on published list of attendees

Signature

Date

Housing Form

Important: Reservations must be received by the Housing Bureau **no later than June 11, 1982**. Some hotels require a deposit.

Do not send deposits to the Housing Bureau. **Send deposit**, if required, **to the hotel** after you receive your confirmation.

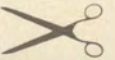
All reservation requests must be in writing using this Official Housing Form. The Housing Bureau **will not** accept telephone reservations. You will receive a written acknowledgement from the Housing Bureau.

Confirmations will come in writing directly from the hotel assigned.

Cancellations and all reservation changes (i.e. name changes, arrival/departure date revisions, etc.) must be made directly with the hotel after receipt of confirmation.

Please complete and mail this form to:

ACM SIGGRAPH '82 HOUSING BUREAU
Greater Boston Convention & Tourist Bureau, Inc.
Prudential Tower, Box 490
Boston, MA 02199



Please Complete this Section in Full (**Print in Ink or Type**).
 Confirm this Reservation to:

Name

Organization

Address

City State Zip

Country

Phone Number

Failure to notify hotel of change in arrival may result in cancellation!

HOTEL PREFERENCE
 (See List on Reverse Side)

1st Choice

2nd Choice

3rd Choice

4th Choice

Important: If first choice hotel at preferred rate is not available, please place in:

Room in preferred hotel at closest available rate

A room in another hotel as near as possible to preferred rate

ROOM TYPE CODE

- S — Single
- D — Double (2 persons—one bed)
- T — Twin (2 beds)
- S1 — One Bedroom Suite
- S2 — Two Bedroom Suite

Name of Occupant	Name of Person(s) Sharing room: (if applicable)	Arrival Date/Time	Departure Date/Time	Room Type Code	Preferred Rate*
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

*Preferred Rate of First Choice Hotel

Housing Information

MAP CODE	HOTEL	SINGLE	DOUBLE or TWIN	ONE BEDROOM SUITE	TWO BEDROOM SUITE
1	Sheraton-Boston*	\$73, 79, 88	\$84, 90, 99	\$125, 135, 195, 245 & up	\$265, 330 & up
2	Lenox	\$62, 68, 74	\$76, 82, 88	\$185	
3	Midtown	\$63	\$68	\$145	\$205
4	Colonnade	\$66, 78, 92	\$74, 92, 100	\$300	\$425
5	Copley Square	\$48, 52	\$60, 66, 70	\$72	\$80 (2 connecting bedrooms)
6	Copley Plaza	\$70, 78, 86	\$80, 88, 101	\$160, 180, 200	\$230—301
7	Boston Park Plaza	\$63, 69	\$74, 80, 86	\$200	\$260
8	'57 Park Plaza/ Howard Johnson's	\$70	\$80		
9	Parker House	\$90	\$100		
10	Meridien	\$95	\$110		
11	Marriott Long Wharf	\$100	\$115	\$250	\$350

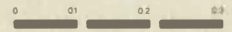
* connected to Hynes Auditorium

Map of Boston

KEY TO MAP

-  Hynes Auditorium
-  1 Sheraton-Boston
-  2 Lenox
-  3 Midtown
-  4 Colonnade
-  5 Copley Square
-  6 Copley Plaza
-  7 Boston Park Plaza
-  8 '57 Park Plaza/ Howard Johnson's
-  9 Parker House
-  10 Meridien
-  11 Marriott Long Wharf
-  T Subway Station

Scale (miles)



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The Ninth Annual Conference
on Computer Graphics and
Interactive Techniques

