1986 Workshop on Interactive 3D Graphics

Frank Crow and Eric Bier, Xerox PARC

Held October 23-24, 1986, at the University of North Carolina (UNC) at Chapel Hill, the Workshop on Interactive 3D Graphics was inspired by several faculty members of the Department of Computer Science, notably Jay Nievergelt, Fred Brooks, and Henry Fuchs.

The University of North Carolina, with a claim to being the oldest state university in the nation, offers a lovely traditional campus, which was nicely complemented by clear weather and fall foliage during the workshop. The triangle formed by the cities of Raleigh, Durham, and Chapel Hill contains a large industrial park (the Research Triangle Industrial Park) bustling with construction of new high-tech industrial plants and housing for the anticipated swarm of business and technical people.

The presence of so many members of the established computer graphics community inspired UNC's computer graphics grad students and faculty to make the best possible presentation. They united in a Herculean effort to get the many interactive systems at UNC functioning in time to demonstrate to the attendees. Demonstrations included

- Pixel-Planes—a processor-per-pixel intelligent frame buffer
- A head-mounted display using a Polhemus sensor and LCD screens from miniature TV sets
- A stereo display using a conventional CRT with a polarizing liquid-crystal shutter supplied by Tektronix
- A color projection stereo display using an LC shutter in front of each projection lens
- A mechanical arm with position sensing and force feedback, made at Argonne Labs long ago
- A varifocal mirror for a 3D display responding to head position, much like a hologram

The various devices were used in systems for exploring everything from molecules to spaces in the new UNC Computer Science Building currently under construction.

The demonstrations were an impressive addition to the workshop.

The conference was run largely by student volunteers, who, in a display of camaraderie, made posters and sign-up sheets, manned the AV booth, and gave demos.

The keynote address was given by Alan Kay, now splitting his time between Apple Computer and MIT Media Lab. Kay asked us to remember the words of Bob Barton with respect to using the same window paradigm for everything from Macintoshes to ultra high-resolution large screens: "Good ideas often don't scale." He further suggested that good user interfaces should be usable by children under six. Adults don't make good subjects because they have too much patience: "They've learned to suffer. That's what schools are for." A videotape of a 22-month-old girl adroitly using MacPaint drove home his point.

Kay promoted the idea of "agents," computer-created creatures with personality and some ability to act on their own. As an experiment in using advanced technology to further this idea, Kay brought together a group of people, including a Disney animator, to spend a weekend with an Evans & Sutherland CT-6 real-time shaded-graphics system.

The result was some very interesting animation of a bouncing rabbit's-eye-view ramble through an infinite forest and a swim in a shallow sea in the company of a couple of realistically swimming sharks.

We were exhorted to strive for impressionistic imagery like that seen in the "Dance of the Sugar Plum Fairies" in Disney's Fantasia, rather than spending teraflops trying to achieve the ever-receding goal of absolute realism.

Kay closed by noting that while art imitates life, computer art/animation can imitate creation itself.

Fred Brooks followed with a paper on a system for building visualization called "Walkthrough." The many ideas he presented for 3D interaction devices sparked a lively discussion, which set the workshop off to a good start. Brooks expressed an important idea, echoed by Robin Forrest in a later paper: A free-hand digitizer with all six degrees of freedom is of little use; constraints are needed. Forrest notes, for example, that a sculptor is always working against a surface.

Brooks showed a device he is building which places a digitizer in a sphere with a flattened bottom. Three degrees of freedom—x, y, and direction (or yaw)—are available by sliding the sphere around on a surface. The remaining degrees of freedom (z, pitch, and roll) can be obtained by tilting the sphere off its flat bottom or lifting it.

The total of 19 presentations included a mix of invited talks and submitted papers. The largest group of talks focused on human-computer interface issues. However, there
were sessions devoted to animation, CAD, and assorted applications. Human vision and graphics system architectures were covered also.

In addition to the keynote address, the following talks were presented:

- "4D Display of Meteorological Data," William L. Hibbard, University of Wisconsin
- "The Virtual Simulator" (a radiation therapy visualizer), Charles E. Mosher et al., UNC
- "Manipulation Within Rotations," Michael Pique, Scripps Clinic
- "3D Scan-Conversion Algorithms for Voxel-Based Graphics," Arie Kaufman, SUNY Stony Brook
- "Virtual Environment Display System," S.S. Fisher et al., NASA Ames Research Center
- "Constraints in Constructive Solid Geometry," Jaroslaw R. Rossignac, IBM T.J. Watson Research Center
- "Constructing Three-Dimensional Geometric Objects Defined by Constraints," Beat Bruderlin, ETH, Zurich
- "Interactive Design of 3D Computer-Animated Legged-Animal Motion," Michael Girard, Ohio State University
- "Multi-Dimensional Input Techniques and Articulated Figure Positioning by Multiple Constraints," Norman I. Badler et al., University of Pennsylvania
- "Interactive Tools to Support Animation Tasks," Frederic I. Parke, New York Institute of Technology
- "Skitters and Jacks: Interactive 3D Positioning Tools," Eric Allan Bier, Xerox PARC
- "Understanding Key Constraints Governing Human-Computer Interfaces," Stuart Card, Xerox PARC
- "Vision and the Graphical Simulation of Spatial Structure," W.A. van de Grind, University of Amsterdam
- "User Interfaces for Geometric Modeling," A.R. Forrest, University of East Anglia, UK
- "Describing Free-Form 3D Surfaces for Animation," Eben Ostby, Pixar
- "Special-Purpose Computer Arrays for Graphics and Other Applications," James Clark, Silicon Graphics

The workshop was sponsored by ACM SIGGRAPH and the National Science Foundation in cooperation with ACM SIGCHI and the IEEE Computer Society. The workshop committee included Frederick P. Brooks, Jr., honorary chair; Henry Fuchs, chair; Frank Crow and Stephen M. Pizer, program chairs; and David Beard, treasurer.

Conflicting software standards could act as trade barriers

The possibility that other countries could set computer software standards that would conflict with those of US industry and thus act as trade barriers was cited by Helen M. Wood at the Fall Joint Computer Conference in Dallas.

The demand for standards from both users and vendors has surged, according to Wood, acting director of the National Bureau of Standards Center for Programming Science and Technology. “Fortunately, a number of needed standards are flowing from national and international organizations to meet the demand,” she added.

Wood pointed to standards efforts now under way that promise to aid the computer graphics field. Approval of the Graphical Kernel System will probably be followed, she said, by the emergence of the Computer Graphics Metafile, making it easier to transport graphics among different manufacturers’ devices.

Once standards are in place, users as well as vendors need a way to be sure the products conform to the standards and will perform as expected. For this reason, NBS has established a software standards testing program involving industry. “An organization can participate in this program in a variety of ways,” Wood said, “ranging from an informal exchange of information and documentation to establishing a formal, cooperative project in which company researchers work with NBS scientists in developing testing methods.”

Currently, 15 companies have signed agreements with NBS to evaluate the GKS validation routines being developed by GMD, a scientific research organization in West Germany.

Over the next few years, NBS plans to support the development of test methods for additional standards in areas including graphics software and graphical data interchange, database management systems, and office systems/document interchange.

IBM to market Interactive Solids Design

CADAM, Inc., has announced a worldwide marketing agreement under which IBM will market CADAM’s Interactive Solids Design, a three-dimensional solid modeling system for engineering design and drafting.

The ISD solid modeler, which incorporates an extensive set of geometric primitives, is a constructive solid geometry system with boundary file capabilities. It can be used for conceptual design; engineering design, drafting, and analysis; and manufacturing.

IBM plans to market ISD as a program product through its Engineering Scientific Industrial centers in the US, Europe, and Asia.
Goals for computer animation

Robert Swanson of Digital/Omnibus Productions recently outlined the goals of his company and the computer animation industry in general. At a conference held by Art Direction and Design in Orange County on the campus of the University of California, Irvine, Swanson said that “the number one goal is photorealism.” Later he showed a TV advertisement with a van driving on Saturn’s rings as an example of how his company has been able to achieve this goal in some of its animations.

Developments in photorealism, he said, will enable computers to generate the background scenery for actors working in the studio. Although the actors won’t see the background, in the final movie sequence the desert or mountain background would not only look real, but “move” realistically according to the actors’ movements.

The company would also like to be able to simulate human motion in computer-generated images of human figures simply by calling on a “walk” or a “run” routine. Current techniques for simulating human motion, as in the company’s “Hard Woman” video for Mick Jagger, are extremely time-consuming.

Swanson explained what may at first seem to be a strange goal—to make computer animation less precise, to add “blur.” Transformations from real to computer-generated sequences can become seamless only by adding intentional distortion to the computer’s images. Computer animation must be made less clean so that it isn’t always calling attention to itself.

Swanson praised Pixar’s recent production “Luxo Jr.” about parent and child desk lamps as an example of what we’ll see more of in the future. He said that computer animation should affect audiences the way this short does: Viewers are so entranced with the story that they never think about the images as computer generated. Putting it briefly, Swanson said that he would like to see computer graphics become a “nonevent” in the media.

Turning to holography, Swanson said that a major auto manufacturer is interested in having techniques developed to simulate crashes in three dimensions. A hologram of a car would crash into, say, the hologram of a wall, showing how the parts would fly in a real crash.

NCGA offers job referral program

Under a new program established by NCGA, computer graphics professionals can learn about the latest opportunities in the industry and employers will have help in filling vacancies quickly.

Job seekers will be able to call NCGA and hear a recorded message about available positions. Descriptions will include job title and location, information about the company, applicant qualifications, date of availability, and salary range, if available.

Callers may send resumes to NCGA, and these will be forwarded weekly to the company that placed the listing. Companies may then contact the applicants of their choice.

Corporate members can list positions for $25 each; noncorporate members will be charged $50. Individual callers can submit resumes for $5 each (members) or $10 each (nonmembers).

Erratum

The Guest Editor’s Introduction for our November 1986 issue omitted some information regarding the availability of the combined Proceedings of Graphics Interface 86 and Vision Interface 86. In the US the publication is available from Morgan Kaufmann, Inc., 95 First St., Los Altos, CA 94022.

The proceedings of previous Graphics Interface conferences are available from the Canadian Information Processing Society, 243 College St., 5th Floor, Toronto, Ontario M5T 2Y1, Canada.

The audience, consisting primarily of commercial artists and designers, gave up their break to see clips of the company’s work—including the “Hard Woman” video and scenes from a Star Trek movie—as well as Hawaiian Punch and Benson & Hedges advertisements created by affiliate Robert Abel.

Growth predicted for image communication systems market

CAP International, a supplier of market information to the electronic imaging industry, estimates that the image communication systems market, which is dominated today by facsimile, will grow by 30 percent annually for the next five years.

The estimate includes facsimile and computer-based equipment that integrates software, scanners, nonimpact printers, and document storage for communication of image (bit-mapped) data. Facsimile will garner over 85 percent of the growth, with the remainder occurring in computer-based image communication systems.

New kinds of image communication systems that combine personal computers and scanner and optical disk technologies will also appear in the next four years to capture a share of the market. By 1990 a sizeable number of facsimile machines will be multifunctional. They will include such office automation functions as plain-paper printing and copying, input scanning, and/or document editing capability, as well as communications.
Computer graphics is becoming kids’ stuff

Tom Calvinner, Assistant Editor

“Vic can mop up pop.” If you are the parent of a school-age child, you may already know that computer graphics is becoming important in education. At a special evening program called SIGKIDZ, sponsored by the Los Angeles chapter of ACM/SIGGRAPH, parents had a chance to see their kids at the computer, and kids had a chance to try machines other than the ones they have at school.

To put together “Vic can mop up pop,” a young student uses a light pen made to look like a pencil to choose each word from a pool of words displayed at the bottom of the screen. Each time the child moves the correct word to the proper slot beneath the guide sentence, the screen briefly flashes a bright color. Once the child has put together the whole sentence, the guide sentence disappears, and now from memory the child again chooses the words.

At another station the shape of a state appears in brown on the screen. “Name this state,” the screen says. A child keys in K-E-N-T-U-C-K-Y. Now a little yellow dot flashes at the spot where the capital is located. “What is its capital?” the screen asks. To the amazement of her mother, the child keys in F-R-A-N-K-F-O-R-T, somewhat hesitantly.

The screen returns to a color map of the United States, Kentucky is filled in, and the screen displays another state. The child presses “enter” to proceed.

On another VDT, a workman is moving about a construction project. At the direction of a child with a joystick, the hard hat goes up and down ladders and across girders. When the child presses a button, the worker gathers up a positive number or a negative number that he happens to be passing. The goal is to reach a target number, say 51, from a number below or above it. The screen displays the target number as well as the current number. If the child does not reach the target number by the time a bucket is lifted by a rope and pulley from the ground to the top of the project, the game is lost.

The children have discovered that learning can indeed be fun, and an element of competition doesn’t hurt either. One third grader sketched and shaded a house on a Macintosh while proudly citing key-in speeds for himself and a friend. His friend’s was 50 words per minute; his was 70!

The machines were jammed with kids. The punch and cookies provided remained largely untouched.

Art competition to include computer art

A major national art competition, including computer art, will be held at Jerry Solomon Gallery, Los Angeles, California, during June 1987. Artists are to submit slides for judging by April 2, 1987.

The selected artists will be invited to show their actual work in a final exhibition and will receive $6000 in cash and purchase prizes and awards. Their slides will be accepted into the Metro Art slide registry, which is accessible to gallery and museum directors and curators, art critics, collectors, and corporate buyers.

The exhibition, running from June 3 to June 28, will be followed by a benefit art auction in which all applying artists will have the opportunity to participate with at least one work.

Jurors for the all-media competition include Laura Rosenstock of the Museum of Modern Art, New York; Susan Lubowsky of the Whitney Museum, New York; Jacque Crist of the Museum of Contemporary Art, Los Angeles; Victor Carlson of the Los Angeles County Museum; and Nina Castelli of Lehman College Gallery, New York.

Interested artists may write for applications to Metro Art, PO Box 286-H, Scarsdale, NY 10583; (914) 699-0969.

Local area networks seen as aid to desktop publishing

“Stand-alone desktop publishing systems can save a corporation both time and money, but only local area networks will allow a corporation to integrate desktop publishing into its daily operations and to recover fully the costs of expensive peripherals such as scanners and laser printers that desktop publishing requires.”

This observation was offered by Larry Blair, director of systems engineering for Univation, Inc., at a recent PC Expo panel on desktop publishing. He also pointed out that networking allows a corporation to form work groups in which several people can contribute simultaneously to the production of a single document.

“The document control provided by desktop publishing on a LAN allows the logical orchestration of very complex documents such as product brochures, technical documentation, government documents, and financial documents, and allows them to be created much faster and with a uniform format,” said Blair.

Additional benefits cited by Blair include the elimination of bottleneck, the ability to create common style sheets, and greater security against damage or theft.

Firms announce VAR agreements

The Computer Systems Division of Digicon Geophysical Corporation will market Convex-based turnkey systems from Convex Computer Corporation. CSD has converted its DISCO software to run on the Convex near supercomputer and will sell the software either separately to direct Convex system buyers or as part of the turnkey systems.

DISCO seismic data processing software is used throughout the world by seismic contractors, oil companies, and universities. The Convex C-1 near supercomputer is a 64-bit integrated scalar and vector
Computer-aided publishing to spur industry

Computer-aided publishing will be a key factor in the computer industry's recovery in 1987, according to initial results of a study launched by Intertec Development Corp., a market research and consulting firm.

The initial success of Apple and, to a somewhat lesser extent, Hewlett-Packard has encouraged a number of other firms to enter the market. There is a proliferation of software and hardware products aimed at the IBM PC/XT/AT user base. Although IBM itself has announced that it is interested in computer-aided publishing, it has not yet introduced any hardware or software products for this market area. A recently announced joint effort by Hewlett-Packard, Microsoft, and Aldus is seen as a possible integrated solution for IBM PC AT users.

The processing power of laser printers will continue to grow, according to the study, and in many cases will exceed the power of the workstation. As greater functionality is added, it will become increasingly important to use the printer as a shared resource in a network.

The report "Business Opportunities in Computer-Aided Publishing" can be purchased for $2450 from International Planning Information, Inc., 465 Convention Way, Suite 1, Redwood City, CA 94063; (415) 364-9040.

IEEE CG&A has new Editor-in-Chief

Under the leadership of Editors-in-Chief Michael Wozny and Chip Hatfield, CG&A has become a widely recognized and respected monthly publication, a force in computer graphics literature. The magazine's strength is based on the dedication of its staff, the work of the Editorial Board, and the efforts of its authors and referees. Over the next two years I hope to be able to continue the excellent work done by these groups, to bring forth articles of lasting interest, and to help CG&A attain further renown. I would like to see a series of in-depth tutorials and surveys of the entire computer graphics field, without compromising the current high level of technical articles. As in the past, I would like to encourage more computer graphics practice papers, and would welcome leads to ferreting out descriptions and discussions of "leading edge" industrial applications.

Margaret Neal and her staff have been instrumental in establishing CG&A as one of the industry's most prestigious platforms for displaying original computer graphics art, as well as bringing off the monthly miracle of on-time publication. I hope to be able to help them in this continuing task. I wish to extend to Chip Hatfield a hearty thank you for his superb technical leadership. I know he now has months of catching up to do on sleep as well as personal and job-related activities.

John Staudhammer
Editor-in-Chief