REPORT ON SIGGRAPH '82

by Mark Schorr

Robotics and process control, while not the main issue of SIGGRAPH '82, remained in the "frame buffer" as the indirect interest of many exhibitors. SIGGRAPH, the ninth annual conference on Computer Graphics and Interactive Techniques, at Hynes Auditorium in Boston July 26-30, attracted larger crowds than anyone anticipated. Registration for the first three days exceeded 23,000. Attendees included members of the ACM Special Interest Group, members of the Boston CAD/CAM community, and an even larger group of non-affiliated professionals and bystanders. "Wait until the next SIGGRAPH in Detroit, then robotics will be the issue," one vendor predicted.

In spite of a long, closely-packed line to register for the meeting, there was plenty of room to view exhibits and technical presentations. The conference was extremely well organized. Special events included shows of computer-generated movies and an exhibit of computer art.

Because of newly-formed alliances between Hollywood and the computer graphics industry, the show had more "star quality" than many recent computer conferences. John Whitney, Jr., president of Digital Productions, announced plans for a 30-minute computer-generated portion of a new movie "Starfighters." Characterizing the movie as "already scripted," Whitney would not rule out the appearance of computer-simulated robot characters in "Starfighters."

Highlights of the technical presentations included an announcement of the X3H3 Graphics Standards. The standards committee attempted to go further than any previous ANSI-specifying body in binding formal specifications to each Programming Language description.

The proposed standard is based on any earlier ACM-Siggraph proposal. Its implications for robotics experimental work affect graphic simulations on displays, computer aided design, and even use of personal computers.

A New Kind of Boilerplate

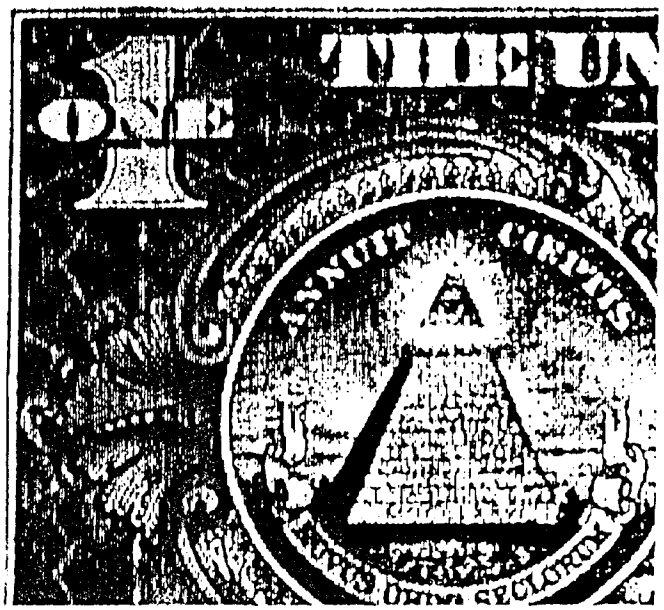
Highlights of the vendor software presentations included GS-1, a Bolt Beranek and Newman software package that simulates industrial process control in real-time graphics. The package is implemented in LISP and runs on the Symbolics LM-2 computer, either in stand-alone mode or driving an AED 512 color terminal.

The operator can work from an editor program to create a real-time graphic control panel objects that also operate in real-time. The user can then interact with the Symbolics workstation to control objects through a mouse-oriented graphic display.

The GS-1 software package appears to do for industrial process control what the Xerox Star system does for Office Automation. All graphics objects, called *icons*, are stored as they are created, and can be used simply by referring to their names. They may be placed in any position on the screen, scaled to any desired dimension, and made to interact with the other objects defined in the program.

GS-1 icons are more than mere pictures on a screen. Although producing complex diagrams is important in its own right, the power of GS-1 stems from the fact that the icons are "smart." Once drawn, they can do all the things that normally make graphic displays of information difficult and time-consuming. For example, a simple command can cause geometric icons to change their color, label, border color, or orientation.

More complex icons can be defined. Dials, columns, and digital readouts show numerical values, can draw proper scales and select proper fonts for labels and markings. Graphs can show entire sets of data as points, lines, or bars,



and can intermix these different modes. Watching the screen that simulated the boiler room of a small ship's engine room one could only note the flexibility of this new form of "boilerplate." The library of icons is easily extendible. The editor can be used to produce new icons. Once created, these icons become prototypes in the library, can be manipulated by the editor and incorporated into a new diagram, or used to create other prototype icons.

Paul Horwitz, the Bolt Beranek and Newman Senior Scientist who showed the software, emphasized that connections between the icons and the "outside world" are easy to make. Interactive graphic displays derive much of their power and usefulness from their connections to data sources, numerical simulations, or actuators. In GS-1, all icons communicate with their environment through taps which pass information in both directions and can thus be used for control as well as for display of information.

Towards a Graphics Control Language

Another attempt at implementing a graphics control language was found not among the software vendors, but in the art exhibition. There on display was Real Time Production's version of a CAD/CAM machine as an arcade gaming system. Using a modified Z-80 arcade processor, with two custom-designed character generator chips, Artist Jane Veeder produced a highly interactive art-game, called "Warp It Out." While the core system video display and control panel was that of an arcade game, two additional color monitors provided outputs both for live audiences (monitor #1) and for Polaroid SX-70 hard copy (monitor #2) of "finished" design products. Game players could digitize an image (typically the player's own face), store the digital image, and then "redesign" the image and a contrasting background using a highly visual set of CAD/CAM tools.

In this software user interface, the Chicago-based art and programming group took a step towards a state-of-the-visual-art graphics control language. The game allowed spectators to learn the CAD/CAM control language very quickly, by simply watching other people redesign images at the monitor. The prompts included such categories as symbol fill, ripple, pattern fill, and edge blow, taken from the repertoire of recent graphic techniques. The next levels of menu almost entirely eliminated words. The overall affect was to encourage the player to make purely visual decisions.

In the long run, this encouragement to think in visual terms can only lead to better design standards throughout the industry. Just as the Bauhaus group once skillfully led people through a carefully-structured process to produce new design standards, the Real Time Production group appears to be leading spectators through a similar process in CAD/CAM design.

Improved Price/Performance

If the Graphics software showed signs of improved user interfaces, hardware showed a trend of improved price/performance. New graphic workstation entries from vendors such as Hewlett-Packard, and Sun Microsystems showed that more performance per dollar could be squeezed from the hardware. At the same time, industry leaders such as Ramtek, Lexidata, and Matra were putting out more raw processing power, and continuing to improve the price/performance ratio for higher end

SIGGRAPH '82

systems.

I was particularly impressed with the low end hardware. After years in the costly world of exorbitantly priced graphic hardware the industry has begun to produce some interesting low-end items. Some of the less expensive items included a mini CAD/CAM called GDS from Stoneware that runs on an APPLE II Plus for under $200. Another show favorite was a Polaroid camera (announced at NCC) that produces an 8 by 10 digitized photograph from a high-resolution CRT in 2.5 minutes. The cost of other items, such as digitizing cameras, is beginning to come down.

The Eye of a Robot

Microtex (Cambridge) produced an image digitizing camera, which could easily serve as a robot eye. Two implementation paths are offered. In an OEM system the camera corrected digitized video. The camera can also be used to form a standalone electronic camera system that interfaces to 8-bit TTL. Cabling carries DC power to the camera and multiplexed picture data/control signals between camera and host.

Using a high quality 35mm lens, the camera can scan the engraved details on a dollar bill and deliver these images at an effective resolution of 200 points per inch (See photo p. 24). The imaging subsystem can compensate for the array and the illumination, using a range of 256 gray levels. The central part of the range, shown on a histogram, provides 80 gray levels, equivalent to some professional grade films. The camera can also enhance degraded images by viewing them at the highest points of contrast. The weight of the camera is a mere 4.5 pounds.

Conclusion

After viewing such an impressive array of computer graphics hardware and software, I am looking forward to the next SIGGRAPH to be held in Detroit (July 25-29, 1983). It is clear that the current work in computer graphics will now provide insights for people working on other industrial control problems. Given the way CAD/CAM tasks are beginning to be sorted out, the tasks involved in other pressing problems such as pattern recognition, may soon begin to be identified. □