Georgia Tech

Research News

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**INNOVATIVE MULTI-MEDIA SYSTEM PROMOTES U.S. BID FOR SUMMER OLYMPICS; BEGINS NEW LAB TO STUDY TECHNIQUES**

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**Photography & Video Available**

Backers of the United States bid to host the 1996 Summer Olympics will use a high-tech, multi-media program to make their final proposal to members of the International Olympic Committee (IOC) in Tokyo September 18.

The show presents a wide-screen view of what the Olympic Village would be like for athletes. The system uses three videodisc players, three computers, computer-composed music, digitized narration and a unique interaction system which includes a computer-animated touch-sensitive three-dimensional model of the proposed Olympic Village. A Commodore Amiga computer controls the presentation, which also uses an Apple Macintosh IIcx and a smaller computer interface device.

The presentation was developed by researchers at the Georgia Institute of Technology, with the assistance of Georgia State University and several private companies. The Georgia Tech researchers saw the project as a way to boost Atlanta's Olympic aspirations -- and as a testbed for developing innovative presentation techniques for a new Multi-Media Technology Laboratory at Georgia Tech.

"We were going to catch the weary IOC in the last week of the competition, so we wanted to make this more entertaining than the other bid presentations they would see," explained Michael J. Sinclair, leader of the technical team which developed the system. "But we wanted to tell the audience about transportation, medical facilities, entertainment, training facilities housing and dining. And we wanted to show with graphics the one-million square foot dormitory that would house the athletes."

**The computer-generated "Golden Athlete" uses unique methods for human motion capture.**
***(Call for photo.)***

As they did with an earlier interactive presentation for the Olympic bid, the Georgia Tech team relied heavily on computer-generated renderings of the proposed buildings. An architectural firm provided a database of information about the dormitory, and the team used that to create a rendering which allows viewers to fly around the building, then enter a remarkably realistic interior space.

"We took a lot of time to computer decorate the inside of the

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bridge between the two buildings," Sinclair explained. "We put in country flags, large easels with portraits of Olympic Committee presidents, marble columns, a checkerboard tile floor and the Atlanta Organizing Committee (AOC) logo."

Software from Thompson Digital Imagery allowed the researchers to produce realistic textures of brick, concrete, grass and other materials. Used with systems from Wavefront Technologies, the texture information helped create a computer-generated view which allows the audience to see the entire Olympic Village from an altitude of about 500 feet.

The graphics were merged with real images shot on film by Academy Award-nominated cinematographers at Georgia State University. A special anomorphic lens compressed onto 35 millimeter film from a single camera enough image information for the three side-by-side video projection screens which form the centerpiece of the presentation.

To produce a three-screen 120-degree "wrap-around" view, the researchers worked with Atlanta-based Crawford Post Productions. Video tracks for each of the three screens were "decompressed" from the 35 millimeter film by a telecine technique to produce high quality images stored on the videodiscs.

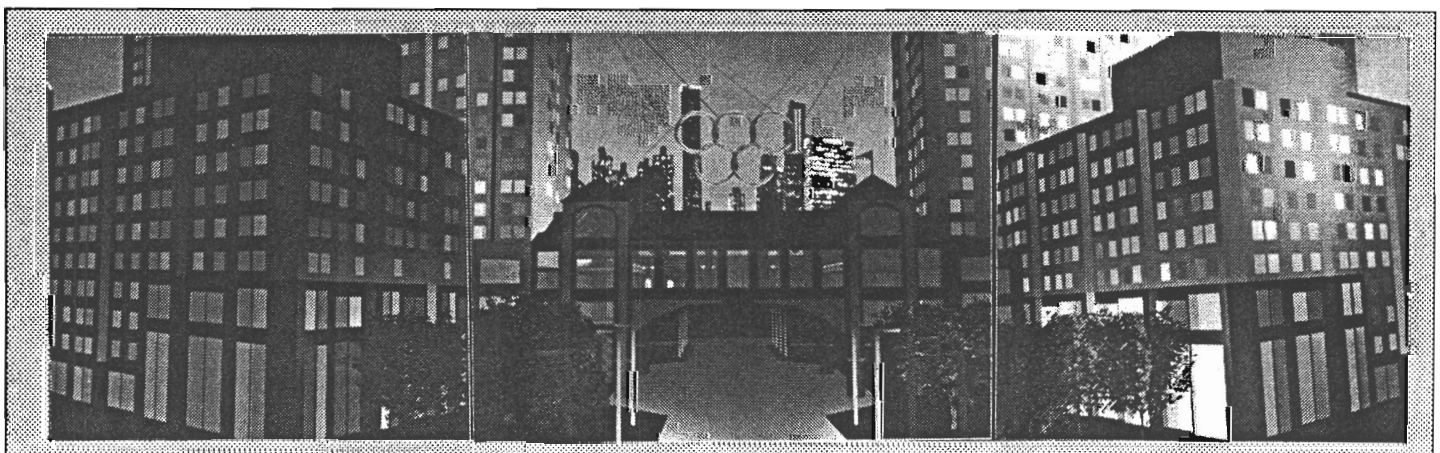
Merging film with videotape also offered other challenges. The video images sliced from the film had to be "edge-mapped" to make sure they fit properly onto the three screens used in the presentations. And special efforts compensated for "gate wobble" generated by the film camera and projector.

## A UNIQUE USER INTERACTION SYSTEM

The earlier presentation system allowed users to select what they wanted to see by moving a computer track ball along a stylized map of the Atlanta area. The track ball proved daunting for some users, however, and permitted only one viewer at a time to interact with the system.

The new presentation package uses a unique touch-sensitive three-dimensional map of the Olympic village proposed for the Georgia Tech campus. The translucent map is animated from below by a special projection system using graphics generated by an Apple Macintosh IIcx.

In addition to icons used for choosing portions of the videodisc-based presentation, the animation includes clouds, moving buses and cars, a fireworks presentation and even an airplane towing an advertising sign. When viewers choose to see a presentation on the Village's entertainment, training or dining facilities, the buildings housing those activities light up on the map.



A computer-generated view of a proposed Olympic dormitory flows across all three screens of the presentation. *(Call for photo.)*

Because of the raised buildings molded into the maps, conventional touch sensitive conductive areas or infrared beams could not be used. Instead, load cells located on the four corners of the model sense pressure exerted by users pressing on the icons. From the load cell information, a small computer calculates the "center of force" to determine what information the user would like to see.

Classical music used in the presentation was composed and generated on the Amiga computer by a company known as the Blue Ribbon Bakery. The technique used the Midi interface, and produced realistic orchestration which includes recognizable instruments.

Along with the music, all narration was digitally stored on the Amiga and is recalled when requested by viewers. In addition to that storage, the Amiga coordinates all activities of the presentation. The machine was chosen, Sinclair said, because it could control the multiple inputs and outputs needed without slowing.

The computer maintains statistics on which of the six basic information tracks are most requested. At the end of each presentation, the computer calls up digital narration suggesting the next most popular track -- though the audience is free to choose any of them. The audience can also choose from two languages: French and English.

The presentation also offered an opportunity to develop better methods for human motion capture, said Sinclair. The presentation opens with a computer-generated "Golden Athlete," who carries the Olympic torch into a realistic rendering of the proposed Olympic stadium.

Consultant Frank Vitz worked with 4-D Video Company to create a realistic model whose body moves like a real human. "Computer-generated people tend to move like robots," Sinclair said. "To make a computer-created figure move like a human is very difficult."

In addition to the other assistance, Atlanta-based Crawford-Post Productions donated production time to put the entire presentation together. Without the substantial donation of equipment, time and resources from Crawford and others, the production would have cost at least $500,000.

To complete the production on time and with a limited budget, the researchers had to overcome a number of daunting technical challenges -- including how to get high-quality images without the costly use of multiple cameras. The resulting use of the anamorphic lens and telecine technique helped keep costs down.

"Because of our rather limited budget, we had to find technical solutions rather than brute force human solutions to the problems," said Sinclair. "We experimented with quite a few different techniques. In many cases, they proved to be more efficient solutions from the standpoint of time and money."

## PROJECT TO START NEW RESEARCH CENTER

Georgia Tech researchers hope to continue the work begun by the Olympics project, which was the first phase of one component of a new research center for multimedia technology. One industrial sponsor has already contributed a seed grant to continue the Center's development.

"The components necessary to build outstanding programs in multi-media technology and telecommunications exist at Georgia Tech," said Dr. John Patrick Crecine, president of Georgia Tech. "We want to mobilize resources from the State of Georgia and a selected group of external sponsors to develop programs of education, research and development which will benefit students, faculty and industrial partners."

Nippon Columbia of Japan and its U.S. subsidiary, Denon Digital Industries, have pledged support for the new center. Other support will come from the State of Georgia and other corporations, Crecine said.

Research initiatives will include telecommunications technology and policy, computer graphics and scientific visualization, translations for the hearing-impaired, a workstation teleconference prototype and distance learning, including adult literacy instruction.

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