

WHAT'S NEXT

## On Internet of the Future, Surfers May Almost Feel the Spray

By ERIC A. TAUB

LOS ANGELES

THE darkened room reverberated with the sounds from the space shuttle's enormous engines as the ship blasted off from what looked at first to be just a few hundred feet away. But as the lights went up, the spectators were reminded that they were not in Florida but in Southern California, watching an extraordinarily vivid videotape of a launching projected on a large, wide-screen display.

The sights and sounds were part of a future entertainment and videoconferencing system demonstrated by University of Southern California researchers, who contend that the system is so good it can mimic reality.

The new project, called Remote Media Immersion, offers video imagery better than today's high-definition television broadcasts, plus surround-sound audio that gives the listener the unexpected sense of being in another place, whether that is watching a football game in a stadium or being caught in a rainstorm. The technology is being developed by the university's Integrated Media Systems Center.

The programming to fuel this immersive experience will not come from a local television broadcaster; instead, it will be delivered on demand, via an extremely high bandwidth version of the Internet.

Officials at the center say the technology could help drive the creation of the next-generation Internet. "This system could give Internet companies a new reason to

upgrade their capacities," said Ulrich Neumann, director of the center. "This isn't about TV on demand. It's a completely new experience."

Pointing to the huge growth in large-screen home theater systems, the researchers say the new technology is so compelling that private industry will develop it and consumers will buy.

To create the illusion of being there, events are recorded using high-definition cameras and are stored on hard drives using the same MPEG-2 compression technology employed for regular HDTV. To improve the quality of the image projected on the center's 9-by-5-foot screen, the picture is compressed from its raw data rate of 1.5 gigabits per second to 45 megabits per second, less than half the amount of compression used to transmit broadcast HDTV.

"With less compression you get less blurriness," said John Villasenor, a professor of electrical engineering at the University of California at Los Angeles and a developer of the MPEG standards. "Even with today's HDTV, if there's too much compression and you're watching on a very large display, signs might not be readable and the edges of objects could appear blocky and pixilated."

To capture the sound, 16 or more microphones are used to record an event, and the tracks are then combined and processed to



Edward Carreon for The New York Times

**REAL FEEL** Remote Media Immersion offers high-quality video and audio delivered on demand.

create 12 digital audio feeds, including 10 full-spectrum channels and 2 low-frequency channels. The audio system, dubbed 10.2 by Tomlinson Holman, its creator and the developer of the THX cinema sound system, creates a more accurate sense of where the sound originated than the 5.1 Dolby Digital standard found on most DVD recordings.

In the home, five speakers would be placed around the front of the video display. A subwoofer would be placed on each side of the viewing area, three surround speakers

would be in the rear, and two more would be hung from the ceiling to fill in spatial gaps.

"Consumers won't need to buy 12 speakers," Dr. Neumann said. "Instead, we can use the six that are part of today's Dolby Digital system and create virtual surround channels for the others," altering tones to give listeners the impression that sounds are emanating from across the room.

Consumers could select a movie or other programming from a standard Web browser, possibly integrated into a TV set, which

would instruct servers to transmit the show. To minimize interruptions in the data flow, program content could be redundantly placed on hard drives throughout the country. The center's streaming server technology, called Yima, senses when packets of data are dropped and resends them before the program is interrupted. The Yima servers can also be configured to send audio from one location and video from another, then combine the two once they reach their destination.

The transmission speeds required mean that this technology will not come from the current Internet. D.S.L. and cable modems typically send data at 1 megabit per second, much slower than the 60 megabits per second required for the Remote Media Immersion system. For the demonstration, researchers used a special high-bandwidth line to connect to servers in Virginia.

Dr. Villasenor said that transmission speeds of 60 megabits per second were possible but that getting such speeds into homes "would require billions of dollars to rip up sidewalks and change out existing copper wires."

"And you'll need to transmit those high speeds consistently," he added. "People wouldn't pay for a telephone if it only worked 90 percent of the time."

Still, Dr. Neumann believes that the world will soon be receptive to their work. "With media immersion, you can get beyond the technology," he said. "You can stop looking at the imperfections in the picture and sound and completely lose yourself in the event."