Siggraph taps virtual video, multitouch

By Nicolas Mokhoff

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San Diego -- Siggraph's annual emerging technologies exhibition is the harbinger of computer interfaces and graphics expected in the next 10 years.

This year, out of 75 submissions, 23 installations were selected to be showcased at Siggraph 2007 here this week. Here are some highlights:

• Researcher Hiroo Iwata, of the University of Tsukuba (Japan), will demonstrate his String Walker, a locomotion interface that provides a locomotion sensation. It uses eight strings actuated by motor-pulley mechanisms mounted on a turntable. String Walker enables users to maintain their positions while walking in various directions in virtual environments. This proprioceptive feedback for walking, which is not provided in most virtual environments, is still in a preliminary state and will be useful in virtual-environment applications, such as training or visual simulation.

• David Merrill, a researcher at Massachusetts Institute of Technology's Media Lab, is showing the "Sound of Touch," a system that enables users to "paint with sound." The system's technology and interface design adopts characteristics of acoustic instruments. The samples are recorded and made malleable to paint with sound on physical textures and resonant objects.

The technology builds on a technique for continuous digital convolution for creation of semi-acoustic musical instruments. A standalone wand incorporates both a microphone for recording samples and a piezoelectric sensor for stimulating the samples. A "texture kit" enables sonic experimentation with a wide range of physical textures and resonant objects.

• Andrew Jones, a researcher at the University of Southern California Center for Creative Technologies, details a 3-D stereoscopic display that renders and projects images at 5,000 frames per second onto a spinning anisotropic reflector with correct geometric, accommodation and vergence cues in a horizontal plane. Motion-tracked vertical parallax is then used to allow unrestricted 3-D movement with correct geometric cues. The innovation was achieved by modifying an off-the-shelf projector to use a new DLP (digital light processing) drive card with custom-programmed FPGA-based circuitry.

• JazzMutant shows its latest development in multitouch technology using resistive technology with a particular focus on visual and graphic arts, and some new advanced interaction techniques involving a multitouch display in combination with other input devices.

Apple recently made multitouch displays common in its new iPhone. And Microsoft will also demonstrate its multitouch Microsoft Surface, which turns an ordinary tabletop into an interactive surface.

• Planar Systems demonstrates its active matrix LCDs with embedded optical sensors in the a-Si backplane of the AMLCD. Researcher Adi Abileah said that the applications will include touch- panel input, hand recognition and image capture.

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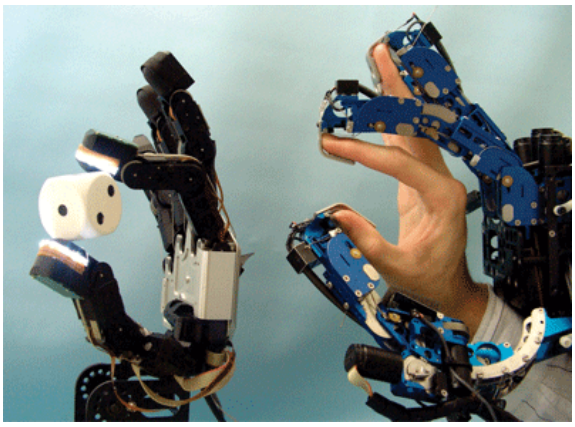

University of Tokyo researchers will show Haptic Telexistence, a highly realistic haptic interaction among humans and objects located remotely. With Haptic Telexistence, one can perceive the exact shape of an object, which simplifies complex tasks such as in telesurgery and 3-D modeling.

The imaging capability and hard-copy capture features also include a hand-recognition algorithm that enables the display to check or confirm identity.

The system supports the use of a light pen and a laser pointer and includes full imaging capability.

Virtual video sets

With the proliferation of digital video on the Web, video authoring and animation are becoming an essential part of the online experience. In a YouTube-empowered world, virtual sets at home or school may become as routine as the HTML editors of the recent past.

Ramesh Raskar, a researcher at Mitsubishi Electric Research Laboratories (MERL), demonstrates a system that uses new methods of flexible scene capture to create a dynamic "virtual recording set." The system uses tracking tags that are imperceptible under attire, and inserted computer graphics elements can match the lighting on the presenter, making the technique ideal for real- time broadcast.

Motion capture no longer requires specially designated spaces, special lighting and a huge investment, according to MERL.

The new system can record orientation and incident illumination at the marker tags. For motion capture, it tracks the position of marker tags at a rate of 500 Hz, with 8-bit location precision, and with self-identifying tags. For the orientation, it strategically configures a set of modulated light transmitters and uses light modulation and demodulation techniques to estimate individual attributes at the locations of the receiving photosensors.

In a virtual-set application, the recording system not only captures motion and lighting conditions in their actual setting, but also the tags worn by an actor are easily hidden by theatrical wardrobe so they are invisible in the video recording, and they do not interfere with performance.

Raskar said a key advantage of this approach is that it is based on components developed by the rapidly advancing fields of optical communication and solid-state lighting, which allows the system to capture photometric quantities without added software or hardware overhead. Marker-based tech- niques that use other physical media cannot capture photometric properties, Raskar said.