NAB TV TechCheck

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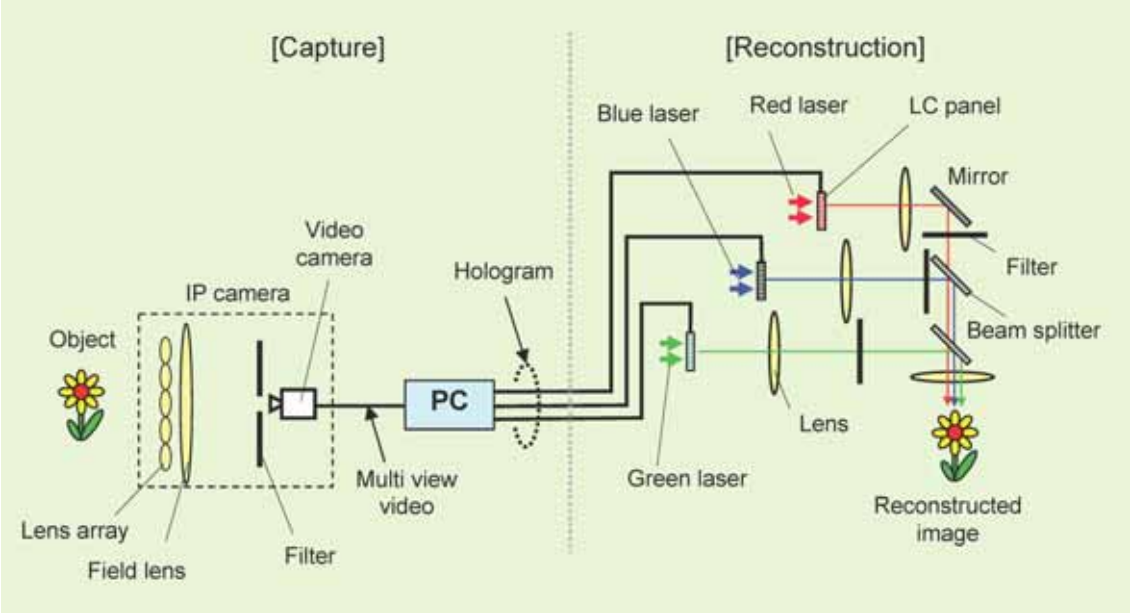
ADVANCED TECHNOLOGY FROM NICT AT THE 2009 NAB SHOW

Some of the most advanced imaging and sound technologies on display at the 2009 NAB Show last week could be found at the NICT Pavilion in the North Hall of the Las Vegas Convention Center. The National Institute of Information and Communications Technology (www.nict.go.jp/index.html) is a Japanese government-funded telecommunications research organization, which was exhibiting at NAB for the first time. Several technologies developed in the NICT labs, including those for holographic 3D television, 3D sound, and an advanced multi-sensory interaction system, were being shown and are described below. Other demonstrations included a glasses-free 72-inch 3D display using 50 rear-screen projectors and an IPTV 3D HD transmission system showing a connection from Japan to the Las Vegas Convention Center via broadband network.

Holographic 3D Television

Holographic imaging has long been regarded as the ultimate method for capturing and recreating 3D images, with advantages that include no special glasses, no visual fatigue, and display of images corresponding to eye-position. In most holography, due to the challenges of capturing and reproducing holographic images of moving objects in real time, a still image is reconstructed using photographic plates. NICT has, however, developed a prototype system that is able to capture and reconstruct real, moving objects using electronic holography. To produce holograms under natural light, the holograms are calculated from multi-view video captured in real time by an integral photography camera using a lens array composed of many micro lenses and the 3D image is reconstructed using red, green and blue lasers. A much-simplified diagram of the overall system is shown below.



The demonstration uses a small rotating model truck and other background items. The small display area for the 3D reconstructed image is just a couple of inches wide and the resolution and brightness of the image is very low but, as can be seen from the photographs below, all the objects are visible. It is also apparent from the picture of the demonstration display system that more development will be required before this becomes a system for commercial implementation.

Captured Objects

Reconstructed Holographic Image

Display System

3D Sound

Separate from the 3D holographic display, but related in its concept of creating virtual reality, was a demonstration of NICT research with ultra-realistic 3D sound. In this demonstration, a small musical group was accurately reproduced as though the musicians were in the room with the listener.

Musical instruments generate sound in various directions and the photo below show the arrangement used for picking up the sound with 26 microphones, recorded to 26 separate audio channels, with the arrangement repeated for each

of three musicians. The sound is reproduced through a special array of 26 loudspeakers for each of three locations, radiating sound in accordance with the original sound source, actualizing the frequency directivity dependence, and giving the illusion of the musicians being present in the room.

Each specially-designed spherical radiator loudspeaker assembly, developed by NICT, is made of ABS and houses 26 one-inch diameter loudspeaker units. The polar coordinate origin is the center of the spherical enclosure.

Multi-Sensory Interaction System

In this technology demonstration, a system re-creates the 3D image, tactile sense, and contact sounds of an ancient copper mirror (see picture) with a textured metal back, allowing users to interact naturally with a virtual object.

As seen in the photo, the user wears 3D glasses to view the reflected image from a panel display, headphones and a pen-like stylus mounted on a retractable arm which provides positional and force-feedback information.

The rusty condition of the piece can be felt and heard as the stylus is used to scrape over the metal, with tactile information revealing the hills and valleys of the ornamental design. The stylus can also be used to rotate the virtual mirror, with feedback to the user giving a sense of the weight of the piece.

To produce this realistic virtual experience, a virtual object model is constructed, including the 3D structure, texture, and contact sound parameters of the real object. The position sensor attached to the stylus makes

judgments about contact with the virtual object, and the system then generates appropriate multi-sensory information to the user.

Potential applications for this technology noted might include cultural and scientific education, remote medicine or medical training, product design or even realistic online shopping. More information about this technology is available from the NICT Multimodal Communication Group in the Universal Media Research Center (email info_mmc@ml.nict.go.jp).

NAB Video Blog – NAB employed "video blogging" technology to capture the experience of attending an NAB Show. This video blog (see screen capture) is available on the NAB Show Web page at http://www.nabshow.com/2009/newsroom/videoBlog.asp and has been compiled by a group of select "bloggers" including:

- *Grace Galloway, student and first-time attendee* – Grace is a senior at the University of Colorado at Colorado Springs and an NAB Show intern. She will be graduating in May with a degree in Communication with an emphasis in Media Management and a Visual Arts Minor.
- *Sarah Milligan, behind the scenes with NAB President and CEO David K. Rehr* – at NAB, Sarah runs the executive office of David Rehr. At the NAB Show, Sarah will be capturing a look behind the curtain as Rehr hosts NAB's biggest annual event;
- *Peggy Miles, Super Session speaker and new media expert* – Peggy was an early pioneer in Webcasting, and digital media, and is the CEO of InterVox Communications and founder of the International Webcasting Association. Peggy also interviewed Philip Rosedale, Founder of Second Life and co-presented with Brian Cooley in the Super Session: "Cool Gadgets, Hot Content" as well as a guest author on the NAB Show Blog;
- *Sandra Adamu, Nigerian educator and attendee* – Sandra is a Broadcast Lecturer at Ahmadu Bello University in Zaria, Nigeria. Her second time to the NAB Show, she will be conveying an international attendee perspective;
- *Shawn Canfield, NAB Show staff* – as Director of NAB Exhibit Services, Shawn is able to provide true backstage access to what it takes to pull off an event of this magnitude, serving more than 1500 exhibitors across 800,000+ square feet of exhibit space. Shawn also manages the NAB Show Exhibitor Blog;
- *Jessica Sheridan, NAB Show staff* – as Interactive Marketing Manager for NAB Show, Jessica is on the front line of Web promotion for the event. While on-site, she will be providing true backstage access to how the show unfolds from a staff perspective. Jessica also manages the NAB Show Blog.