From Presentations

Research Presentation 1

A 120-Hz Image Sensor for Super Hi-Vision

Toshihisa Watabe, Imaging & Storage Devices Research Division

STRL is working on the next generation of broadcasting services that will deliver higher quality and a greater sense of presence. Our current R&D focuses on full-spec Super Hi-Vision (SHV) with a 7680 horizontal × 4320 vertical pixel display, 120-Hz frame rate (progressive scanning), 12-bit depth, and wide range of RGB colors. We constructed a prototype CMOS image sensor for a full-spec SHV camera that meets the required specifications for the pixel count, frame rate, and bit depth. The prototype image sensor has an effective image area with a diagonal length of 25mm and power consumption of approximately 2.5W.

This presentation explained our newly developed two-stage cyclic A/D (analog/digital) converter and parallel signal output circuit for achieving high-speed operation at a 120-Hz frame rate and 12-bit resolution with 33 million pixels. The configuration, specifications, and operation of the image sensor that incorporates these circuits were also discussed. Also addressed were the characteristics of a prototype sensor as evaluated in an image pickup experiment and the system configuration of a three-sensor color camera that utilizes this image sensor.

Research Presentation 2

A Plasma Display Panel for Super Hi-Vision

Keiji Ishii, Display & Functional Devices Research Division

In the Super Hi-Vision system, a large high-definition display is needed to reproduce images conveying a strong sense of presence and material perception. At STRL, we have been developing a plasma display (PDP) that is a self-emitting direct-view display device featuring excellent video display performance with high contrast and a wide viewing angle that is relatively easy to produce at large screen sizes. We have just succeeded in building the world's first full-resolution (7680 x 4320 pixels) PDP prototype with a 145-inch screen and a pixel pitch of 0.417 mm.

In this presentation, I will introduce the panel driving technology that we developed to reproduce stable Super Hi-Vision video output on this screen. When controlling the display brightness, we use a multi-line simultaneous scanning technique whereby the pixels of multiple adjacent lines in the vertical direction are displayed at the same brightness, thereby speeding up the panel scanning driver. Furthermore, by suitably selecting the range of brightness to which this technique is applied and the number of lines that are simultaneously scanned, we can achieve stable panel driving characteristics whereby the reduction of picture quality with increasing speed is suppressed, allowing all the lines of the display to be scanned.

Research Presentation 3

Binaural Technology for Super Hi-Vision Audio

Kentaro Matsui, Advanced Television Systems Research Division

NHK STRL has been researching a 22.2 multichannel sound system for Super Hi-Vision (SHV). This system realizes stereoscopic spatial sound reproduction through the use of numerous loudspeakers placed three-dimensionally around the TV viewing position. To make 22.2 multichannel sound feasible at home, we are also studying binaural technology. Binaural technology allows a listener to perceive sound arriving from an arbitrary direction by simulating the sound propagation characteristics from a sound source to the ears (head-related transfer functions: HRTFs). The technology makes it feasible to reproduce 22.2 multichannel audio using simple devices such as headphones or stereo loudspeakers.

This presentation gave a brief overview of HRTFs, from their measurement to adjustment techniques, and discussed a binaural 22.2 multichannel headphone processor for monitoring audio such as in an outside broadcasting van or on location. Also presented was a technique to reproduce 22.2 multichannel sound using only a simple pair of frontal loudspeakers, the current status of our research, and our efforts towards practical implementation.

Research Presentation 4

Large-capacity Transmission Technology for Next-generation Digital Terrestrial Broadcasting in Super Hi-Vision (SHV)

Kenichi Murayama, Broadcasting Networks Research Division

Terrestrial analog TV broadcasting terminated in Japan (expect in three prefectures) on 24 July 2011. (In three prefectures in the Tohoku region, it ended on March 31 2012). The transition to digital TV broadcasting was finally completed. At STRL, we are conducting research and development on large-capacity transmission technology with the aim of delivering Super Hi-Vision to households by using the next generation of terrestrial broadcasting. On the basis of ISDB-T, which is the international digital terrestrial broadcasting standard developed at STRL, we applied a combination of dual-polarized MIMO and ultra-multilevel OFDM technologies to expand the transmission capacity and built a prototype system that successfully transmitted one Super Hi-Vision program over terrestrial waves on two UHF channels.

The presentation introduced large-capacity transmission technologies for the next generation of terrestrial broadcasting. In particular, it covered dual-polarized MIMO technology, which enables two different signals to be simultaneously transmitted using horizontally and vertically polarized waves, and ultra-multilevel OFDM technology that expands the modulation scheme up to 4096QAM. There was also a report on techniques such as LDPC coding and inter-polarization interleaving for reducing the transmission characteristic degradations caused by multipath distortion and field-strength differences between polarizations. Moreover, the results of field trials in urban areas and an overview of SHV transmission experiments using two UHF channels were presented.

Research Presentation 5

Analysis of User Behavior in Social TV System –teleda–

Go Ohtake, Advanced Broadcasting Platforms Research Division

Social networking services (SNSs) have become hugely popular, and people around the world are actively using them to share their experiences relating to TV programs they have watched. At STRL, we are developing a social TV system called "teleda" that combines a broadcast service with an SNS so that viewers can enjoy TV programs in a new way. The teleda system includes functions that allow users to express their feelings and share their experiences while watching broadcasts currently on air or previously aired programs. Since this system makes horizontal connections among viewers in addition to vertical connections between the broadcaster and viewers, the viewers can get many opportunities to encounter programs which they've never watched before by communicating with other viewers.

In this presentation, I will describe the service model and system including the teleda API for providing resources such as programs and social graphs. I will also show an overview of the three-month-long field trials on the Internet conducted in fiscal 2010, where approximately 1,000 users experienced the experimental teleda website, and I will discuss the feasibility of services that combine broadcast services with SNSs. Finally, I will introduce our field trials on teleda with extended functions that were held in fiscal 2011, and I will discuss our future plans.

Research Presentation 6

Translating Japanese Text into Sign Language CG Animation

Naoto Kato, Human & Information Science Research Division

NHK is working on expanding its sign language services by targeting hearing-impaired viewers whose mother tongue is sign language, in addition to striving to expand its captioning services for the hard of hearing. To achieve these goals, STRL is studying machine translation technology from Japanese text to sign language CG animation. We recently developed machine translation methods to account for the difference in grammar between Japanese and sign language; the language translation is based on a corpus (a database containing a large set of bilingual texts).

This presentation will cover our machine translation methods and their application to a prototype system for translating meteorological information in Japanese text to sign language CG animation. By using a parallel corpus of Japanese and sign language, we can perform translations without having to know the grammar of sign language. Also, by dividing the parallel corpus into clause and phrase units, it can be used either directly (example-based translation) or indirectly as learning data (statistical translation) to translate a wide range of Japanese expressions into sign language. The prototype system can produce sign language CG animations from our large-scale dictionary.