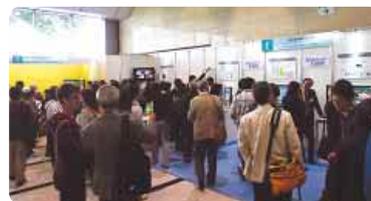


Fusion of Broadcasting and Communications

A new type of broadcasting service technology, Hybridcast, combines the strengths of broadcasting and broadband communications networks to provide broadcast-related information and services. This exhibit also presented the necessary supporting technologies to ensure the safety and security of such services.



Super Hi-Vision (SHV)

The latest research results were introduced for the Super Hi-Vision (SHV) system that will convey a heightened sensation of reality to viewers. This year's exhibit featured the first exhibition of a full-resolution SHV camera using three image sensors, each with 33 million pixels. We also presented other SHV technologies, including a high-performance video codec and its transmission technology.



Integral Three-dimensional Television

This exhibit presented our latest developments on our integral three-dimensional television, the ultimate 3D TV that will allow natural stereoscopic video images to be viewed without special glasses. This year's progress included quality enhancements to the 3D video picture.



Digital Terrestrial Broadcasting

This part of the exhibition introduced digital terrestrial broadcasting technologies that will complete the switchover from analog to digital broadcasting in 2011 and new digital broadcasting technologies for the next era of television. The displayed items included a compact, low-cost interference canceller and a large-capacity transmission technology based on ultra-multilevel OFDM and dual-polarized MIMO.



Human-friendly Broadcasting Services

STRL technologies were introduced that will enable everyone, including the elderly and the visually/hearing impaired, to enjoy broadcasting services. The exhibits included a tactile information presentation technology for visually impaired persons and a technology that translates spoken-Japanese into Japanese-sign-language CGs.



Enhancing Production

We presented our leading-edge technology for a more advanced program production environment. On display were a millimeter-wave TV camera that captures images of objects hidden behind obstacles and visual effects technology that was used during production of the NHK drama "Saka no Ue no Kumo."



Next-generation Broadcasting Devices

We exhibited our latest broadcasting device technologies for future broadcasting services, including flexible displays, color organic imaging devices, and high-density holographic recording technologies.



Museum of Broadcasting

This exhibit highlighted STRL's R&D on television cameras and showed how cameras have developed over the years. Starting with the iconoscope camera, continuous research and development of camera systems have led to progressively higher quality and more compact models.



NHK Engineering Services

NHK Engineering Services, Inc. (NES) supervises the licensing of patents and the introduction of the technological expertise resulting from NHK's research and development. NES also promotes R&D for practical implementation of our technologies, with the goal of contributing to society. The NES exhibit showed visitors some of the devices under development and NHK's patented technologies.



Fusion of Broadcasting and Communications

Hybridcast: Fusing Broadcasting and Communications

We are working to create a more convenient, easier-to-use broadcasting service with enriched content that combines the strengths of broadcasting and broadband communications networks. The exhibit presented examples of the hybridcast services that it will be technologically feasible in the near future.



Identity-Web Services Framework between Broadcasting and Communications

We are studying an identity verification sharing technology (Identity Web Service technology) with the goal of making personal services or members-only services easier to use for television service. This exhibit presented a framework in which a user can easily access communications services while watching a TV program.



Digital Watermarking System for Content Distribution over the Internet

To prevent copyright infringements such as unauthorized distribution of content, STRL is conducting research on a digital watermarking technology that embeds invisible information in video content. The exhibit demonstrated a technology that quickly detects such information embedded in live video streams sent over the Internet.



Context-aware TV User Interface

STRL is working on an advanced TV user interface incorporating context recognition technologies that can understand a viewer's circumstances and display content that may interest them. This exhibit showed how the interface maintains its awareness of the viewer and how it selects and presents appropriate content.



Secure Content Distribution Services

STRL is studying security technologies for secure and reliable content distribution via communications networks. The exhibited technology enables anonymous content viewing rights even while it utilizes the viewing history of the user.



Comment Analysis for Social TV Services

We are interested in developing social television services that will be able to analyze comments that viewers post while watching TV and use the results to offer services that may be of interest to them. The exhibit presented research on new virtual communication spaces, "virtual living rooms," where creative relationships can be built between viewers and between broadcasters and viewers.



Relevant Retrieval System for NHK Creative Library

The Relevant Retrieval System searches for archived video in the online NHK Creative Library by using content and image similarity retrieval technologies. Its search results are presented in an easy-to-understand manner.



CG Content Production Services using Cloud Computing

Research is advancing on CG video content production services using cloud computing, in which all of the processes, ranging from materials retrieval and TVML-based CG content production to live video streaming are handled on the server side. The latest research results were presented to show how end-users can easily produce CG video content on their PCs and mobile devices.



Super Hi-Vision (SHV)

Full-resolution Super Hi-Vision Camera System

STRL is working on a full-resolution Super Hi-Vision (SHV) camera that uses three image sensors, each with 33 million pixels. The exhibit displayed our latest prototype color camera that incorporates signal processing to improve picture quality and a transmitter small enough to be integrated with the camera head.



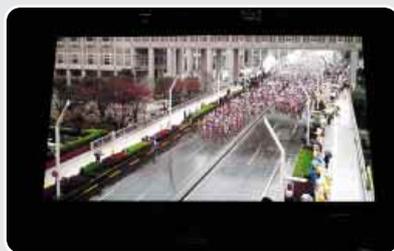
High-performance Super Hi-Vision Video Codec

Research is continuing on video compression coding technology for Super Hi-Vision (SHV) broadcasting. The exhibited device codes and decodes SHV signals in real time. 60p encoding and signal compensation is an efficient way to guarantee high picture quality.



Super Hi-Vision Theater

Visitors to the theater were treated to a program that combined vivid Super Hi-Vision (SHV) images by a prototype camera designed to be compact and easily handled with realistic three-dimensional sound produced on a 22.2 multichannel sound system. They also saw the first SHV video shot with our prototype full-resolution camera.



Cable Television System for Super Hi-Vision

STRL is proceeding with its research on Super Hi-Vision broadcasting for cable television. It has developed technologies for transmitting SHV on existing cable television systems that work by dividing up encoded SHV signals, which are larger than encoded Hi-Vision signals, and transmitting them as multiple high-frequency signals.



Optical LAN for Super Hi-Vision

Research continues on ultra-fast optical networks to transmit Super Hi-vision (SHV) signals between the studios, video servers, editing rooms, etc. in a broadcasting station. The latest prototype is capable of transmitting multiple uncompressed SHV signals in the dual green format over a single optical fiber.



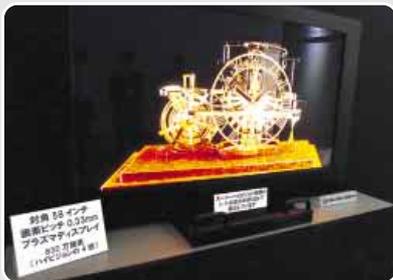
Lightweight Loudspeaker Using Polymer Films

We are conducting research on compact, lightweight loudspeakers, with the ultimate goal being a 22.2 multichannel sound system for a home Super Hi-Vision (SHV) system. STRL researchers invented a completely new type of loudspeaker that employs high-tensile-strength electroactive elastomer. This new type of loudspeaker has a wide frequency range (from 80 Hz to 15 kHz) and good sound quality.



58-inch Diagonal Ultrahigh-Definition Plasma Display with 0.33-mm Pixel Pitch

STRL is studying large ultrahigh-definition plasma display panels (PDPs) with the goal of realizing a home Super Hi-Vision (SHV) television system. Based on the guidelines obtained through gas-discharge simulations and PDP panel simulations, a prototype 58-inch ultrahigh-resolution PDP with a 0.33-mm pixel pitch was fabricated and exhibited.



Wide-gamut Colorimetry for Super Hi-Vision

The Super Hi-Vision (SHV) system is meant to convey an unparalleled sense of quality and realism. To make this possible, examinations are underway on choosing the appropriate video parameters for SHV systems. This exhibit introduced our wide color gamut video parameter proposal for faithfully reproducing more vivid colors than are feasible with conventional TV systems.



Home Reproduction of Super Hi-Vision Audio

We are conducting studies to enable highly realistic SHV audio presentations using only a few loudspeakers. By calculating the sound propagation characteristics of a listening area, we successfully reproduced 22.2 multichannel sound with only four or nine loudspeakers.



22.2 Multichannel Sound Production System

STRL is developing a sound production system that will make it easy to produce 22.2 multichannel sound for Super Hi-Vision (SHV). This exhibit presented new microphones and an audio mixer for the 22.2 multichannel sound system.



Integral Three-dimensional Television

Integral Three-dimensional Television

STRL is researching an integral three-dimensional (3D) TV system for future broadcasting. This system uses an array of micro-lenses to shoot and display stereoscopic images. We improved the quality of the reconstructed 3D images by increasing the lens positioning accuracy and making a distortion compensation for the projected images.



Digital Terrestrial Broadcasting

Channel Equalizer of Multipath Distortion for Community Reception Facilities

To ensure stable reception of digital terrestrial broadcasts, STRL is developing reception technology that is resistant to interference. This exhibit presented a new channel equalizer for use in community reception facilities. It eliminates the multipath distortion of received signals caused by long-delay multipath waves outside the guard interval (GI) of the OFDM signal.



Interference Canceller for Digital Terrestrial Broadcasting Receiver

A large number of transmitter sites are being installed for digital terrestrial broadcasting, and there is a danger that co-channel interference from them will occasionally disrupt signal reception. To solve this problem, we have developed a compact, low-cost digital interference canceller for use in community reception facilities and households.



Mobile Reception Technology for Digital Terrestrial HDTV Broadcasting

The reception area for mobile HDTV broadcasting is limited because of signal power drops and obstacles encountered along the movement route. This exhibit presented a mobile reception technology that expands the coverage area by using eight-branch space diversity reception and iterative decoding of error correction codes.



Mobile Multimedia Broadcasting in the VHF-Low Band

In 2009, the Information and Communications Council decided on the format for multimedia broadcasts on channels 1 to 3 in the VHF band (90 to 108 MHz), which will become available after analog television broadcasts end in 2011. Prototype receivers compliant with this format and conceptual service images were presented.



Large-capacity Transmission Technology for Next-generation Digital Terrestrial Broadcasting

STRL is researching ways of expanding transmission capacity to enable Super Hi-Vision (SHV) and other large-capacity content to be carried over digital terrestrial broadcasts. The combination of 'ultra-multilevel' OFDM technology and dual polarized MIMO technology makes it feasible to transmit four Hi-Vision (HD) programs on a single channel.



Robust Transmission Technology of Mobile Reception for Next-generation Digital Terrestrial Broadcasting

The next generation of digital terrestrial broadcasting will deliver stable Hi-Vision quality video signals to mobile terminals; even mobile phones on moving trains will be able to receive stable images. This exhibit introduced some of the robust transmission technologies for mobile reception in severe multipath fading environments.



Consultation Desk for Answering Your Questions about Digital Broadcasting Reception

Analog terrestrial and satellite TV broadcasts will end until July 24 2011 and be completely replaced by digital broadcasting. NHK is working to keep viewers informed about how to receive digital broadcasting, and it set up a booth to answer questions about digital broadcasting from visitors to the open house.



Human-friendly Broadcasting Services

Multi-modal Information Presentation System for the Visually Impaired

STRL is researching barrier-free information technology, which enables people with visual impairments to understand data broadcasts and utilize electronic program guides. This exhibit presented a multi-modal information presentation system that allows the user to select the information presentation format that best compensates for their specific impairment.



Translating Japanese into Computer-animated Japanese Sign Language

To expand Japanese Sign Language (JSL) broadcasting services, STRL is conducting basic research on technologies that will translate spoken-Japanese into JSL and automatically generate CG videos of JSL. Our Japanese-JSL dictionary for use in translating text into JSL and a high-quality, natural JSL CG video were on display.



Live Closed-captioning using Speech Recognition

We are researching speech recognition technology with the goal of enhancing closed-captioned broadcasting for the hearing impaired and elderly. In fact, automatic speech recognition is already being used to produce closed-captions for certain programs such as sports. The exhibit presented a compact, labor-saving closed-caption production system for live news programs.



Automatic Evaluation of Program Sound Balance for the Elderly

In line with STRL's goal to make broadcasting services easier for the elderly to listen to, we conducted hearing experiments on the audio portion of a program and developed a technology that automatically determines the optimal sound balance for elderly persons, based on the relationship between the loudness of the narration and the background sound (music and sound effects). This exhibit also presented a demonstration of how a person's sense of hearing changes with age.



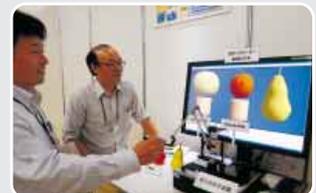
Automatic Detection of Unpleasant Scenes

Viewers of large-screen TVs may feel uncomfortable viewing certain scenes involving shaky camera shots and flickering patterns. This booth displayed STRL's ongoing research on technologies to automatically detect scenes that are likely to generate unpleasant sensations. These technologies are intended for the editing stage of program production.



Haptic Technology for Representing 3-D Objects

Research is underway on haptic technology in an attempt to create televisions that can transmit the sensation of touching a displayed object. Through the control of high-precision haptic devices, we have achieved a way of touching a virtual object with the palm and fingers.



Enhancing Production

Flexible Program Production System

This booth presented a distributed file system for storing massive amounts of program materials by distributing them to different broadcasting stations. It also featured a versatile program production system with which program editors can do their work on a web screen and access all the necessary materials by using distribution processing and long-distance file transfer technology.



Lighting Device Technology using Organic Light Emitting Diodes

We are working on developing white organic electroluminescence (EL) lighting equipment for program production that is low in energy consumption, gentle on the eyes, and does not use mercury. This exhibit included a compact base light and a caster light which was used in the television programs of the Vancouver Winter Olympics.



Millimeter-wave TV Camera

STRL is making progress on the millimeter-wave TV camera that uses radio waves to capture images of objects hidden by obstructions such as smoke or fog. The camera would be useful, for example, in making reports during disasters. The latest prototype has faster beam scanning and a higher frame frequency than the previous one.



Advanced FPU Mobile Relay System

STRL is conducting research to enhance the reliability of the 800-MHz band field pick-up units (FPUs) used in live broadcasts of marathons and other events. The exhibit featured MIMO-OFDM technology, which has double the transmission capacity of the conventional transmission technology while having the same bandwidth and link reliability.



The VFX World of "Saka no Ue no Kumo"

NHK's special drama, "Saka no Ue no Kumo (part 1)," broadcast in December 2009, employed many visual effects (VFX) to reproduce street scenes in Japan during the Meiji period and scenes from the First Sino-Japanese War and Russo-Japanese War. This exhibit introduced the video



production technologies used to make this program.

Next Generation Broadcasting Devices

Organic Image Sensor

The eventual goal of this research is to construct a small, high-quality color camera that will use a single-chip color image sensor with layered organic films instead of multiple image sensors and a prism. A recently fabricated prototype sensor with a small pixel size and increased number of pixels was on display at the exhibit.



HARP Imaging Device using Fiber Optic Plate

Work is advancing on an ultrahigh-sensitivity image tube that incorporates a fiber optic plate (FOP) as its substrate. The FOP can directly connect a HARP photoconductive film to an X-ray fluorescent screen or to an image intensifier sensitive to near-infrared light, and it can be used to improve the quality of science television programs and the performance of X-ray diagnostic equipment.



Flexible Organic Light Emitting Diode Display

Research is continuing on a thin, lightweight and flexible television display. We intend to make a bendable display that is easy-to-transport. STRL used a coating method to fabricate an organic TFT-driven organic EL panel and used it to make a high-resolution flexible display.



Recording System using Thin Optical Disks

STRL has been conducting studies on high-speed, large-capacity thin optical disks, with the goal of using them in a next-generation archive system. This exhibit showed a device technology that will handle flexible, soft, thin optical disks in the same way as current optical disks.



High-density Holographic Recording Technology

STRL has been studying holographic recording technology that can store huge amounts of data and record Super Hi-Vision (SHV) signals in the future. The exhibit showed an experimental system, which enlarged the numerical aperture of the object lens for recording and reproduction and has a light-focusing spot size that is less than a quarter the size of our 2009 prototype.



NHK Engineering Services

Licensing and Applicational Development of NHK's Technology

NHK Engineering Services, Inc. (NES) supervises the licensing of the patents and technological expertise resulting from NHK's research and development and supports R&D with a view toward contributing to society. NES presented some of NHK's patented technologies and devices under development.



NHK Museum of Broadcasting

Eighty Years of STRL Achievements

This exhibit highlighted STRL's work on television cameras and traced how cameras have evolved over the years. Starting with the iconoscope camera, continuous research and development of camera tubes and other equipment have led to higher quality and more compact models. This exhibit showed some of the cameras and camera tubes that have been used over the years.



Poster Exhibit

The poster exhibits gave detailed explanations about STRL's research. This year, guides gave short presentations for each poster. Many visitors had opportunities to listen to these presentations during the four days of the open house.

[Poster exhibit topics]

Delay Stabilization Method for Wireless Local Area Networks
High-performance Video Coding Technology
Estimating TV Viewers' Psychological State by using Multimodal Brain Function Imaging
High-quality Speech Synthesis Method for Definite Form Sentences
HARP Photoconductive Film with High Quantum Efficiency
Electret Charging Method for Vibration-driven Power Generator
Magneto-optical Observation of Magnetic Domain Structures
Improvement of Electrode Properties for Reducing Power Consumption of Plasma Displays
Vertical Organic Transistor with Low Voltage and High Current Operation
Light Modulation Device Driven by Spin Transfer Switching



STRL Open House Online

STRL provided live video streaming over the Internet of the lectures and research presentations from the Open House, as well as the on-demand streaming of video produced in TVML*.

Live video streaming using overlay network technology**

Live video streaming of lectures and research presentations was provided using STRL's overlay network technology, which is stable and requires no special software installation.

Exhibit-introduction video made by TVML

We presented on-demand video clips over the Internet that were produced using TVML and in which CG characters introduced the open house exhibition items.

*: TVML (TV program Making Language), a program production description language developed by STRL.

** : Overlay network technology: a technology that configures a new network by means of relaying signals among terminals over the Internet.