8K Super Hi-Vision

**Compact 120-fps 8K Super Hi-Vision Camera**
Various cameras are being developed with the goal of constructing a 120-fps 8K Super Hi-Vision video production system. This exhibition presented a compact camera that incorporates our new 33-megapixel 120-fps single-chip CMOS image sensor.

**Full-specification 8K Super Hi-Vision Production System**
We presented a new video production system for full-specification 8K Super Hi-Vision (120-Hz frame frequency, 12-bit bit depth, and wide-color-gamut colorimetry).

**Compact 8K Super Hi-Vision Recorder with Removable Memory**
A mobile compact video recorder will make it easier to produce 8K Super Hi-Vision programs. One of our systems being developed for this purpose was displayed, namely a compact video recorder equipped with a removable high-speed, high-capacity, solid-state memory pack.

**8K Super Hi-Vision Satellite Broadcasting System**
Our research continues on efficient video coding technology and large-capacity satellite transmission technology with the goal of launching 8K Super Hi-Vision test broadcasting in 2016. We exhibited a satellite broadcasting system that uses these two technologies.

**8K Super Hi-Vision Distribution Technology for Cable TV Networks**
We are conducting research to deliver 8K Super Hi-Vision (8K) broadcasting to subscribers’ homes via cable TV networks. This exhibit presented a technique capable of sending 8K signals over multiple channels.

**8K Super Hi-Vision Sound Reproduction with Display-integrated Loudspeakers**
22.2 multichannel sound is optimally reproduced using speakers arranged around the listener. To reproduce 22.2 multichannel sound in a typical living room that does not have space to install numerous speakers around the listening point, we are developing technology that mounts all of the speakers around the edge of the display.
Transmission Technologies for the Next Generation of Digital Terrestrial Broadcasting

We are researching large-capacity transmission technologies for the next generation of terrestrial broadcasting that will involve 8K Super Hi-Vision. This exhibition presented technology that enables mobile reception of multiple Hi-Vision TV programs over a single TV channel. This technology was the subject of long-distance transmission tests conducted in and around Hitoyoshi City, Kumamoto Prefecture.

MMT-based Transport Technology for Advanced Services in 8K Super Hi-Vision

MPEG-H MMT, a new media transport scheme to deliver content via both broadcasting and broadband, has been internationally standardized. This exhibit introduced MMT equipment including a transmitter and receiver and an example application for 8K Super Hi-Vision broadcasting.

Advanced Conditional Access System

We are researching the next generation of CAS technology, which will provide content rights protection and conditional access. This year’s presentation featured a new highly secure CAS that enables software updates to maintain and improve security.

Innovative Equipment for Promotion of 8K Super Hi-Vision

On exhibit were a baseband processor unit that can be combined with a commercial high-resolution cinema camera to provide simultaneous real-time output of 8K, 4K, and 2K video and a single-chip camera lens for 8K Super Hi-Vision.

133-megapixel Image Sensor

Research is continuing on constructing smaller 8K Super Hi-Vision cameras. We displayed a 133-megapixel image sensor that enables a single chip to capture full-resolution 8K Super Hi-Vision video.

Real-Time Spatio-temporal Video Format Converter

Advances are being made on an ultra-high-efficiency video transmission system capable of handling video signals with various spatio-temporal resolutions, ranging from 8K Super Hi-Vision to 2K Hi-Vision. We demonstrated a real-time video codec system based on a spatio-temporal video format converter that we had developed.

8K Super Hi-Vision “Theater Camera”

A wide variety of productions are ongoing to boost the line-up of 8K Super Hi-Vision (8K) contents. STRL has developed a new 8K “Theater Camera”, which has higher sensitivity to light and produces less audio noise.
8K Super Hi-Vision Theater

“Rigoletto” is a masterpiece of an opera by the great composer, Giuseppe Verdi. We presented a 10-minute highlight video capturing the best moments from Teatro alla Scala’s opera performance in Tokyo that celebrated the bicentennial of Verdi’s birth.

NHK’s Theater Camera was designed to have very quiet operation and high performance even in an underlit environment, and it captured one of the world’s most renowned operas in detail, from the extravagant costumes to each artist’s subtle signs of emotion.

This immersive theater built in the STRL auditorium featured a 33-megapixel high-resolution video system and a 22.2 multichannel 3D sound system to take the audience on a virtual trip to the greatest theater in the world.

Fusion of Broadcast and Broadband

Hybridcast for 8K Super Hi-Vision

Hybridcast is a platform technology for integrated broadcast-broadband services that offer new TV experiences to viewers. NHK launched its “NHK Hybridcast” TV service in September 2013. Hybridcast for 8K Super Hi-Vision (SHV) is also being researched. This exhibition presented an example of a service that takes advantage of the ultra-high resolution screen of 8K SHV to show a TV program together with various program-related information on the same display.

Technologies for Advanced Hybridcast

STRL has conducted research and development on the technical elements for an advanced version of Hybridcast to offer even more convenient and diverse services. This exhibition presented a system technology that enables third-party service providers other than broadcasters to provide cross-channel services and management technology for distribution of program-related data from broadcasters to third-party service providers.

Hybridcast

A booth was dedicated to NHK’s Hybridcast service launched in September of last year. It showcased current services offered by NHK and field trials conducted by commercial broadcasters.

Integrated Service by Broadcasting Stations and Internet Service Companies

Information about TV programs and commercials is shared through a diverse range of Internet services, including websites, smartphone apps, and social network services. This exhibit introduced service examples that aim to provide a broader range of richer and more convenient experiences through collaborations between broadcasting stations and Internet service providers.
Sign Animation Synthesis System Partially Introducing Facial Expressions
Research continues on a technology to translate spoken Japanese into sign language and produce signing computer graphic (CG) animation. The exhibited translation system combines presentations of facial expressions, which play an important linguistic role in sign language, with manual signs in its CG synthesis.

Tactile Presentation Technology to Convey 2D & 3D information
Our research on tactile and haptic presentation is aimed at conveying information on the shape and hardness of 3D objects such as works of art, together with 2D diagrams and graphs, to people with visual impairments. A haptic presentation system was on display to demonstrate how people can feel the shape and hardness of a scanned object with a sensation that is close to that of the original, together with a tactile presentation system that rapidly conveys diagrammatic information such as from a map.

Integral Three-dimensional Television
With the aim of developing three-dimensional television that can present natural 3D images without special glasses, we are conducting studies on integral three-dimensional TV systems. This exhibit showed how technologies for imaging and display make it possible to capture 3D images of any object and present higher quality 3D images.

Spatial Light Modulator Driven by Spin Transfer Switching
We are studying ultra-high-pixel-count, ultra-high-density spatial light modulators (SLMs) as a crucial technology for future holographic 3D televisions. We displayed a new spin-transfer switching SLM driven by an active matrix method.

Human-friendly Broadcasting Service
TV Program Navigation Based on Estimation of Viewer’s Interests
We are developing a means to assist our viewers in finding TV programs that will appeal to their individual interests. This exhibit featured TV program navigation technologies that estimate a TV viewer’s interests on the basis of her/his TV viewing behaviors and assist with more targeted program retrieval based on these interests.

Accuracy Improvement on Live Captioning System Automated by Speech Recognition
We are conducting research and development on speech recognition with the goal of expanding live-captioned broadcasting so that our TV programs can be enjoyed by a wider range of people, particularly those with hearing difficulties. Our exhibition introduced a new speech recognition technology that enables efficient live caption generation, even at a regional small broadcasting station.

Broadcast Technology No.57, Summer 2014 © NHK STRL
**Enhancing Production**

**Video Retrieval System Enabling to Searches by New Vocabulary**

We are conducting research that will enable efficient application of NHK’s archived video data. In particular, we are studying video retrieval technology that enables users to easily search for scenes of interest. The exhibited system has enhanced flexibility when it comes to making video queries; it searches not only by using manually pre-indexed keywords, but also by using new keywords.

**Privacy Preserving for Integrated Broadcast-broadband Services**

Although it is anticipated that the use of personal information will enhance integrated broadcast-broadband services, the privacy of TV viewers must also be protected. These technologies will ensure both the convenience and the security of such services.

**Underwater Visible Light Wireless IP Transmission Technology**

Advances are being made on visible-light wireless IP transmission technology to realize underwater live relay broadcasts. This exhibit introduced underwater wireless IP transmission technologies that can transmit stable video signals using visible light, even when signal attenuation or temporary transmission path interruptions occur due to objects floating in the water.

**TDD Bidirectional Digital FPU Enabling High-speed File Transfer**

Wireless links called FPU (Field Pickup Units) are used to send video materials for relay programs or reporting from a relay site to a broadcasting station. We have incorporated an interactive communication capability into the conventionally unidirectional FPU, and introduced new functions, including file-based video transfers and a return link to send broadcast video back to the relay site.

**Video News Gathering over Software Defined Network**

This research focuses on developing news gathering networks to allow broadcasters to gather footage from various sites and sources for prompt news broadcasts. This exhibit featured an IP network technology shared by multiple users to monitor network traffic and control transmission rates based on the importance of the video footage.

*SDN (Software Defined Network): a network that enables dynamic control and management of its configuration such as its transfer speed.*

**Professional Digital Wireless Microphone by OFDM System**

The wireless microphones that are used in broadcast program production are scheduled to be shifted to new frequency bands to conform to the reorganization of Japan’s frequency policy. To ensure a smooth transition, we constructed a new digital wireless microphone that provides stable and high-quality audio on the new frequencies. Our system has been adopted as a standard.
Utilization and Development of NHK’s Technology

NHK Engineering Systems, Inc. promotes the patents and technical expertise that NHK has acquired through its R&D activities. It also seeks ways to make contributions to society by passing on the benefits of broadcasting technologies to the general public. This booth presented some of NHK’s patents and results of ongoing research that are available for wider application.

Broadcasting Service

HD Video Stabilizer for High-resolution Camera Video
We have developed a video stabilizer that produces shake-compensated HD video with no quality degradation using a 4K camera. Using this equipment, shake-free HD video can be obtained without a large anti-shake device or special shooting expertise.

Big Data Visualization System
We exhibited a big data visualization system used in the NHK Special, Disaster Big Data. By exploiting the advantages of real-time computer graphics, we realized a more diverse range of TV productions, along with substantial mobility improvements through the on-location data confirmation capability, by running it on portable PCs.

Next Generation Broadcasting Devices

Flexible Organic Light-Emitting Diode Display
Research continues on a super-slim, lightweight flexible display for easy transport. Some of our element technologies aimed at constructing large displays for 8K Super Hi-Vision were on exhibit here, including an 8-inch-diagonal flexible display based on an inverted OLED, which is expected to extend the life-time of a display device.

CMOS Image Sensor Overlaid with Photoelectric Conversion Layer
We are studying ways to build new image sensors to improve the sensitivity of 8K Super Hi-Vision cameras. This year’s open house presented a CMOS image sensor with a photoelectric conversion layer and low-voltage operation capability.

Sound controller to make program sound more intelligible

Virtual studio using hybrid sensors

8K audio premium seat
NHK Museum of Broadcasting

The Tokyo Olympics in 1964 demonstrated to the world the height of Japanese broadcast technology and was also a golden opportunity for the Japanese TV industry to make its debut on the world stage. This exhibition featured equipment and footage from a relay broadcast of the Olympics, which was supported by the research and development conducted by the Institute of Technology (now the NHK Science and Technical Research Laboratories).

Digital Broadcasting Reception Consultation Desk

We welcomed questions related to digital broadcasting reception methods and home networks.

Interactive Exhibit

Haptic TV -Touch me if you can-
Participants shook a little bag while watching the TV screen, to feel the popcorn popping in the pan on TV.

Augmented TV
Visitors looked into the TV through an electronic tablet and enjoyed seeing the cartoon characters pop out of the TV.

Poster Exhibit

- Interactive Object Extraction Method for “Video Bank” System
- Improved Method for Measuring MTF of 4K/8K Cameras
- Effects of 3-dimensional Reverberation on Spatial Impressions in 8K Super Hi-Vision Sound Production
- Non-native Japanese Speakers’ Understanding on News Specific Expressions
- Estimating Subjective Mental State from Brain Activity Obtained During TV Viewing
- Directionality Control Method of Light Beam through Sub-micron Dielectric Structures
- 3D Integration Technology for Imaging Device
- Continuously Stacked Technology in Organic Image Sensors
- Viewing Behavior on Time Shift Zapping System of Years of Broadcasting Contents