Overview of NHK STRL

NHK Science & Technical Research Laboratories (NHK STRL) is the research arm of Japan's public broadcasting corporation, Nippon Hoso Kyokai (Japan Broadcasting Corporation). STRL was established in 1930, five years after NHK launched Japan's first radio broadcasting service. For over 70 years, it has specialized in research and development of broadcasting and related technologies. STRL will continue to promote broadcasting in the 21st century. Its new research facility was opened in April 2002.

Research Activities

STRL's overall goal is to facilitate the creation of new forms broadcasting. To do so, we feel it is important to study emergent technologies and to improve current broadcast technologies. Our activities range from fundamental research on human vision and audition, physics, and materials science to the development of complete broadcasting systems and services.

■ Advanced digital broadcasting

Digital terrestrial broadcasting was launched in the three major metropolitan areas of Tokyo,Osaka, and Nagoya on December 1, 2003. Along with digital satellite broadcasting, which started in 2000, this new form of broadcasting heralds a transformation in Japanense broadcasting. Research on advanced digital broadcasting is intended to provide broadcasting services that will enrich the viewer's cultural life. The research is focused on *integrated services television*, which spans the fields of broadcasting and communications and can be provided anytime the viewer wishes; *mobile & portable reception*, which can provide services anywhere; and *individualized human-friendly broadcasting services* which will enable anyone, even people with disabilities, to enjoy TV.

■ Contents production technology

Research into *'intelligent', efficient contents production* is meant to reduce the cost and to ease the technical burden of television program production that often limit the choices of producers and talent in creating new forms of audiovisual expression. Additionally, this research has yielded equipment for live broadcasting of breaking news, including super-sensitive cameras and small, lightweight devices for news gathering and transmission. This reflects NHK's responsibility as a public broadcaster to supply precise information to viewers to help protect lives and property in the event of a disaster.

■ Future broadcasting service and fundamental technology

Research on future media beyond the confines of ordinary television include an ultrahigh-definition video system with 4000 scanning lines (Super Hi-Vision) that outperforms HDTV in terms of picture sharpness and a 3D acoustic system. The development of *new transmission technology and frequencies* centers on the use of the frequency band allocated to broadcasting satellites (21 GHz and above).

Materials and devices research may lead to technological breakthroughs giving rise to radically new broadcasting services. Research topics include small ultrahigh-sensitivity image pickup devices, foldable displays, and very small, super-dense recorders that can record HDTV pictures for hours.

ORGANIZATION

NHK Science & Technical Research Laboratories

Planning & Coordination
Planning and management of research work, public relations, and international correspondence on research issues...

Networked Broadcasting Systems
Networked program production broadcasting systems and services...

Wireless Systems
Terrestrial/satellite digital broadcasting technology, wireless LAN technology...

Advanced Television Systems
Ultrahigh-definition video (Super Hi-Vision), 3D visual systems...

Acoustics and Audio Signal Processing
High-definition audio systems, acoustic signal analysis and coding, speech signal processing...

Visual Information Technology
Video compression, image expression...

Intelligent Information Processing
Metadata production and application, image recognition, media processing...

Human Science
Services for visual or hearing impaired, software agents, speech and language processing...

Advanced Broadcasting Devices
Ultrahigh-sensitivity and ultrahigh-speed imaging devices, and ultrahigh-density recording...

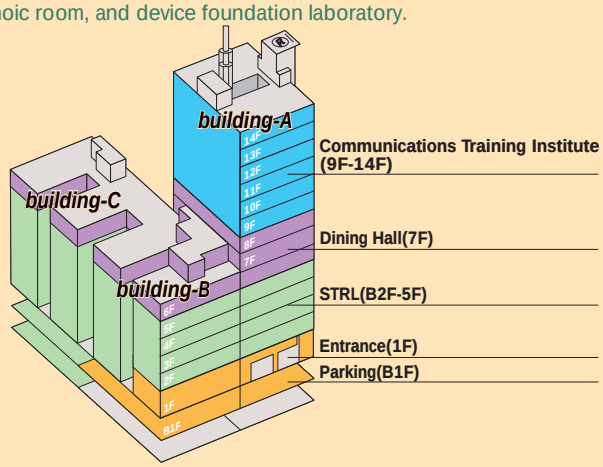
Materials Science
Materials for displays and recording devices...

General Affairs
Administration, accounting, and facility management...

Personnel: 286

RESEARCH FACILITY

STRL occupies the first five floors and basement of the NHK facility in Kinuta, Tokyo. The facility has a variety of special experimental laboratories, including an experimental studio, ISDB laboratory, acoustic-anechoic room, and device foundation laboratory.



Advanced digital broadcasting

Integrated services television

A broadcasting system based on home servers utilizes a receiver equipped with a large-capacity storage function and a communication function. It will promote diverse TV viewing styles, such as viewing programs at exactly the preferred time or retrieving only pieces of programs, by using metadata (program related information) provided by the broadcaster. We are conducting research on an essential part of integrated services television, which will provide new services that link broadcasting and the Internet.

Digital terrestrial broadcasting for mobile & portable receives

In the near future, digital terrestrial broadcasting will be receivable on cellular phones or portable TV receivers. Diversity reception technology will make it feasible for viewers in cars and trains to receive high-quality digital terrestrial broadcasting on a mobile terminal. For these kinds of reception, we are studying new network-linked data broadcast services that combine data broadcasting and information that has been obtained through a communications network.

Human-friendly digital TV

Digital broadcasting has a variety of forms, from textual data and diagrams to regular video and audio data. We would like to use exploit this diversity to provide human-friendly broadcasting services that would be accessible to everyone, including the elderly and people with physical impairments.

Tactile presentation

Content production technologies

Intelligent robot camera

Research on intelligent robot cameras continues with the aim of program production support and greater powers of expression. The robot camera has been programmed with the shooting technique of a professional cameraman, and it can shoot images with some of the finesses of a professional cameraman.

High-quality speech synthesis

This high-quality speech synthesis method creates natural sounding computer-generated speech. Its application possibilities range from automatic sound broadcasting, which automatically converts scripts into speech for radio, to automatic TV program generation combining CGs and synthesized speech.

Future broadcasting services

Ultrahigh-definition video system with 4000 scanning lines (Super Hi-Vision)

Imagine a future media defined by wide-screen images that can convey a much stronger sensation of reality to viewers, a sensation of being at the site of or actually in the broadcast. Imagine a video system that can display images with the quality of gravure printing. The ultrahigh-definition video system with 4000 scanning lines (Super Hi-Vision) is a pioneering effort towards such future media.

Advanced satellite broadcasting technology

Research continues on advanced 21-GHz-band satellite broadcasting to achieve a transmission medium that will provide television services that will succeed Hi-Vision (HDTV). Such satellite services will be prone to interruptions due to heavy rainfall and will require compensatory technologies to overcome the problem. We are studying of a 21-GHz-band mesh reflector and an algorithm that determines the required radiation pattern to compensate for rain attenuation based on actual rainfall conditions.

Materials and devices

Field emitter array image sensor with HARP target

An ultrahigh- sensitivity camera would be useful for the production of a variety of HDTV programs. It would vastly improve the quality of images shot at night. It would be particularly useful when reporting breaking news at night or when shooting images of nocturnal animals. To construct such a camera, NHK has been studying a new type of compact imaging device, called a field emitter array image sensor with HARP target.

Flexible ultra-thin displays

Digital broadcasting will increase the opportunities to watch television. For instance, it will be possible to receive excellent reception outdoors on mobile terminals. We want to create a durable display device suitable for such viewing styles, that is, a lightweight, ultra-thin display that can be rolled up. We are studying a flexible organic electroluminescent display (left) and a flexible liquid crystal display (right).

Small perpendicular magnetic recording disk

Digital terrestrial broadcasting will provide new services for mobile terminals. For these services, the mobile terminal will need a compact large-capacity storage device. Perpendicular magnetic recording disk technology is intended for such an application.