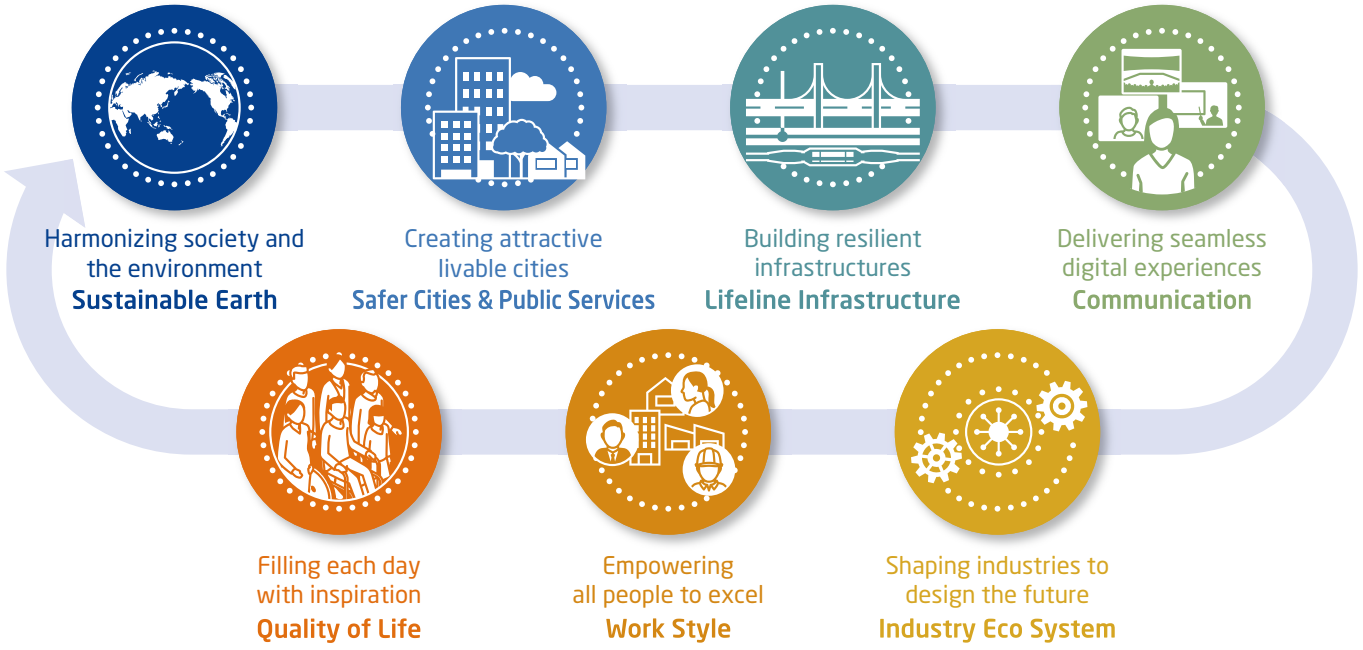
\Orchestrating a brighter world NEC

WISE VISION® Endoscopy

NEC has evolved AI technology for nearly half a century in a variety of fields

NEC has focused on the potential of AI for half a century, working on the evolution of technologies. Through co-creation with customers and partners, NEC will create new values to contribute to the realization of a brighter society that embodies the values of Safety, Security, Fairness, and Efficiency.

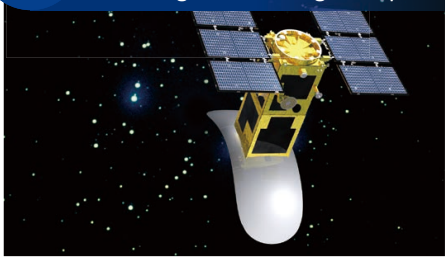
NEC's Seven Themes for Social Value Creation



Business based on "NEC's Seven Themes for Social Value Creation"

Sustainable Earth

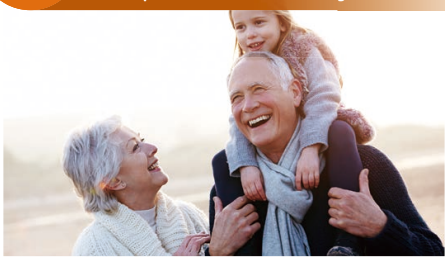
Meeting the Challenges inSpace



Since its involvement in ventures such as satellite broadcasting of international sport events in 1964 and the launch of Japan' s first artificial satellite "Ohsumi" in 1970, NEC has played a part in the launch of about 70 satellites. In addition, NEC also supplies all kinds of equipment for use in satellites all around the world and, in recent years, has been involved in initiatives such as the development and manufacture of "Hayabusa."

Quality of Life

Hospital Information System

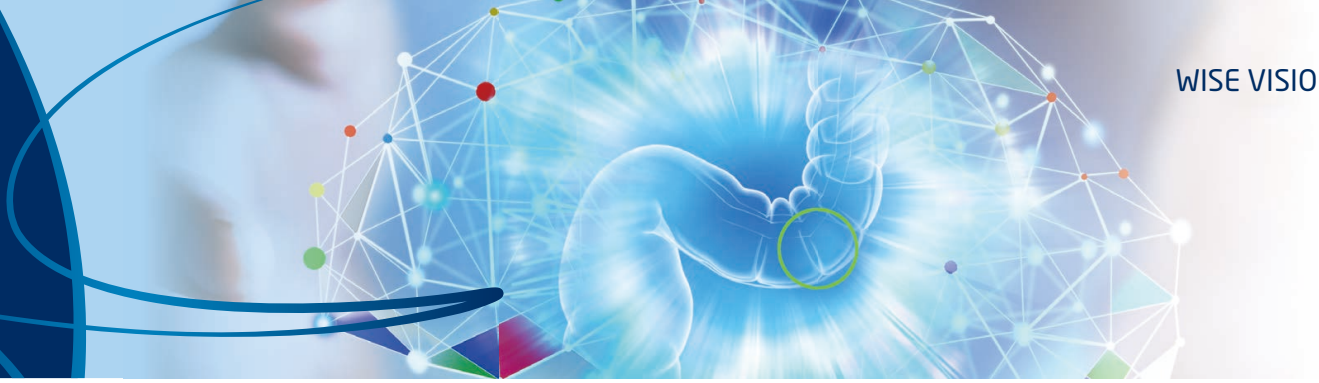


NEC has undertaken "enhancing the quality of healthcare" and "improving the work efficiency of medical practitioners" with ICT.
Since Japan' s first medical accounting system in 1966, NEC has supported the enhancement of information infrastructures at medical institutions by evolving systems for electronic medical records, regional medical network and hospital information.

Lifeline Infrastructure

Submarine Cables

Submarine cables laid by NEC are the basis of global communication infrastructures required for development such as 5G, IoT (Internet of Things) and AI.
As of June 2020, NEC has laid submarine cables exceeding a total span of 300,000 km, or 7.5 circumference around the Earth.



NEC's Unique Technologies

NEC has developed as many as six types of biometric technologies including facial recognition deployed in unique services. As a result, NEC has a reputation as the No.1* or Only 1 in the fields of "visualization," "analysis" and "Control and Guidance." Through our advanced AI technologies branded as "NEC the WISE" , such as image/video recognition, language/meaning comprehension, and forecasting/predictive detection, NEC will contribute to the problem solving and the creation of new innovations.

Biometric Research and Development spanning over 50 years

NEC has six types of biometric authentication technology (Facial, Iris, Fingerprint, Palmprint, Finger Vein, Voice and Otoacoustic Recognition), all of which are either world-class or original technologies.

1800 AI Researchers

NEC AI researchers from multi countries work hard pouring their energy in research and develop ment of new technologies.

Facial, Iris and Fingerprint Recognition Ranked No. 1

The accuracy of NEC' s fingerprint authentication technology has been demonstrated as No.1, a total of eight times since 2007,our Facial Recognition technology has been demonstrated as No.1 a total of five times between 2009 and 2019, and Iris authentication technology has hailed No.1 in 2018.

70 Countries around the World

NEC biometric authentication systems have been introduced in 70 countries around the world. (In safety field of government and police, or logistics and financial industry.)

*: Ranked No.1 in various technology evaluation content benchmarking by the NIST (National Institute of Standards and Technology) in US.

Projects utilizing NEC's Unique Technologies

Safer Cities & Public Services

Lisbon Intelligent Management Platform with AI

To improve the QOL of the citizens and enhance urban security, Lisbon City in Portugal and NEC have collaborated to build a smart platform. The platform collect, analyze and manage data from local governments and more than 30 public and private institutions in an integrated manner. As a part of that, NEC' s AI/ IoT technologies support detecting illegal parking and suspicious objects by collecting and analyzing real-time data within the city.

Quality of Life

Vaccination for children - Applying a NEC's authentication technology

Given the sad fact that 20 million children cannot receive a basic course of vaccines, it is required to verify their identity and manage the history of vaccination for each individual. NEC is working with Gavi, the Vaccine Alliance, and Simprints to solve this problem. NEC has developed a fingerprint authentication system that achieved high identification rate for children' s fingerprints.

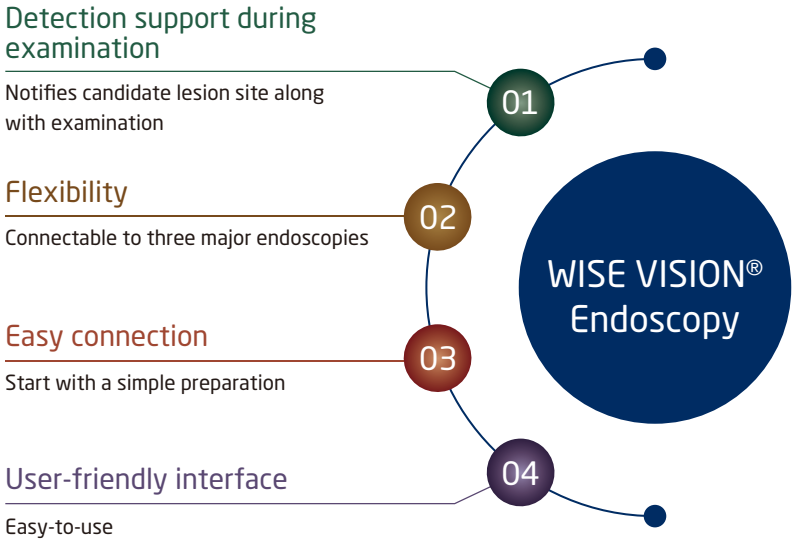
Our next challenge with AI technology is in "Healthcare"

WISE VISION® Endoscopy

The journey for AI in Endoscopy begins

System Development embodying the Goal of "Supporting Healthy Human Life"

Contribute to medical care by utilizing ICT, NEC aspires to support "Quality of Life" to promote healthy human lives. NEC has developed an AI system to be used together with an endoscope and support in detecting early-stage colorectal cancer and precancerous lesions. The system supports detection of lesions and incorporates a user-friendly interface and simple operation.



01 Detection support during examination

Supports lesion detection by pointing to candidate lesion sites during examination

NEC's Facial Recognition Technology

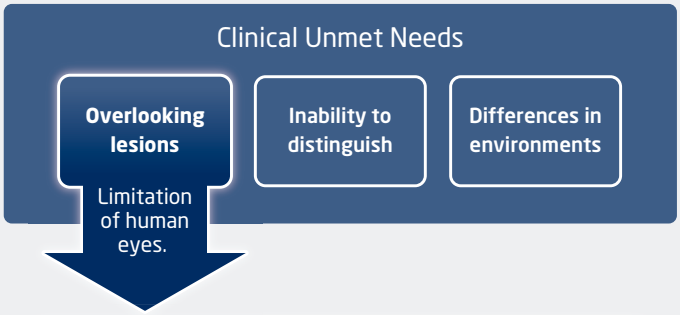
To realize smooth video authentication, NEC incorporates deep-learning technology applied to facial comparison, enabling enhancement of performance (robustness) that maintains high accuracy even for different facial directions or far from the camera. This results in the top ranking in video facial recognition performance evaluation by the U.S. National Institute of Standards and Technology.
The idea of possibly being able to distinguish the different "faces" of cancer resulted in application of this technology to notify candidate lesion.

Clinical unmet needs in Colonoscopy

An important aspect of the colonoscopy exam is to identify potential lesions. It has however been reported that up to 24% lesions are missed during exams*1 due to multiple factors:

1. Location. Some of them are not easy to spot for the human eye
2. Experience. Some lesions are more difficult to identify for less experienced endoscopists
3. Exam repetition. Focus and concentration of the endoscopist is reduced after performing multiple procedures one after the other.

Further reports indicate that 6% of the patients which had a colonoscopy are later diagnosed with colorectal cancer. Within this 6% group it has been found that in 58% of the cases cancerous lesions were not detected*2.



Expertise in Image authentication
NEC's AI can support solving these problems!

The arrival of the Artificial Intelligence

*1: Rex DK, Cutler CS, Lemmel GT, et al. Colonoscopic miss rates of adenomas determined by back-to-back colonoscopies. Gastroenterology. 1997;112(1):24-28.

*2: Samadder NJ, Curtin K, Tuohy TM, et al. Characteristics of missed or interval colorectal cancer and patient survival: a population-based study. Gastroenterology. 2014;146(4):950-960.

Why NEC entered the medical device field?

NEC uses its strength in cutting edge technology like AI to provide a wide range of advanced solutions to various healthcare services such as electronic medical record systems, data utilization systems and regional medical network.

As part of these technology driven initiatives NEC has now developed an endoscopic imaging analysis AI which aim to improve detection of early stage colorectal cancer.

Collaboration with the National Cancer Center Hospital (NCCH)

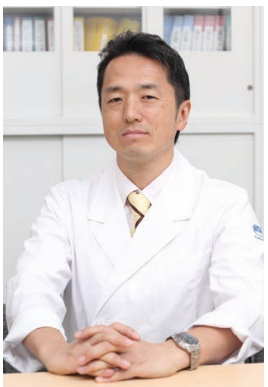
While the National Cancer Center Hospital (NCCH) in Japan continues to provide a high standard of cancer treatment, it is also a leading hospital that promotes a wide range of research and development including clinical trials and close collaboration with research institutes. The strong desire to share knowledge and the combination of our efforts is what led to the introduction of this new innovative technology into the field of Endoscopy.

"We aspire to provide support for endoscopists to eradicate advanced colorectal cancer"

Colorectal cancer is one of the few cancers that has been proven to have a mortality rate which can be reduced just by undergoing one colonoscopy in a lifetime. It has been pointed out that increasing the adenoma detection rate (ADR) has a correlation with the decrease in the number of cancer and so it is logical to provide patients with endoscopies of the highest quality possible.

As a result we believe that enhancing the detection of neoplastic lesions not only helps endoscopists but also improves the level of support given to patients. It is important to ensure that the examinations are painless and with the less discomfort as possible to create an environment where patient would be willing to undergo endoscopies.

It's our hope to further expand the use of endoscopies around the world in the fight against cancer.



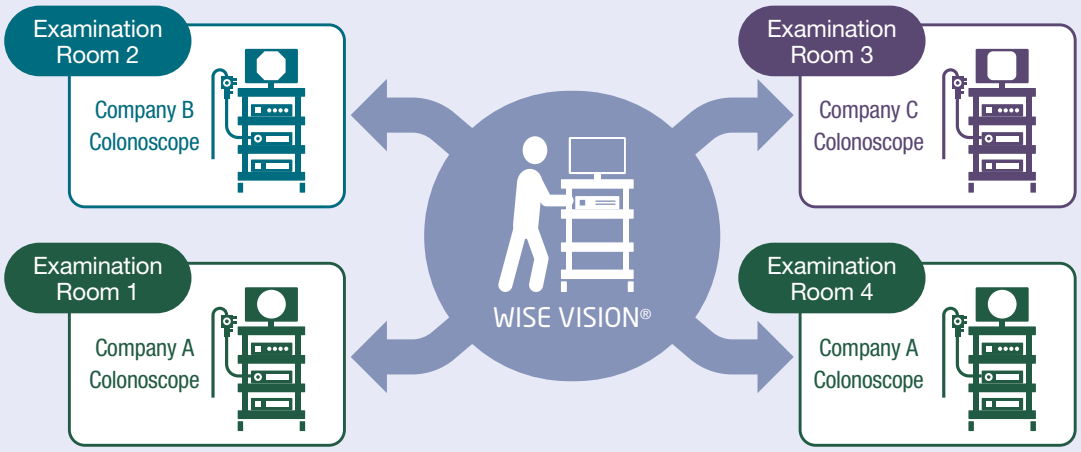
National Cancer Center Hospital
Director of Endoscopy Center,
Chief of Endoscopy Division
Dr. Yutaka Saito

AI developed to support endoscopic procedures
“Easy to use and easy to connect”

02 Flexibility

Connectable to the major endoscopies*

WISE VISION® Endoscopy can be connected to the endoscopes of three major companies. You can use your own endoscopes. Once the examination completes, simply disconnect the SDI cable. AI-supported colonoscopies can be performed in any endoscopy room in the hospital.



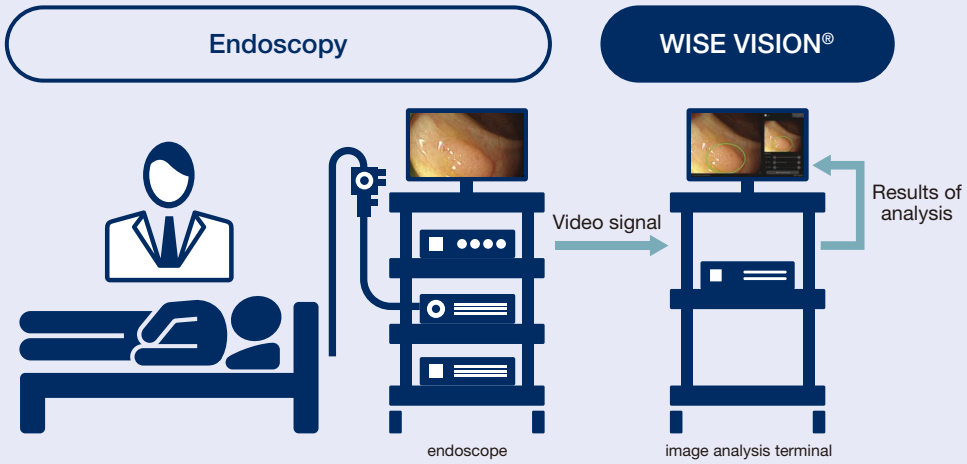
*: Endoscopes of three major companies

- OLYMPUS EVIS LUCERA ELITE Video System Center CV-290
- FUJIFILM ELUXEO video processor VP-7000
- PENTAX Medical OPTIVISTA EPK-i7010 video processor

03 Easy connection

Start with simple preparations

Turn on the endoscope and connect the SDI cable to the image analysis terminal.
Then, turn on the image analysis terminal and monitor to complete the simple setup.



*: The photo is an installation example.

04 User-friendly interface

Easy-to-use

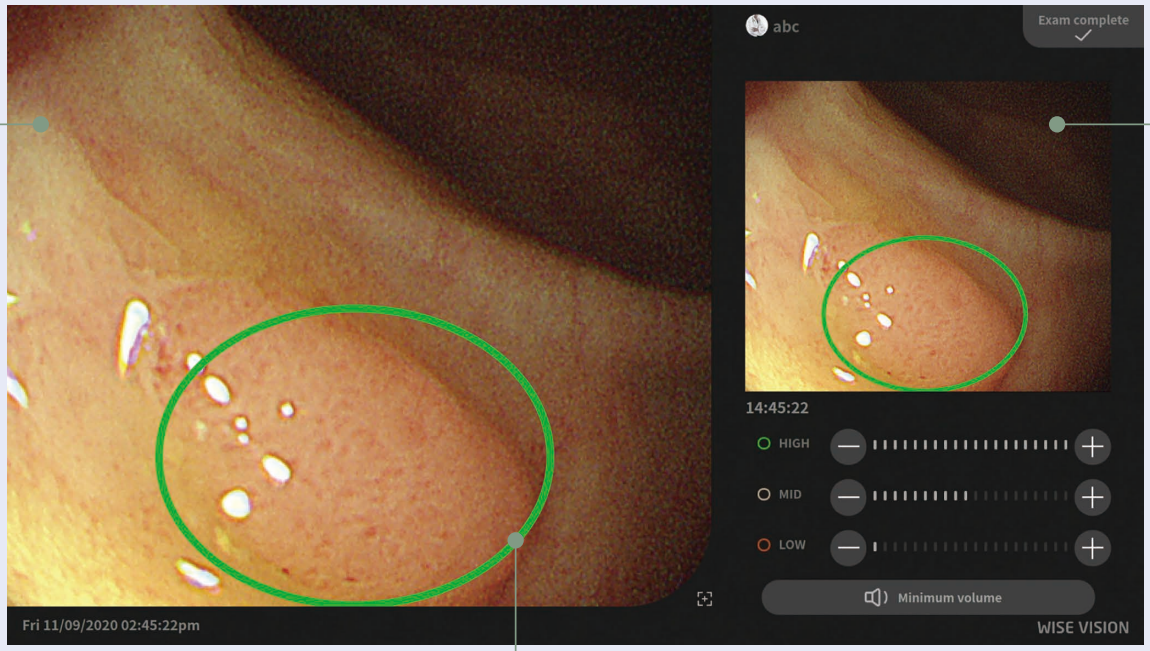
WISE VISION® Endoscopy marks potential lesions and notifies by sound. Notification sound, volume and marker colors can be freely customized at any time. The high-visualization user interface enables intuitive operation to ensure a stress-free examination procedure.

Image Analysis Field

Video signals from the endoscope are analyzed and displayed.

Analysis History

Results of analysis and marking times are displayed as a history.



Candidate Lesion Position Mark

The positions of candidate lesions are marked with a circle on the video image displayed in the image analysis field.

Volume Adjustment Field

The volume can be adjusted based on users' preference.

Professor Pradeep Bhandari
Consultant Gastroenterologist & Director of Endoscopy Research, Portsmouth Hospitals University NHS Trust

Expectations of AI to open up the Potential of Endoscopy

Endoscopy was developed as a diagnostic specialty but we are slowly noticing that it has moved on from just being diagnostic to now also playing a huge role in therapeutics. I feel that we are starting to push the boundaries and so we are seeing a lot more interest in the use case of endoscopy. In this effort to push for progress I personally see the addition of AI technology as a valuable tool which will definitely improve the potential of endoscopy even further.

Specifications

- Image Analysis Terminal

CPU	Intel Xeon W-2125
Memory	64 GB or more
Storage	512 GB or more on SSD
Graphic board	NVIDIA Quadro RTX5000 (2)
Capture board	Blackmagic Design DeckLink Mini Recorder (SDI input terminal)
Optical drive	DVD drive capable of reading DVD-R (Single/Dual layer)
Standard compatibility	Compatible with IEC 60950 or IEC 62368-1

- Cable connecting the Image Analysis Terminal and Monitor

Specifications	Display Port cable

- Monitor

Resolution	1920 × 1080
Color reproduction	Color display
Standard compatibility	Compatible with IEC 60950 or IEC 62368-1

- Speaker

Specifications	Any voice output device

- Cable connecting the Endoscopic Examination Device and Image Analysis Terminal

Specifications	HD-SDI or 3G-SDI cable

The arrival of next-generation technology

WISE VISION®

Contact

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