国立研究開発法人
情報通信研究機構
National Institute of Information and Communications Technology

Advanced ICT Research Institute

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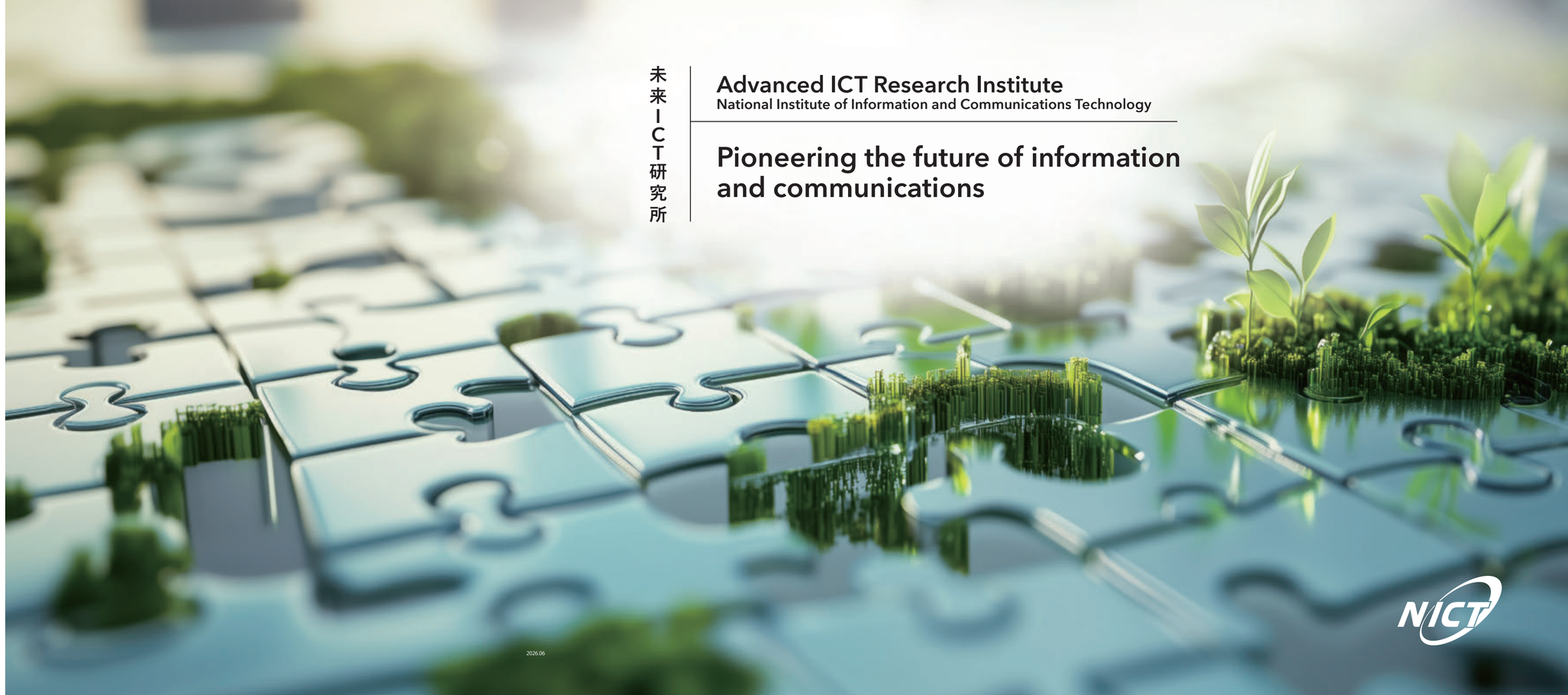


未来ICT研究所

Advanced ICT Research Institute

National Institute of Information and Communications Technology

Pioneering the future of information and communications

2026.06

Pioneering the future

Advancing the possibilities of information and communication with novel technologies

With ideas and technologies unconstrained by conventional concepts, we create new value in information and communications and foster innovation that will support the next era.

Information and communications technologies are a foundation that supports our society in many ways.
To further expand their possibilities, we have been working to create new technologies and systems from perspectives unconstrained by conventional frameworks.
Our goal is not merely technological development, but innovation that is utilized in society and contributes to the future. We aim to create and develop innovation with this in mind.

Creating, developping, and connecting to the future.

We “create” research, “develop” technology, and “connect” them to society.
Through the circulation of people, technologies, and knowledge, the Advanced ICT Research Institute continues to transform the possibilities of information and communications into the power for society.

Initiatives that broaden the scope of ideas

Through research that transcends disciplinary boundaries, we are working to create new ideas and foundational technologies that will lead to next-generation ICT.

Toward technologies that can be applied in society

We aim to connect research results to technologies useful in society and realize ICT that supports a safe and secure future society.

Building mechanisms that lead to the next

We are advancing the development of mechanisms to accumulate and share research results, and to expand them into subsequent research and social implementation.

Learn more about
the Advanced ICT Research Institute

Five years of Progress

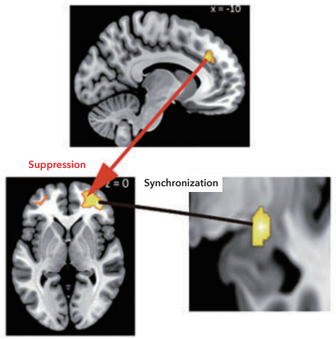
Accumulative research effort in development and social implementation

Since the 5th Mid- to Long-Term Plan,
the Advanced ICT Research Institute has engaged in cutting-edge research and development that forms the foundation of next-generation ICT under a three-site structure.
We have also actively engaged in cross-disciplinary research, steadily creating new ideas and technologies while connecting those results to society.

Explore our Research Highlights

New ICT Inspired by Life and the Brain

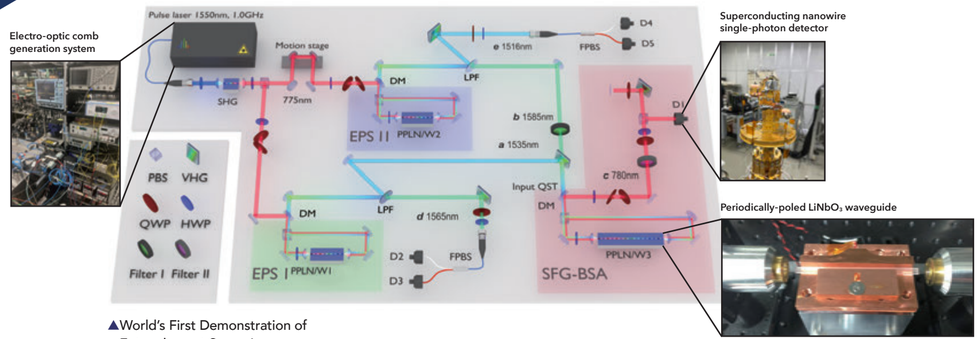
Research outcomes are emerging that open new possibilities for information processing and communications by drawing on mechanisms of biological systems and the brain.



▲Elucidation of the Mechanism Suppressing Unfair Judgments in the Brain

Next-Generation Communications and Quantum Technologies

Research on terahertz-band, quantum communication, and quantum computing technologies to support the future of ICT.



▲World's First Demonstration of Entanglement Swapping Using Sum-Frequency Generation Between Single Photons

Creating advanced technologies that connect to society

Efforts are underway to apply research outcomes to solving social issues and practical implementation.

▲Deep-Ultraviolet LED System for Rapid and Safe Inactivation of Airborne Viruses in Large Spaces

Major Awards and Honors

Maejima Hisoka Award (for outstanding research achievements in the field of information and communications)
Telecommunications Advancement Foundation Award
The Japan Society of Applied Physics Outstanding Paper Award, among others

The progress in the last five years has laid a solid foundation to open up the future.

From now on, we will continue forward toward our next challenges.

Research Locations and Organization

A vision under the 6th Mid- to Long-Term Plan to open up the future of information and communications

Under a system in our three sites
in Kobe, Tokyo, and Osaka, which work in close coordination,
we are advancing research and development
in advanced convergent fields
and expanding its outcomes into society.

Learn more about our institute

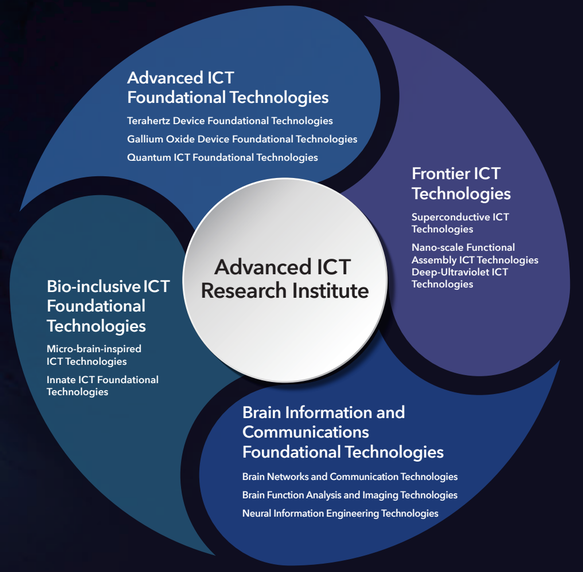
By leveraging the expertise
and regional strengths of each site
and linking them together,
we are creating new value.

KOBE
588-2 Iwaoka, Iwaoka-cho, Nishi-ku, Kobe-shi, Hyogo 651-2492,Japan

OSAKA
1-4 Yamadaoka, Suita-shi, Osaka 565-0871, Japan

TOKYO
4-2-1 Nukui-Kitamachi, Koganei-shi, Tokyo 184-8795, Japan

Opening up the future through four technology fields



Under the research structure that transcends fields and centers, we are advancing research that leads into the future.

Research Organization of Advanced ICT Research Institute

- Director General
- General Planning Office

KOBE

- Kobe Frontier Research Center
  - Superconductive ICT Device Laboratory
  - Nano-scale Functional Assembly ICT Laboratory
  - DUV ICT Device Laboratory
- Bio-ICT Collaboration Center
  - Bio-ICT Laboratory
  - Neuro-ICT Laboratory

TOKYO

- Koganei Frontier Research Center
  - Planning Office
  - Terahertz ICT Device Laboratory
  - Green ICT Device Laboratory
  - Quantum ICT Laboratory

OSAKA

- Center for Information and Neural Networks
  - Planning Office
  - Brain Networks and Communication Laboratory
  - Brain Function Analysis and Imaging Laboratory
  - Neural Information Engineering Laboratory

KOBE

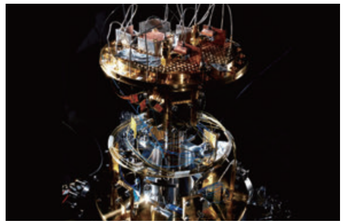
At the Kobe site, we conduct research and development on new foundational technologies for information and communications, as well as advanced convergent research fields that incorporate perspectives inspired by biological phenomena, neural activity, and nature.

Frontier ICT Technologies

Advanced research that challenges new fields

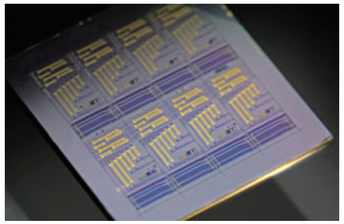
Kobe Frontier Research Center

We are promoting the technology fields positioned in the Mid- to Long-Term Plan, including superconductive ICT, nano-scale functional assembly ICT, and deep-ultraviolet ICT.



Superconductive ICT Device Laboratory

We are advancing research and development of superconducting devices that will support future ICT— such as detectors, qubits, and integrated circuits—based on high-quality nitride superconducting thin films and junction technologies.



Nano-scale Functional Assembly ICT Laboratory

Research on next-generation communications that are ultra-high-speed, low-power, and broadband, with nanoscale structural control and functional integration as core technologies.

DUV ICT Device Laboratory

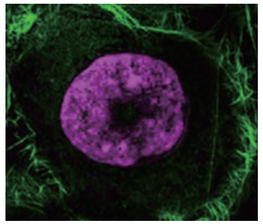
Research on the creation of new communication and sensing technologies that are difficult to achieve with visible light or radio waves, based on research on deep-ultraviolet light devices.

Bio-inclusive ICT Foundational Technologies

Next-generation ICT foundations inspired by living organisms

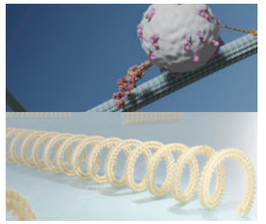
Bio-ICT Collaboration Center

From the perspective of connecting biology and ICT, we are working to create information and communications technologies that are attuned to people, living organisms, and the environment through research on the acquisition and processing of biological information and on interface technologies.



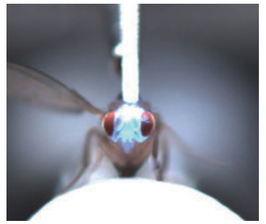
Bio-ICT Laboratory Cell Biology Project

We develop technologies for measuring and controlling cellular information that connects biology and ICT, aiming to create ICT that leverages biological information.



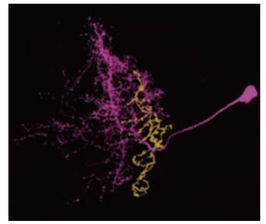
Bio-ICT Laboratory Protein Biophysics Project

By uncovering the mechanisms behind the sophisticated functions of biomolecules and biological systems, we strive to drive innovation in ICT.



Neuro-ICT Laboratory Neuro-network Evolution Project

Inspired by the tiny insect brain, which achieves sophisticated information processing with minimal energy through compact and efficient circuitry, we aim to create a new paradigm for energy-efficient ICT.



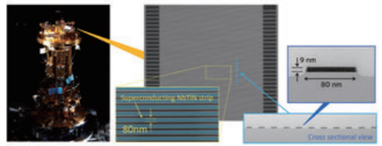
Neuro-ICT Laboratory Memory Neurobiology Project

We are trying to establish basic mechanism of memory in the brain to develop brain-inspired ICT with improved energy efficiency.

Research Seeds

One nanometer (nm) is one ten-millionth of a centimeter. In a world too small to see with the naked eye, new possibilities for information and communications are emerging.

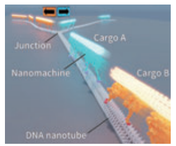
Superconducting single photon detector (SSPD) system →



Research Seeds

Cells exchange information using molecules such as proteins and DNA. By learning from the information-processing mechanisms found in living organisms, we are expanding the future of information and communications.

Schematic illustration of two types of nanomachines sorting "cargo" on a Y-shaped DNA nanotube. →



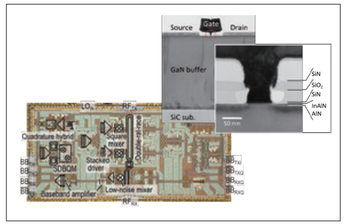
TOKYO

Advanced ICT Foundational Technologies

Evolving the foundational technologies that support information and communications

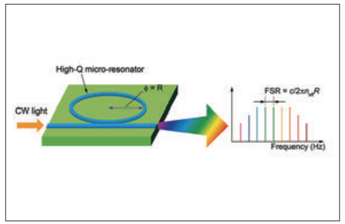
Koganei Frontier Research Center

Building on advanced technologies such as quantum and terahertz technologies, we are advancing research on devices and network infrastructures that support next-generation information and communications and cyber-physical systems.



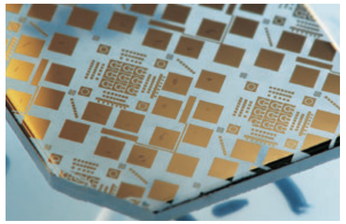
Terahertz ICT Device Laboratory
Terahertz Electronics Project

Research and development of core technologies, focusing on beam control and device technologies, toward the practical application of terahertz wireless communications.



Terahertz ICT Device Laboratory
Terahertz Photonics Project

Research and development of efficient signal source technologies supporting terahertz wireless communications for future ultra-high-speed, high-capacity communications.

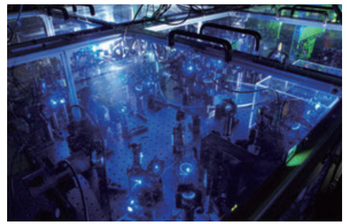


Green ICT Device Laboratory

Focusing on device technologies utilizing wide-bandgap materials such as gallium oxide, we are researching high-frequency devices capable of stable operation even in harsh environments.

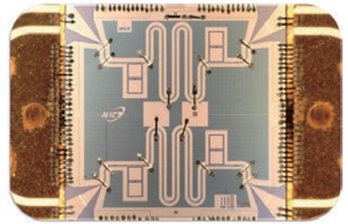
Quantum ICT Laboratory
Quantum Security Project

Research and development of space quantum communications, including satellite quantum key distribution, toward long-distance quantum communications and networking.



Quantum ICT Laboratory
Quantum Node Project

Research and development of quantum node technologies connecting multiplexed photonic quantum systems and heterogeneous quantum systems for the realization of a quantum internet.



Quantum ICT Laboratory
Macroscopic Quantum Physics Project

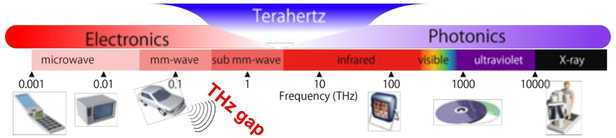
Research and development of foundational technologies for superconducting quantum circuits and optical fiber connections toward the realization of quantum interfaces.

Research Seeds

Terahertz waves are electromagnetic waves that occupy the region between radio waves and light, at frequencies from 100 GHz to 10 THz. This range is an unexplored frequency band that has not yet been much utilized. Generally, higher-frequency waves have higher directivity and exhibit larger attenuation in the air than lower-frequency waves. Therefore, terahertz waves have different properties from those of microwaves of up to 30 GHz, such as Wi-Fi, which have been used so far. Also, as terahertz waves can convey a large amount of data due to their high frequency, they are attracting much attention from the high-speed, large-capacity wireless communications field.

Millimeter- and terahertz-wave wireless applications →

Millimeter- and terahertz-wave wireless applications（Advancing fundamental technologies to utilize extremely high frequency）



OSAKA

Brain Information and Communications Technologies

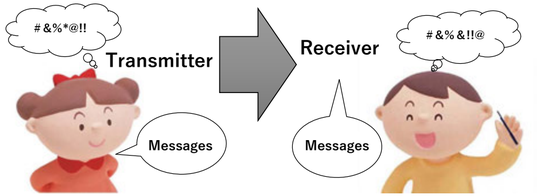
New research connecting people and information and communications

Center for Information and Neural Networks (CiNet)

We work to realize new information and communications based on an understanding of human brain functions by integrating the measurement and analysis of brain activity, behavior, and mental states with ICT.

"Omoroi" is a sense of excitement that goes beyond a single word — attractive, cool, and even a bit sexy.
We conduct new research that connects people and info-communication to create that kind of inspiring experience.

Information exists in the brain



Information in my brain

Information recalled in your brain

We aim to enable communication that leverages senses shared across all people, by building mechanisms to compensate for missing information based on our brain model.

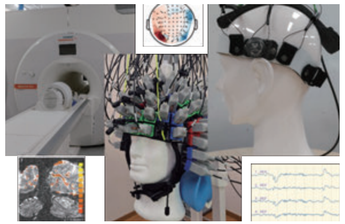
Research Seeds

In our daily lives, we rely on brain functions such as sensing, thinking, and acting. Understanding how the brain processes information is opening new possibilities for information and communications.

Measurement | fMRI measurement →

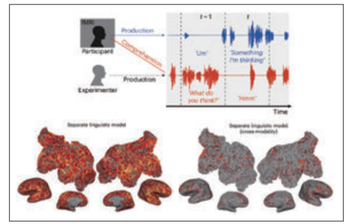
Brain Networks and Communication Laboratory

We aim to elucidate brain mechanisms underlying visual perception, spatiotemporal cognition, and motor control; through modeling, we are developing technologies to improve and support these functions, with the goal of implementing them in society.



Brain Function Analysis and Imaging Laboratory

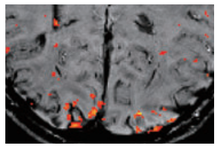
We work to understand human behavior and mental states by acquiring and analyzing multimodal brain activity data, using brain-measurement devices ranging from large-scale neuroimaging systems to compact measurement devices suitable for everyday environments.

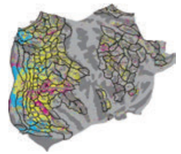


Neural Information Engineering Laboratory

We conduct research on technologies that support improvements in well-being by applying outcomes of brain activity measurement and modeling to ICT while being attentive to human activities and mental states.

Visualization | (L) Visualization of brain activity (R) Representation of different attentions →





MESSAGE from the Director General

At the Advanced ICT Research Institute, we pursue a broad range of research - from fundamental studies to applied research - to open up the future of information and communications technologies.

By bringing together knowledge from diverse fields, including physics, device technologies, life science, and brain science, we aim to create new information and communications technologies that are friendly to people and society. We also believe that collaboration among industry, academia, and government is essential for bringing research results into society.

Let us open up together the future of information and communications and create a prosperous, safe, and secure society.

Director General **Shukichi Tanaka**

Industry-Academia-Government Collaboration Initiatives

As a hub for industry-academia-government collaboration in advanced convergent fields, we are promoting research and development, and returning its results to society.

Collaborative Research

By making use of various programs and frameworks, we promote research and development through collaborative research with universities, research institutes, and companies.

Affiliated Graduate School Programs

Through research collaboration agreements with universities, we promote research and development, personnel exchange, and the acceptance of students.

Facility Tours

As part of our outreach activities, we accept visitors for facility tours.

Facility Tours

Human Resource Development

We are committed to developing the next generation of talent, including by cooperating with activities at Super Science High School (SSH)-designated schools. We also promote cooperation with nearby high schools as part of our educational partnerships.

Advanced ICT Device R&D Promotion Center

We are developing open research and environment where researchers from Industry-Academia-Government collaboration, leveraging advanced fabrication and measurement facilities for ICT devices.

Kobe Clean Room Facilities

Information Picked Up Events

We hold and participate in such as the following events

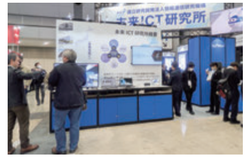
Annual Schedule

June	NICT Open House TOKYO
July	Advanced ICT Research Institute Open House KOBE
September	International Frontier Industry Messe KOBE
Around November	CiNet Symposium TOKYO
Around December to January	nano tech International Nanotechnology Exhibition and Conference TOKYO

For more details, please visit our website.

Advanced ICT Research Institute
https://www2.nict.go.jp/advanced_ict/en/

Open House

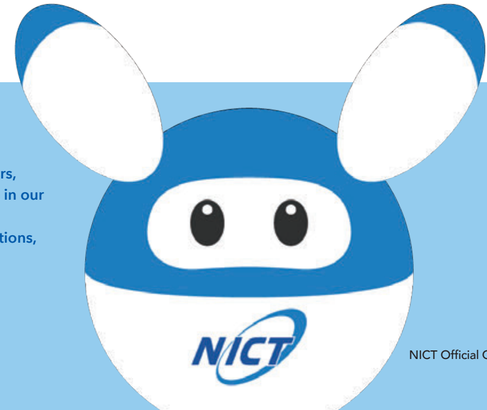


nano tech Exhibition Booth

Be Part of Our Research

At the Advanced ICT Research Institute, we welcome researchers, engineers, students, and other talented individuals to take part in our research activities.
If you are interested in the field of information and communications, please visit the recruitment page on website of NICT.

Learn more about opportunities to get involved
https://www2.nict.go.jp/employment/researcher/en/



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