NICT NEWS

National Institute of Information and Communication Technology

For Young People

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Vol.506

Welcome to the Future

NICT is creating our future.

Welcome to the Future

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We’re NICT, a national research institute pioneering advancements in information and communication technology.
Our work spans exciting fields like next-generation mobile communication, cybersecurity, AI, and quantum technologies.
What you think of when you hear the words “information and communication” is just the beginning when it comes to our work.
Our mission is to forge a future where society is safe, secure, comfortable, and convenient.
We are crafting tomorrow, today.
Let us show you what the future holds.
Welcome to the future.

Check out our promotional videos

"The Future with N" and "NICT Station"
(Narration in Japanese by Japanese actress KAMISHIRAISHI Mone.)

The Future with N (Subtitles in English)

NICT Station (No Subtitles)

The Future Created by the Radio Research Institute

The Radio Research Institute conducts research and development at three research centers to effectively utilize the electromagnetic waves that support our daily lives. The Radio Propagation Research Center conducts research and development on remote sensing technology that uses optical and radio waves to instantly monitor the atmosphere and ground surface over a wide area from a distance, and on monitoring. The center also conducts research and development on monitoring and forecasting the space environment, including space weather forecast services.

The Electromagnetic Standards Research Center is dedicated to research that focuses on measuring the electromagnetic environment created by our home appliances and communication devices in our daily lives. It also focuses on ensuring our safety through human body numerical models, and on generating and disseminating Japan Standard Time (JST) as an essential service for information technology. The center also develops cutting-edge atomic clocks as well.

The Applied Electromagnetic Research Center promotes research and development aimed at manufacturing diffractive optical elements using digital hologram printing and establishing precision optical measurements in the real world using holograms.

The Radio Research Institute aims to realize comfortable and smart living in the real world and enable highly accurate future predictions by using electromagnetic waves to accurately understand natural phenomena and social conditions.

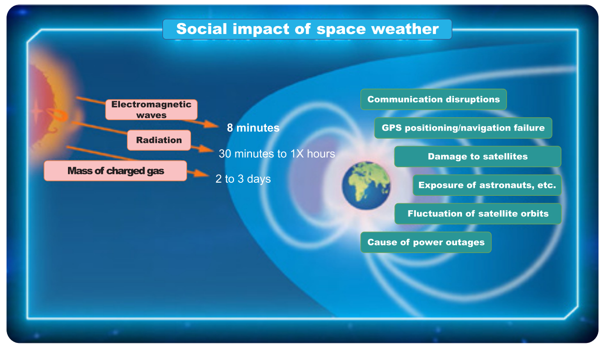
Q How far ahead will we be able to predict localized torrential rainfall?

Localized torrential rainfall

A We are researching with the aim of predicting localized torrential rainfall about an hour ahead of time. The MP-PAWR (Multi-parameter Phased Array Weather Radar) being developed by NICT is capable of observing rainfall in three dimensions, 10 times more detailed than a conventional weather radar in both time and space, or 100 times more detailed in total, and can quickly and reliably detect "baby cells of torrential rainfall" that occur in the sky above. When a "baby cell of torrential rainfall" appears, raindrops take about 5 to 10 minutes to fall to the ground surface. Using MP-PAWR, we can reliably determine where and how much rain will fall in 5 to 10 minutes. Furthermore, NICT is also researching an AI-based short-time precipitation nowcasting system to predict rainfall in the near future, and by combining MP-PAWR data with this nowcasting system, it has become possible to accurately predict heavy rainfall 10 to 15 minutes in advance.

NICT is also developing technology to use electromagnetic waves to observe wind, water vapor, and temperature over a wide area. In the future, NICT aims to minimize damage by predicting torrential rainfall more quickly and accurately.

Q Why is space weather forecasting becoming increasingly important?



Social impact of space weather

A It's because of the increasing digitalization of society.

Did you know that when a solar flare, a large explosion on the sun's surface, occurs, powerful electromagnetic waves, radiation, and masses of charged gas are released and travel to Earth? These phenomena are called "space weather," and they can disrupt the space environment around the Earth, affecting social infrastructure such as communications. Space weather forecasting predicts the state of the space environment that will have such effects. The Earth is protected by two protective barriers, the atmosphere and the magnetic field, which guard against solar influences. However, when a large solar flare occurs, it can penetrate these two protective barriers and reach close to the Earth's surface. This can affect satellite operations, radio communications on the ground, GPS accuracy, airplane operations, stable power supply, and astronaut health. In the absence of electronic devices, space weather had little impact on people's lives, but in the coming digital society, where wireless communication will be available to everyone, and drones, self-driving cars, and space travel will become commonplace, space weather will increasingly affect our daily lives. However, by using space weather forecasting, we can minimize or prevent the effects of space weather.

NICT has been observing space weather for over seven decades, and now provides space weather forecasts 24 hours a day, every day.

In the future, NICT will continue to expand its observation network from the ground and satellites while using AI and high-speed computers to provide more accurate forecasts.

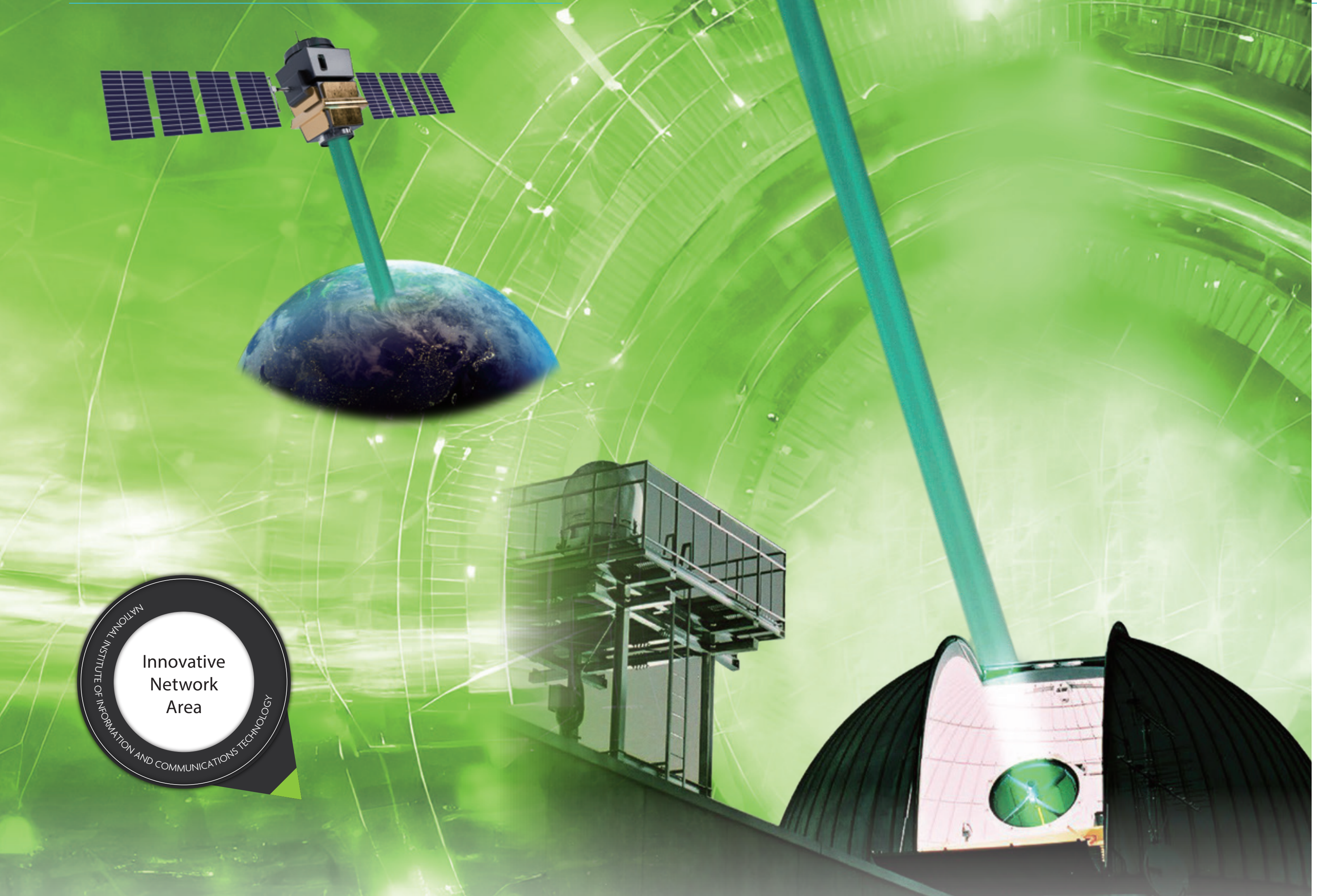
Q Will we still be able to communicate with an ever-increasing number of wireless devices, such as smartphones and game consoles?

Bad effects of electromagnetic noise to wireless communication

A NICT is conducting research and development to ensure proper communication.

In our daily lives, we use smartphones, game consoles, tablets, PCs, and other devices that use wireless LANs, which use radio waves with various characteristics (frequency, output power, etc.). As new wireless communication services appear, the types of radio waves will increase. However, in Japan and many other countries, the frequencies and output powers to be used are carefully determined by law (Radio Law in Japan) to prevent interference between wireless communication services already in use. This means that wireless communications will continue to be possible without problem. However, unwanted radio waves (i.e., electromagnetic noise) are sometimes emitted from TVs, lights, and other devices that are not communication devices. If they emit strong electromagnetic noise, wireless communications may not be able to be used properly. To avoid such adverse effects, NICT has been researching methods for measuring electromagnetic noise and evaluating its interference with wireless communications. Based on the results of this research, we are also contributing to the development of international rules and emission limits for electromagnetic noise.

As a result, we can continue to use wireless communications without any problems.



The Future Created by the Network Research Institute

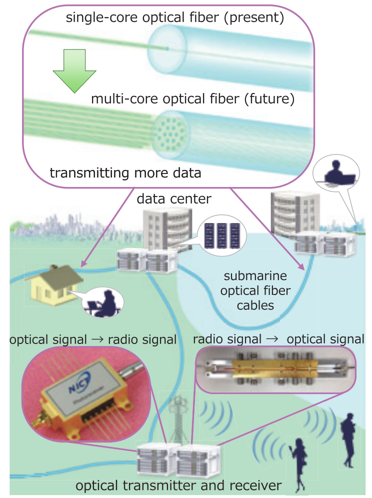
Welcome to a world where new values are created, linking all people and things by sharing various knowledge and information—this is Society 5.0. The Network Research Institute conducts R&D on the information and communications networks which play central roles toward this world. Remotely operated robots and automatic-driving cars are some examples of growing and new future services. Our technologies support to realize them and enable information sharing wherever you are on land, in the ocean, or in space. Innovation of such advanced technologies makes industries more efficient and keeps our daily life safer and fulfilling.

We're already looking to 6G and eyeing 7G, aiming to transmit "more data, quickly, anywhere, reliably, exactly as people want," and also "sustainably, simply, flexibly, and efficiently." Our mission is to provide the innovative networks that connect people and support society. Optical fiber communications, wireless communications, and devices which manipulate optical and radio signals, are core technologies of networks to transmit "more data, quickly, anywhere." For "quickly, anywhere" we're also working to keep you better connected—on land, in the ocean, and even out in space! We're also pursuing resilient communications that can sustain information distribution and continue to be used reliably even in the harshest communications environments. We're trying to build a networking lab in a virtual space, where various network services can coexist to be more "simple" but "exactly as people want," and where new technologies can be explored "flexibly and efficiently." After introducing our technologies to the world, we also refine them in synergy with technologies generated from companies and universities. Then we promote deployment in cross-border collaboration.

Q How are smartphones and computers connected to the world?

A They are connected to the world through optical fiber networks. Here's how it works: data generated from your smartphone are transmitted as radio wave signals to mobile base stations and converted into optical signals by optical transmitters. The optical signals are transmitted over optical fiber cables on the land or in submarines to remotely located data centers. Data processed in the data centers are transmitted to other computers in the opposite route, or some are converted again into radio signals and transmitted to smartphones. Optical fiber networks play indispensable roles to connect people around the world.

Sharing videos on SNS is quite popular these days, and an enormous amount of data is being exchanged. Communication traffic will grow rapidly by new apps such as holographic communication and remotely operated robots. To transmit "more data quickly," we're engaged in R&D on novel optical fiber communication technologies toward the next generation optical network. The latest technologies are, for example, "multi-core optical fibers" which have multiple optical paths in a single fiber and "radio over fiber" which directly converts radio signals into optical signals. With these advanced technologies, we aim to make our society comfortable for everyone to connect to the world sustainably.



Future world connected by advanced optical fiber communication technologies

Q Will flying cars be able to safely fly in the sky ?


Future with Flying cars

A NICT is conducting research and development so that flying cars can fly safely.

To operate everywhere, flying cars will be able to fly over mountains and oceans where even your cellphones are useless. Furthermore, they aim to for flying in the sky safely without pilots in the future. To fly safely, flying cars need to be precisely controlled according to accurate information about their surroundings. Therefore, it's necessary to communicate "anywhere" without interruption and to exchange information accurately.

To achieve this, NICT is conducting research and development on technologies to avoid collisions by informing each other of their positions and to communicate anywhere by using satellites.

Q What would happen if we could see radio waves?

A Radio waves are electromagnetic waves, just like the light we can see. However, the wavelengths of light visible to human eyes range from about 400 to 800 nanometers in wavelength (less than one-thousandth of a millimeter). This is tiny compared to the wavelengths of cell phone signals and means we can't see radio waves ourselves. But if we could, we'd need "radio wave blocking sunglasses" just to deal with the brightness in our cities.

For robots, seeing radio waves could be a game changer. For example, in disasters or accidents, robots can enter dangerous areas instead of humans. This keeps people safe while the robots receive their orders via radio waves. However, if these radio waves get disrupted, the robot could be in trouble. But if a robot could "see" radio waves, it could avoid weak signal areas to safely carry out its work.

At NICT, we're developing AI technology that predicts how radio wave strength shifts as a robot moves. This prediction is based on video data captured by the robot's cameras. Once we complete this technology, robots won't just dodge physical obstacles—they'll also navigate the invisible landscape of radio wave signals, choosing the best path for their tasks.

Pretty cool, right?


A future robot that works while watching radio waves

The Future Created by the Cybersecurity Research Institute

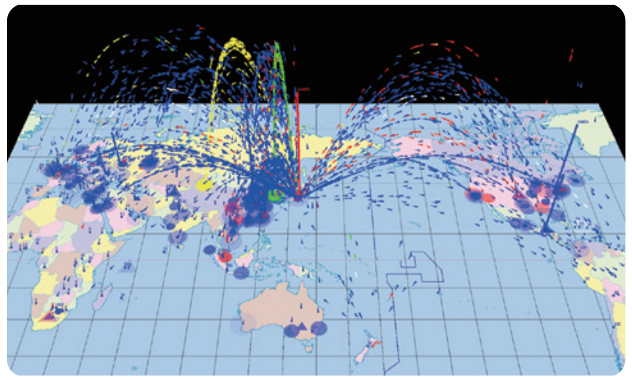
At the Cybersecurity Research Institute, we're like digital detectives. We scoop up tons of data on cyberattacks from around the Internet, crunch it with AI, and lay it out in easy-to-understand visuals. Our goal? To automate the defenses that keep both organizations and individuals safe through practical cybersecurity research and development.

We're also at the forefront of crypto innovation. Not only do we create new paths for securing data, but we also try to break them to ensure they're robust. This helps us secure the crypto technologies and improve the security that protects your digital life without you even realizing it.

Our work doesn't stop in the lab. We host large-scale cyber exercises for agencies across Japan, giving their members a real-world taste of the latest cyber threats and what it takes to combat them. Throughout the year, we also spark the creativity and skills of the next generation of security talent through hackathons.

We also keep a close eye on Japan's cybersecurity: analyzing and publishing findings on the latest cyber threats hitting home, and scanning for security gaps in devices connected to the Japanese Internet, alerting users with the help of ISPs. On top of that, we put homegrown security products through rigorous long-term tests. Through these efforts, we're boosting Japan's security independence and sharpening its edge against cyber threats.

Q Is it possible to completely get rid of cyberattacks?

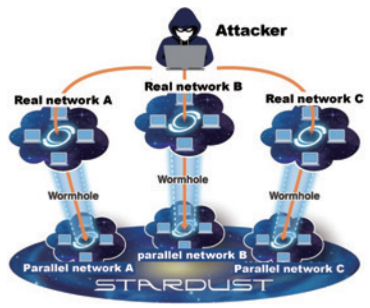


Visualization of indiscriminate cyberattacks by the cyber-attack observation and analysis system NICTER

A Crimes like breaking into homes, theft of money and goods, vandalism, and ransoms have been around since the dawn of civilization and have never gone away from the world. Now, they've just moved into a new neighborhood: the cyberspace, where they're called cyberattacks. And they're getting trickier to manage every year. Unfortunately, being able to wipe out cyberattacks forever is unlikely, but that doesn't mean we should stop trying! We need to keep pushing the boundaries of cybersecurity to shield everyone from these digital threats.

Though we can't eradicate cyberattacks entirely, we can make them less damaging and harder to pull off. Since it is a human attacker who is triggering the cyberattack, we can think of our strategy as an ongoing battle where the goal is to hike up the costs for attackers while lowering them for the defenders. We're constantly working on new technology to spot attacks faster and plug security gaps, making it too costly and difficult for cybercriminals to succeed.

Q What types of cyberattacks are there?



Observation and analysis of targeted attacks through the cyber-attack attraction platform STARDUST

A Cyberattacks come in many forms, but we can generally split them into two main types: "indiscriminate attacks" and "targeted attacks." Indiscriminate attacks are like a virus outbreak: they spread far and wide, hitting devices globally without discrimination. On the other hand, targeted attacks see cybercriminals focus intensely on specific organizations.

To stay ahead, NICT has been running Japan's largest cyber-attack observation hub, NICTER, since around 2005. This system keeps track of these attacks, which we later release as reports. We also turn raw data into understandable visuals updated live on our NICTER Web platform (https://www.nicter.jp).

For the more calculated and targeted attacks, where a human attacker targets and infiltrates a specific organization, we set decoys to lure attackers. This is done using STARDUST, our platform that mimics large, realistic network environments, allowing us to attract and then monitor attackers' moves closely.

Remember, cyberattacks are not born from nature, but crafted by clever humans. This means we're constantly encountering new strategies from attackers, pushing us to innovate and develop sharper methods for observing and analyzing cyber threats.

Q Where should I start studying security?

Young Security Innovators Development Project "SecHack36" (Japanese only)

A The field of security is super broad, which means there are loads of ways to dive in.

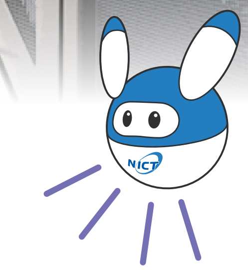
For starters, a solid grip on computer science is essential if you're keen on tackling observation and analysis of cyber-attacks. Also, knowing your way around network technology and binary analysis really helps. And since data is a big deal in cybersecurity, getting skilled in data science, including AI and machine learning, is becoming more and more important.

When quantum computers become reality, they'll be able to easily crack many of the crypto algorithms we use today. To fight this, we need post quantum cryptography, which is a fancy way of saying "super tough codes that even quantum computers can't break." This area uses some seriously advanced math.

But security isn't just about the tech. Humans can accidentally become weak spots in security or get tricked by false info. That's why understanding psychology and sociology is also key to building strong security. Plus, skills in user interfaces and computer graphics could come in handy when designing the security operations of the future.

NICT really wants to help young people get into security. We host a yearly long-term hackathon called SecHack365 for young innovators under 25. Why not give it a shot? (https://sechack365.nict.go.jp (in Japanese))

The Future Created by the Universal Communication Research Institute



The Universal Communication Research Institute promotes research and development (R&D) with the aim to enable universal communication where everyone, regardless of language or background, can understand each other. The key to achieve this goal is our huge database packed with high-quality Japanese texts. We are able to develop sophisticated AI systems by collecting data from specific fields such as patent and medical care. Data collection is not limited to text. Information from smartphones, car navigation systems, and other sources are also essential for AI learning. The database we have created is used for many different R&D projects. For instance, "multilingual" technologies such as multilingual speech translation and simultaneous interpretation, "dialogue" technologies that understand users' interests and backgrounds, and "behavior support" technologies that not only understand but can also predict real-world situations through big data. At the heart of our institute's philosophy is a balance between research and sharing. By pioneering entirely new technologies and improving them to be used everywhere, we work to bring our inventions from the lab to the real world. While working with industry, academia, and government, we integrate these innovations into systems that businesses can launch as practical, commercial services and be widely used in society. We then bring the knowledge we learn from real-world applications back into research, improving our technologies so that they become everyday tools in society.

Q Will I be able to talk to people from different countries without learning their languages?


Multilingual speech translation technology using machine translation

A Yes, you will be able to. Thanks to translation apps and websites, you can instantly translate languages you've never studied right on your smartphone or computer. Here at NICT, we're passionately working on making this even easier with our multilingual speech translation technology. Our software and technology are provided to society through VoiceTra and other applications, and we're constantly making improvements so people can use them in all kinds of situations.

On the other hand, if you're thinking about learning a foreign language, that's great! Learning a language is like getting a key to understand more about the world—it lets you explore the history and culture of the places where those languages are spoken. While you're learning, you can use NICT's multilingual speech translation technology to help you along the way.

Q Can AI be a reliable chat partner?

Demonstration of the multimodal speech dialogue system MICSUS using Robohon®
(Provided by KDDI)

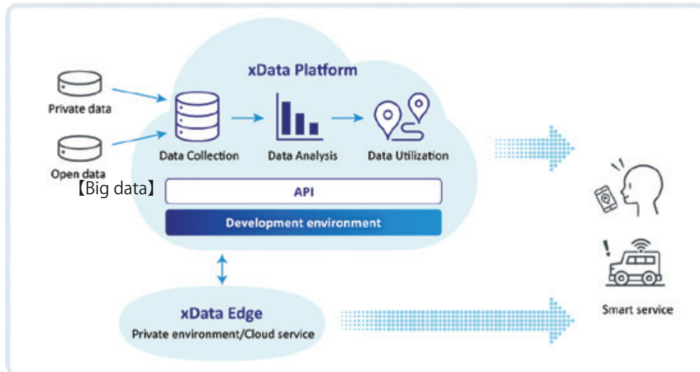
A To be able to chat with an AI like a human counterpart, we need some pretty advanced tech that allows AI to understand and process human language, so a ton of research is going into this!

At NICT, our teams are carrying out various research and development projects using a technique called "deep learning", which helps AI get smarter by effectively utilizing the knowledge available on the internet. We've come up with systems like WISDOM X, which can answer all sorts of questions based on information available online, and MICSUS, which provides help in elderly care through speech-based interactions.

Lately, AI has become so advanced that it can write text so well you might think a real person wrote it! But even though it's clever, some experts point out that it's far from perfect. Sometimes, if an AI learns from biased information, it can end up creating biased texts, or it might present something untrue as if it were a fact, which they say raises questions about its reliability.

To tackle these problems, NICT and other research institutes are on a mission to develop smarter AI. But it's also important for us to understand AI technology and have an ethical view on its role within our society, to make sure that it's used in the best way possible.

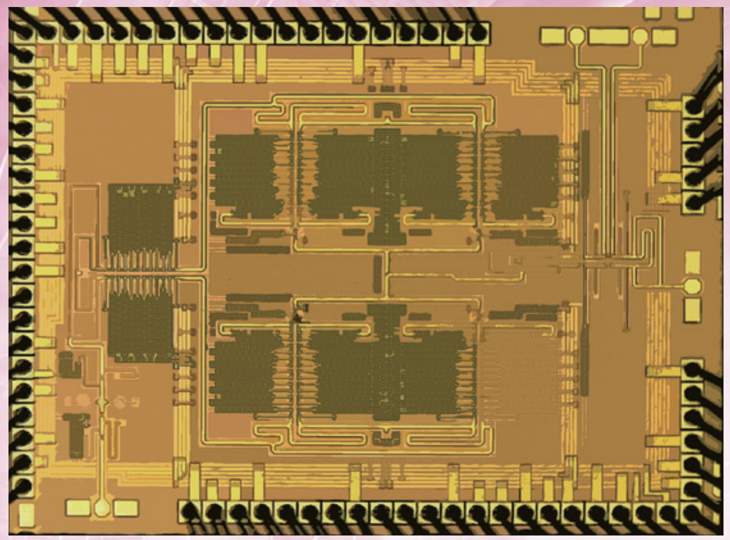
Q Will big data become useful in daily life?



xData Platform: A data linkage analysis platform

A Big data is like a huge collection of data that's too big for any person to fully understand on their own. It includes all kinds of types and forms—texts, voice data, pictures, and data from sensors—and is already helping us throughout our lives. For instance, the location information from smartphones or car navigation systems used to find out which tourist attractions and roads are likely to be crowded. Weather and air pollution observation data can be used to predict the risk of damage to the human body, agricultural products, buildings, etc., and to develop countermeasures.

NICT is conducting research to combine and analyze such big data around us so that we can develop services that support safe and comfortable transportation and healthy living. For example, it aims to warn drivers of danger and recommend routes that avoid traffic congestion and reduce CO_2 emissions. The "magic" of big data will make our future safe and convenient.



Frontier Science Area

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY

The Future Created by the Advanced ICT Research Institute

Pioneering the Future of Information and Communication
At the Advanced ICT Research Institute, our motto is "Pioneering New Horizons in Information and Communication". Here, we dive into advanced and challenging research areas like devices, materials, quantum technologies, biology, and brain information. Our goal is to hatch brand-new tech that can redefine our future, making society richer, safer, and super secure, all supported by ICT.

What does it mean to Pioneer the Future?
While ICT has made our lives more interesting and interconnected, several issues have also emerged that need to be solved. Think about the explosion of data zooming around networks, eating up more and more energy, the worries about keeping these networks safe and running, or even the rare resources they need that might run out. To tackle these challenges head-on, it's not enough to just improve current tech. We need to dig into the basics and stretch far and wide into research that might leapfrog into entirely new innovations in technologies, materials, and methods. The Advanced ICT Research Institute is hard at work at three cutting-edge facilities: the Koganei Frontier Research Center, the Kobe Frontier Research Center, and the Center for Information and Neural Networks (Suita). There, we're laying the groundwork for the ICT tech that will shape our world in the next 10 to 20 years.

Q Can brain training boost your movement skills?

Making mistakes is essential for getting better at any movement skill.

A Ever wondered if you could get better at sports or playing an instrument just by training your brain? The answer is a bit of yes and a bit of no. Let's look at how this works.

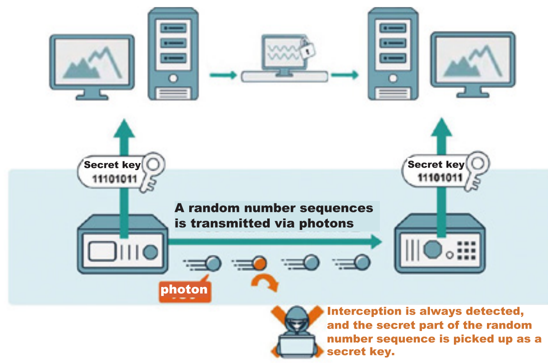
Improving your movement skills isn't just about moving your body; it starts up in your brain through two main parts: the "cognitive process" and the "motor process."

The cognitive part is all about learning the knowledge behind the movements. Take piano playing, for instance. Before you even touch the piano, you study the sheet music, understand the timing, and figure out how hard or soft to press the keys. By mastering these details in your mind, you can actually get better at the piano without physically practicing.

The motor part is about the brain sending the right electrical signals to your muscles to make them move exactly how you want. But here's the catch: to improve these motor commands, you need to make mistakes. When playing the piano, your motor commands can be corrected through the discrepancy between how you thought you'd strike the keys and how you actually did. The only way to make those mistakes is to actually play the piano — in other words, practice.

So, while brain training can help, it has its limits. If you really want to level up your skills, you've got to pair it with lots of physical practice and, yes, lots of mistakes. Just remember, "failure is the mother of success."

Q Is there a way to stop important messages from being intercepted?



Communication that is absolutely secure using quantum cryptography

A There's a way to make sure your messages on the smartphone stay completely private.

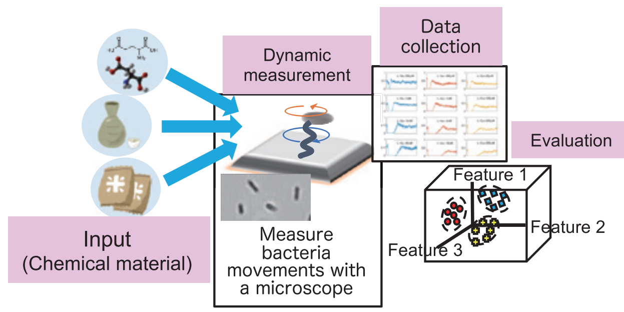
Currently, there are two main reasons that no one can intercept your messages: One is that secrecy is protected by a law that states "mobile phone carriers must maintain the secrecy of communications." The other is that we use strong encryption code such that it would take over 10,000 years to decrypt it even with latest computers.

But there's a catch. Criminals ignore the rules, and future technology could get really fast at cracking our current codes.

That's where something called "quantum cryptography" comes in—it's being studied at NICT and it's unbreakable. Quantum cryptography is, in principle, completely secure. This is because, if anyone tries to spy on a message on a quantum cryptography line, it definitely leaves a mark, like footprints which means an alarm appears alerting that a line is being intercepted.

So, when quantum cryptography is a reality, you can send your messages without ever worrying about someone intercepting.

Q How will biological research contribute to the future of information and communication?



Chemical sensor technology using bacteria

A When you think about sending messages, you probably think of using light or radio waves, right? But there are tons of types of information around us that our typical tech tools find tricky to handle. Take, for instance, the scents of plants or chemical material such as bioactive substances inside our bodies. These are often in such small amounts that it's hard to detect them and communicate their meaning. Yet living organisms do this effortlessly. Ever seen sniffer dogs at airports? They can sniff out illegal drugs and dangerous goods using their amazing sense of smell.

At NICT, researchers are interested in how living organisms communicate using these chemical materials. They're working on borrowing this natural talent to make new tech. For example, they're creating sensors using living bacteria that can spot tiny bits of these chemicals in solutions. They're even designing molecules and cells with new functions that do not exist naturally and can process information.

As this research gets better, if we can make effective use of the information on chemical materials abundant around us, we might soon use these discoveries in lots of different areas like healthcare and medicine.

A Day in the Life of Researchers Creating the Future

Have you gotten a feel for the kind of future NICT is envisioning?
Picture a world where everyone flourishes no matter where they live, how old they are, or what gender they ar. It's a future that cherishes each person's uniqueness and their opinions.
It's about living comfortably in a society that's always progressing forward.
And even in the face of disasters, the future we envision ensures that everyone is safe, secure, and connected with people across the globe.
Who's behind this inspiring vision? The dedicated researchers at NICT, that's who!
Curious how they do it?

!

At NICT, innovation isn't just in what we research but also in how we work. Our team enjoys flexible working conditions, including flextime, a discretionary labor system, staggered hours, and the option to work remotely. This ensures that our researchers have the freedom to innovate on their own terms.

KIHARA Ami

Researcher,
Spade-Time Standards Laboratory,
Electromagnetic Standards Research Center,
Radio Research Institute
Ph.D. (Science)

My current work is developing a trapped-ion optical clock system. This system will set the standard for one second by precisely measuring the frequency of laser light resonating between the quantum states of a single trapped in a vacuum chamber. The famous use case of the ion trap is such as quantum computer, but it also can use for creating precise time standards, a testament to their broad applications from fundamental research to integral social infrastructure.
In my personal life, embraced a new challenge in April 2023—motherhood. Returning to work after maternity leave, I face the common hurdles of early motherhood, including morning sickness during pregnancy and my ongoing battle with sleep deprivation due to my child's night wakings. Despite these challenges, I am still able to effectively balance demanding career and motherhood, thanks to NICT's supportive childcare system.

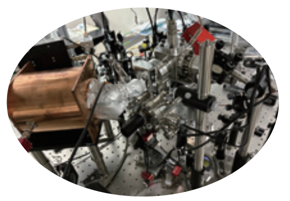
TIME SCHEDULE — A Day of KIHARA Ami

6:00 Start my day early, preparing for work and enjoying breakfast

6:45 The day begin for my daughter, too
I wakes her up, feeds her breakfast, prepare for daycare, and run the dishwasher

7:45 Leave home with her daughter
After dropping my daughter off at daycare, I head heads to NICT

8:50 Arrive at NICT
Upon arrival at work, I check my to-do list from the previous day and dive into my tasks



12:00 Lunch
Recently, I've been enjoying onigiri bento from the station

13:00 Continue the morning's work
The afternoon is dedicated to adjusting the optical and laser systems of my project

16:30 Utilizing NICT's time-off system, I leave work a bit early to pick up my daughter from daycare
I make a to-do list for the next day before leaving work (to help balance research and childcare)

17:40 Arrive home
I spend time with my daughter, feeding and bathing her

19:00 Dinner, housework, and bath
While I have dinner, I use a baby monitor to check on daughter who is falling asleep

23:00 Go to bed
I finally head to bed, although later I may have to get up to take care of my daughter and put her back to sleep

HASEGAWA Ayako

Senior Researcher
Cybersecurity Laboratory,
Cybersecurity Research Institute

I am working in the field of usable security, a research field that improves security technology from a human perspective. I am working on various research themes, particularly providing security advice to end-users. My goal is to provide easy-to-understand advice tailored to each user's situation in order to help them configure appropriate security settings. I want young people to understand themselves and apply this understanding to their work and daily living. I believe it is important to know what you are passionate about and make that your specialty or strength, and to live as stress-free as possible by understanding what is comfortable or uncomfortable for you.

TIME SCHEDULE — A Day of HASEGAWA Ayako

8:30 Waking up in a relaxed mood
I am not an early riser, so I start my day in a relaxed manner, trying not to overexert myself.

9:30 Tending to the garden and watering plants
My hobby is growing vegetables in my kitchen garden. Recently, I have been passionate about making dried flowers.

10:00 Learning English
I often spend my mornings on self-improvement, especially learning English.

11:00 Reply to e-mails, etc.
I try to finish paperwork in the morning wherever possible.

13:00 Meeting with co-authors
I ask them about the progress of their research. I try to make positive comments.

14:30 Survey and analysis
Analysis of online user survey results, etc.

16:30 Writing a paper
When I concentrate on writing, time flies.

19:00 Dinner
My husband cooks dinner. It is always delicious, and I am grateful to him.

20:00 Survey of recent papers
I check new papers carefully. I sometimes hold a paper reading session.

21:00 Refreshing time
I watch dramas and play games. I revitalizes myself by talking with my family.

25:00 Going to bed with my sleep aids
I get a good night's sleep after enjoying a foot massage, aromatherapy, and a hot eye mask.

OKAMOTO Takuma

Research Manager
Advanced Speech Technology Laboratory,
Advanced Speech Translation Research and Development Promotion Center,
Universal Communication Research Institute
Ph.D. (Information Sciences)

I am at the forefront of speech technology at NICT, where my research is enabling machines to talk just like humans. My work on the VoiceTra smartphone app brings natural-sounding speech in 21 languages to users around the globe. But my ambitions don't stop there. I am pioneering the development of multiple sound spot synthesis technology, an advanced system that synthesizes different voices in multiple directions using array of 16 loud speakers. This cutting-edge technology was even featured on Nippon TV in January 2024. My work is grounded in the realms of matrix operations and complex numbers, that I topics never grasped in high school. So I recommend everyone to study hard on them. Juggling dual research projects requires not just intellect but also creativity, which fuels with morning jogs. I also have fun going out drinking with colleagues in the institute.

TIME SCHEDULE — A Day of OKAMOTO Takuma

4:00 Wake up
Embody the maxim that "the early bird catches the worm infinitely"

6:00 Goes for a jog (10 km)
This helps clear my mind and spark creativity

8:30 Start my day at NICT

10:00 Lead an online meeting with a graduate students
Discusse his latest experiments and steer his future research

12:00 Eat lunch with the speech synthesis team
They end up having an enthusiastic conversation about muscle training

13:00 Meeting with a company interested in multiple sound spot synthesis technology
Provide a demo of the technology

15:00 Code programs and write papers

18:30 Arrive home
I return home to play with my son, share a family meal, and unwind with a drink

22:00 Head to bed, recharging for another day of innovation

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