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Cover image: Measuring results of eye movements using the perimetry system

Development of a Perimetry System using Eye Movement

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After completing a doctoral course, he worked as Assistant Professor of Waseda University, studied at Brown University (USA) and worked at the National Institute for Physiological Sciences, National Institutes of Natural Sciences. In 1993, he joined Communications Research Laboratory, the Ministry of Posts and Telecommunications (currently, NICT). He is mainly engaged in research and development related to non-invasive brain function measurements of fMRI, magnetoencephalography, and electroencephalography. Ph.D. (Medicine).

Satoshi NAKADOMARI

National Rehabilitation Center for Persons with Disabilities

After completing a doctoral course, he worked at Kanagawa Rehabilitation Hospital (Ophthalmology), Stanford University (USA) and Jikei University School of Medicine (Ophthalmology, Associate Professor). Since 2008, he has served in National Rehabilitation Center for Persons with Disabilities (Director of Department of Medical Treatment (2)). MD.

Visual acuity and visual field

When we say something like "My eyes are getting bad recently," usually we are talking about visual acuity, but there is another important aspect to vision, namely, visual field. Vision can become poor or be lost completely in parts of the visual field due to brain damage or changes in the retina with aging. Problems with visual acuity are usually noticed immediately, such as blurred distance vision or difficulty reading small print. They can be measured easily using visual acuity test chart having rows of different sized Landolt rings. However, we are normally mostly unaware of our visual field, so if there is a problem, it can be very difficult to notice. Poor visual acuity is certainly inconvenient, but defects in the visual field can be not only inconvenient, they can be extremely dangerous (Figure 1).

It is quite difficult to assess visual field. It is typically done using the Goldmann perimeter (GP) test, and takes approximately 30 minutes to assess both eyes. During this time, the subject must hold their head still and stare straight ahead, without moving their eyes. Then, they must immediately push a button whenever they see a stimulus such as a flashing light anywhere in their visual field, which is repeated dozens of times. The clinician must constantly monitor whether the subject is keeping their eyes looking directly forward. Visual field is represented in 2D coordinates with the gaze position at the origin, so it cannot be measured if the eyes move. Healthy people can accomplish this without too much trouble, but it can be very difficult for the aged or disabled, and this can cause difficulty for the clinician. It seems that there should be an easier way to measure visual field.

The Copernican revolution in perimetry

Suppose that you are reading this issue of NICT NEWS on your computer screen. When an icon notifying you that an email has arrived appears in the corner, your eyes move involuntarily and you look at it. This type of eye motion is called a *visually triggered saccade*. The motion begins 200 to 300 ms after the stimulus, and continues for 50 to 150 ms with the eyes moving at from 300 to 500 degrees per second. However, if the subject does not notice the icon, the eyes do not move. Our idea was to use this movement of the eyes to measure visual field, rather than prohibiting motion, as is done with conventional visual field tests.

As shown in Figure 2, the subject is asked to follow successive targets (white circles) appearing on the screen with their eyes (Figure 2-(1)). This eye movement is measured using a contactless eye-tracking system (Figure 2-(2), (3)). The data is then analyzed, taking the eye position after the eye has moved over a target for a set period of time as the origin and recomputing the target positions (Figure 2-(4)). The results are used to display automatically, regions that are not visible within the visual field (Figure 2-(5)). The measuring results for a healthy subject (Figure 3-(1)) and a subject with defects in their left visual field (Figure 3-(2)) are shown in Figure 3. These results match well

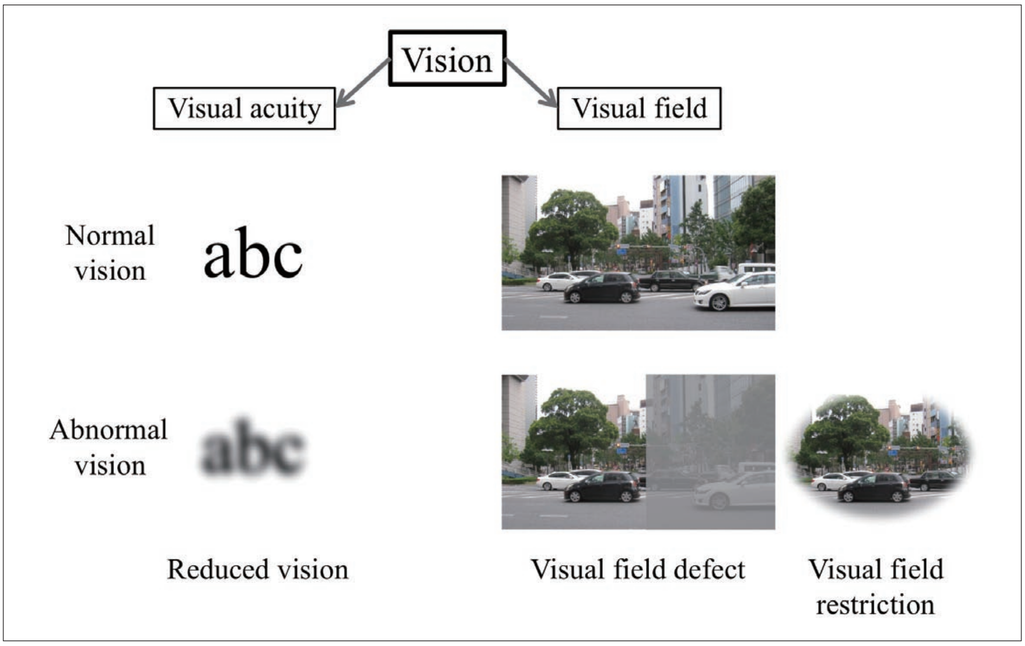

Figure 1 Visual acuity and visual field. Poor visual acuity is inconvenient, but visual field defects can be dangerous

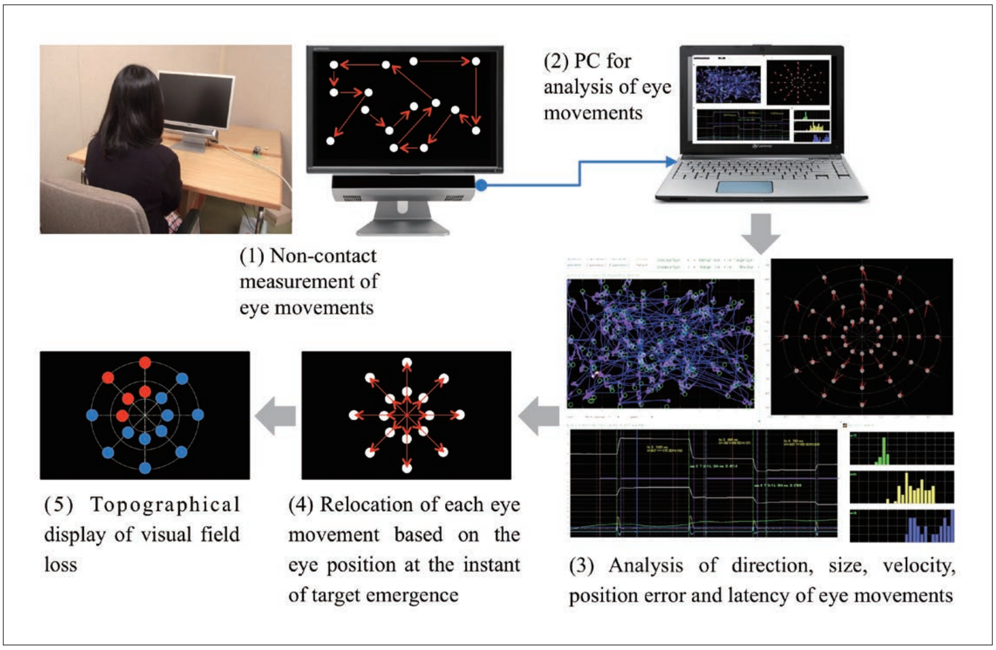

Figure 2 Newly developed perimetry system using eye movement

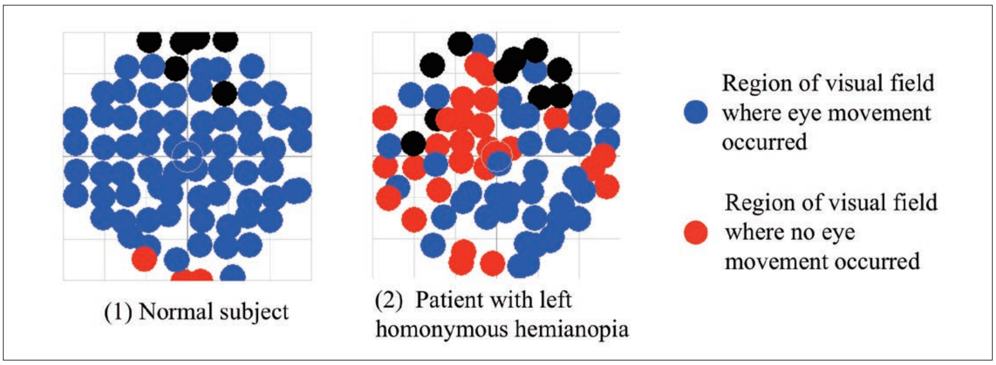

Figure 3 Example measurements from the eye movement perimetry system

The center of the figures is the center of the visual field, blue circles indicate areas where eyes moved to the target normally, red circles indicate areas where eye movement did not occur, and black circles indicate areas where the result was uncertain.
(1) is the result from assessing a healthy person. For this person, eye motion was evident for almost all of the visual field.
(2) is the result from assessing a person with macular splitting due to a brain hemorrhage, causing half-blindness (hemianopsia) of the left visual field. Eye movement did not occur when the targets appeared in the left visual field, and particularly in the upper part of the left visual field. The same result was obtained using conventional perimetry.

with results from conventional perimetry.

A comparison of conventional perimetry (Goldmann perimeter) and the perimetry system we have developed is shown in Figure 4. Much less time is required for the assessment, and the burden on both subject and clinician is greatly reduced relative to conventional perimetry. The assessment feels just like watching television, so it can be done easily, even for aged or disabled subjects, and it could even be used to perform perimetry on small children by using cartoon characters for the targets.

Future prospects

People with visual disabilities, including weak eyesight and other visual acuity issues, and not including the totally blind, are called low-vision, and these include 1.45 million people in Japan. With the westernization of diet and increasing elderly population, these numbers will tend to increase. Visual field assessment is an essential test performed by almost all of the over 8,000 ophthalmologists (ophthalmology clinics and ophthalmology departments at hospitals) throughout Japan. No matter how good the assessment method is, it is meaningless if it is no used in clinical practice. In the future, we will continue development, increasing assessment accuracy by improving target-stimulus and eye-motion detection algorithms, and expanding our scope to include developing products in cooperation with medical instrument manufacturers, and standardizing it as a method for visual field assessment with medical institutions.

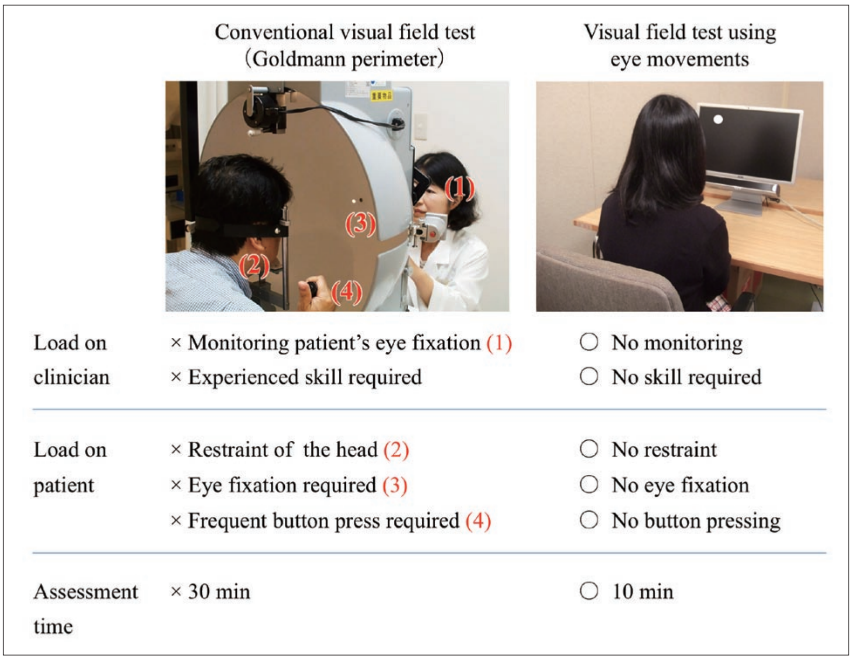

Figure 4 Comparison of conventional perimetry and the newly developed perimetry system

* This research is the result of collaborative research among the following researchers and research organizations. Dr. Ayumu FURUTA (Maeda Ophthalmic Clinic), Dr. Hiroyuki KUBO (Kanagawa Rehabilitation Hospital), Dr. Keiko OGAWA (Hiroshima University).

* A part of this research received support from the NICT Funds for Promoting R&D and a Health and Labour Sciences Research Grant from the Ministry of Health, Labour and Welfare (comprehensive research on health and welfare for people with disabilities), for "Practical testing of a next-generation support system for the visually disabled" (from FY2013 to FY2014).

Conclusion of Cooperation Agreement with Chikuma City

—Flood control using Information and Communications Technology—

Sakae MURONO

Research Expert, New Generation Network Laboratory, Network Research Headquarters

He has been engaged in planning and operation of a large-scale smart ICT service platform testbed since June 2013.

Introduction

At NICT, we are conducting practical research and development to find solutions to social and public issues using information and communications technologies (ICT), which we call *Social ICT*.

Figure 1 Mr. Akio OKADA, Mayor of Chikuma City (left) and Dr. Masao SAKAUCHI, President of NICT (right) at the signing ceremony (Chikuma City, Koshoku City Hall)

Figure 2 Press conference

On June 16, 2014, NICT entered an agreement with Chikuma City in Nagano prefecture for cooperation on ICT measures to prevent damage from flooding, and began testing of such ICT measures. On that day, a signing ceremony, with Dr. Masao SAKAUCHI, President of NICT and Mr. Akio OKADA, Mayor of Chikuma City attending (Figure 1), and a press conference (Figure 2) were held. The event was widely covered by local television stations and newspapers.

Overview of flood defense measure test facilities

Based on the cooperation agreement with Chikuma City, NICT installed experimental sensor network equipment to obtain real time water level and rainfall data in the basin of the Sawayamagawa River, a tributary of the Chikuma River which flows through Chikuma City (Figure 3). This equipment consisted of nine water level sensors installed at water gates in six locations (Figure 4) and a rainfall sensor installed at a water gate in one location, which send their sensor data to the city hall in real time using 920 MHz-band multi-hop wireless communications technology*.

According to Chikuma City, flood damage in the Sawayamagawa River basin has resulted occasionally in the past when there is heavy rain, as during a typhoon (Figure 5). During such heavy rain, decisions whether to open or close the gates are made by sending city employees, under those dangerous conditions, to visually check water levels and report by phone. With the experimental sensor network equipment installed by NICT, Chikuma City employees no longer need to go on-site and can monitor water levels centrally (Figure 6). This water level and rainfall data should contribute to being able to predict water levels safely.

Future prospects

We plan to obtain feedback on this trial sensor network equipment from the perspectives of information quality (frequency of measurements, accuracy of water level predictions, whether they can be shown clearly) and operability (whether anyone can use it easily), and apply them to future research and development. Chikuma City is also planning to publish the data from this test equipment on the city Web page, and in that case, NICT will also cooperate on issues such as how to publish it.

Due to the effects of typhoon 11, which landed in Japan in August, 2014, localized heavy rain occurred in various areas,

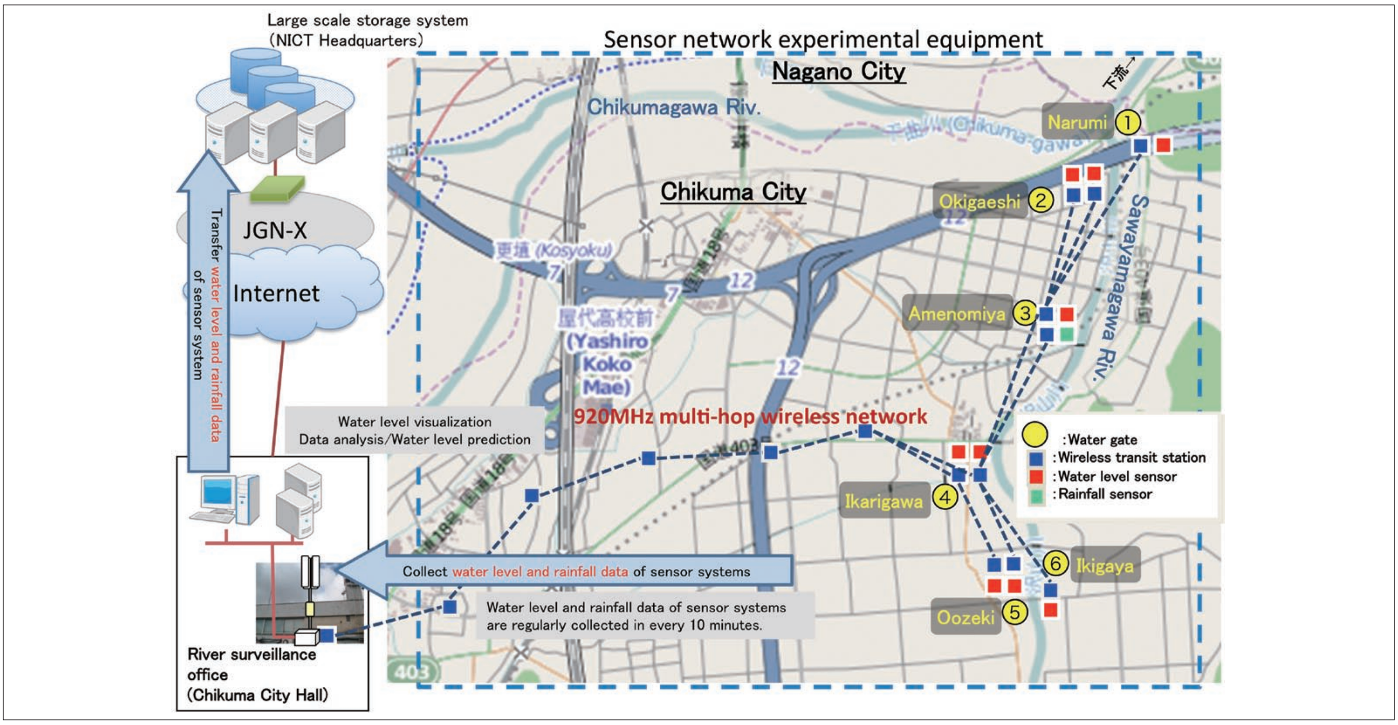

Figure 3 Trial sensor network equipment installed in Chikuma City

Figure 4 Water level sensor installed in the Sawayamagawa River basin

Figure 5 Flood damage in the Sawayamagawa River basin (Aug. 1999) (photo provided by Chikuma City)
The blue line in the photo indicates the peak flood level.

but water levels in Chikuma City did not rise enough for the observation data from the trial sensor network equipment installed by NICT to cause warnings (Figure 6).

NICT is contributing to building systems for local disaster prevention, through trials like this one; building a model case for small to medium flood damage prevention using ICT in cooperation with Chikuma City.

沢山川排水機場 観測データ

表示対象年月日 2014 年 8 月 10 日 ◯10分単位 ◉60分単位
検索

排水機場	鳴海		起返		五十里		雨宮		大堰		生萱		雨量(雨宮)	
月/日 時:分	内水位 (m)	外水位 (m)	内水位 (m)	外水位 (m)	内水位 (m)	外水位 (m)	内水位 (m)	外水位 (m)	内水位 (m)	外水位 (m)	内水位 (m)	外水位 (m)	60分雨量 (mm)	累計雨量 (mm)
08/10 08:00	0.05 -	0.10 -	0.73 -	0.10 -	0.21 -	0.42 -	0.23 -	0.42 -	0.87 -	0.22 -	0.14 -	0.22 -	1.0	15.0
08/10 09:00	0.07 -	**	0.73 -	**	0.22 -	0.44 -	0.24 -	0.44 -	0.88 -	0.23 -	0.16 -	0.23 -	1.0	16.0
08/10 10:00	0.06 -	0.08 -	**	0.08 -	0.22 -	0.45 -	0.25 -	0.45 -	0.89 -	**	0.17 -	**	0.0	16.0
08/10 11:00	0.05 -	0.08 -	0.73 -	0.08 -	0.22 -	0.45 -	0.25 -	0.45 -	0.88 -	0.23 -	0.17 -	0.23 -	0.0	16.0
08/10 12:00	0.05 -	0.06 -	0.73 -	0.06 -	0.23 -	0.47 -	0.25 -	0.47 -	0.89 -	0.23 -	0.17 -	0.23 -	0.0	16.0
08/10 13:00	0.05 -	0.07 -	0.72 -	0.07 -	0.22 -	0.46 -	0.25 -	0.46 -	0.88 -	0.23 -	0.17 -	0.23 -	0.0	16.0
08/10 14:00	0.04 -	**	0.72 -	**	0.21 -	0.44 -	0.24 -	0.44 -	0.87 -	0.22 -	0.16 -	0.22 -	0.0	16.0
08/10 15:00	0.04	0.07	0.72	0.07	0.21	0.43	0.24	0.43	0.87	0.22	0.15	0.22	0.5	16.5
08/10 16:00	0.06 -	0.08 -	0.72 -	0.08 -	0.22 -	0.46 -	0.25 -	0.46 -	0.88 -	0.23 -	0.17 -	0.23 -	0.5	17.0
08/10 17:00	0.09 -	0.11 -	0.73 -	0.11 -	0.29 ↑	0.53 ↑	0.32 ↑	0.53 ↑	0.95 ↑	0.28 -	0.21 -	0.28 -	3.5	20.5
08/10 18:00	0.09 -	0.07 -	0.72 -	0.07 -	0.35 ↑	0.59 ↑	0.37 -	0.59 ↑	1.02 ↑	0.34 ↑	0.29 ↑	0.34 ↑	0.5	21.0
08/10 19:00	0.06 -	0.05 -	0.72 -	0.05 -	0.29 ↓	0.55 -	0.32 -	0.55 -	0.96 ↓	0.28 ↓	0.24 -	0.28 ↓	0.5	21.5
08/10 20:00	0.05 -	0.05 -	0.72 -	0.05 -	0.22 ↓	0.48 ↓	0.25 ↓	0.48 ↓	0.86 ↓	0.21 ↓	0.15 ↓	0.21 ↓	0.0	21.5
08/10 21:00	0.04 -	0.05 -	0.71 -	0.05 -	0.18 -	0.41 ↓	0.20 -	0.41 ↓	0.79 ↓	0.17 -	0.09 ↓	0.17 -	0.0	21.5
08/10 22:00	0.04 -	0.04 -	0.71 -	0.04 -	0.16 -	0.35 ↓	0.19 -	0.35 ↓	0.73 ↓	0.15 -	0.07 -	0.15 -	0.0	21.5
08/10 23:00	0.04 -	0.04 -	0.71 -	0.04 -	0.16 -	0.30 -	**	0.30 -	0.70 -	0.15 -	**	0.15 -	0.0	21.5

**：欠測　↑：上昇中　↓：下降中　-：変化なし

Figure 6 Measured water level data
Shown are water levels measured hourly from 8:00 to 23:00 on Aug. 10, 2014 at water gates at six locations. Rising water levels can be seen at four locations from 17:00 to 18:00, but after 19:00, the water level gradually decreases. For clarity, data in the figure is shown in pink when the water level is rising, and light blue when it is falling.

＊Multi-hop wireless communications technology
A bucket-relay type of scheme for data transmission. The scheme used here is called IEEE802.15.4g and was standardized with contributions from NICT.

NICT Technologies used in Society

—Systems and support for technology transfer of research results to industry—

Fumitake SAWADA
Manager, Intellectual Property Promotion Office,
Outcome Promotion Department

Introduction

To return research results broadly back to society, NICT has ongoing services that support life in society, such as Japan Standard Time and Space Weather Forecasts, various types of data from observation and analysis, such as the Polarimetric and Interferometric Airborne Synthetic Aperture Radar System (Pi-SAR2), and publication of research results, but it also conducts technology transfer activities that provide patents, software, and other Intellectual Properties (IP) to industry for compensation.

Technology transfer activities return the results of NICT research broadly into society by having private enterprise create products and businesses based on NICT's strong technical capabilities, which is an important mandate for NICT as a research-based independent administrative agency.

The Intellectual Property Promotion Office, which is at the front lines of such giving back to society, engages in technology transfer to companies through activities such as working with researchers to create IP that is accessible to industry, helping with creation of rights, and finding the seeds for technical transfer.

These systems and the current state of technology transfer are introduced below.

Technology transfer systems

What sort of impressions do the words "technology transfer" convey? The term technology transfer often refers to the transfer of technology to developing countries based on Official Development Assistance (ODA), but in this article we are referring to the systems for licensing, transfer and technical support given to private enterprise regarding IP produced as a result of research by NICT and other independent government R&D agencies and national universities. This differs from technology transfer through ODA in that the party receiving the technology is not decided beforehand, and the technology transfer involves compensation. As such, trade in IP is a free market, so this office also maintains constant contact with researchers when providing support, in order to increase (strengthen) the market value that can be obtained for such IP.

The office makes itself familiar with the technical details of the IP and its inventor, and then begins a phase of searching for a partner company that can create a product or provide a service using it. From the product concept described when applying for a patent, companies suitable to produce and sell such a product are narrowed down, in consideration of technical, manufacturing and sales capabilities. When selecting the actual partner, the IP is disclosed to some of the partners, so non-disclosure agreements (NDA), and materials transfer agreements (MTA), which are necessary when providing research prototype samples, are also signed (Table 1). When handling technologies that are relatively complete, near a stage that can be offered as a product or service, staff from the office also take an active role in developing PR for related events and exhibitions.

For example, they have worked as needed in cooperation with researchers at events such as the "Patent and Information Fair," which is backed by the Patent Agency, and the "Collaboration Networking Event," which is held by the Tokyo Metropolitan Small and Medium Enterprise Support Center and attracts many small and medium businesses in the Tama locality (Photo 1). In such cases, work begins with an overview of NICT, work to promote industry collaboration, technology transfer systems, and new

Table 1 Industry collaboration options related to technology transfer

	Main processes for technology transfer	Options to be used
1	Discovery of basic principles to be used as a technology base	(Collaborative) Patent applications, etc.
2	Selection of partner companies capable of implementation	Non-disclosure agreements (NDA), materials transfer agreements (MTA), etc.
3	Collaborative development toward implementation with partner companies	Collaborative research agreements, etc.
4	Selection of licensable IP and negotiation of IP licenses	Patent assignment and license agreements
5	Advice and direction for improvements in product production environment	Technical support, etc.

Photo 1 Example of exhibit at a trade show
Collaboration networking event held by the Tokyo Metropolitan Small and Medium Enterprise Support Center
October, 2013

technologies under the title, "Recent Recommendations." If companies or organizations that are interested in NICT IP appear during the process, agreements are established with them according to the technology transfer flow illustrated in Table 2. An area of difficulty with this sort of technology transfer is that there are no standard answers as to which of the various options for industry collaboration to use, the timing of such efforts, and at what stage of completion the IP should be provided to the enterprise, based on various conditions such as the details of the technology in question, its characteristics, application area and placement as a product or service, the development state of the research project that is the basis for the IP, and the enterprise business plan.

Technology transfer agreements include conditions such as payment of royalties according to sales volumes and periodic sales and other business reporting. By receiving such reports, NICT can be aware of how the technologies it has provided are spreading. NICT can also dispatch researchers to provide technical guidance, depending on the conditions.

In these ways, NICT research results and technologies are transferred to enterprises that can use them to conduct business, and this provides a system for the enterprises to deliver products and services to the public, which perform and function better than before, and to develop NICT research results and technologies in society.

Recent state of technology transfer (incidents, monetary value)

We will now examine the state of technology transfer at NICT in the past several years. Each year, there are 20 or more new agreements (Figure 1). Since FY2011, when we entered the Third Medium-term Plan, revenues from IP have exceeded those in the previous medium-term plan (Figure 2), but this is due to a significant increase in IP revenue from software.

Most of the IP involved in technology transfer recently has been in the fields of language and translation, information security, and wireless communication related technologies. An "IP utilization rate" was also defined to express which among all IP held are actually being used, and this index (value) is also increasing every year as a result of activities to increase utilization of IP.

Table 2 Technology transfer flowchart

Introduce NICT research results and technology
・NICT Open House, trade shows, events, etc.
・NICT press releases, articles in various media, etc.
・NICT website
・Providing information in communities in various fields

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・Consult on patents and technologies
・Consult on licensing agreements, etc.

↓

・Apply for licensing agreement

↓

・Licensing agreement for patent or other IP

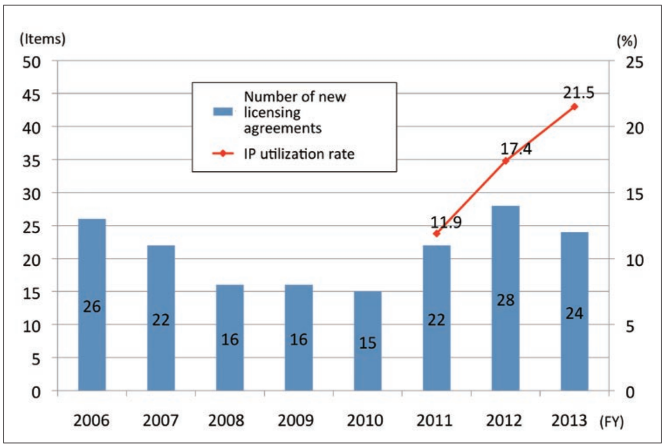

Figure 1 Trends in number of new licensing agreements

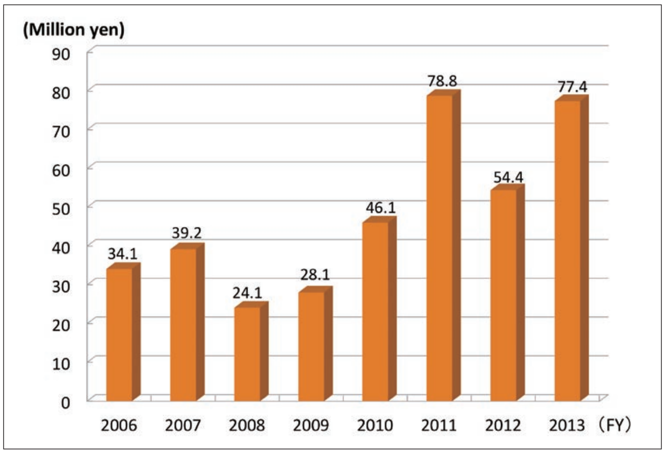

Figure 2 Trends in IP revenues

Conclusion

In this article, we have introduced the technology transfer systems at NICT and discussed conditions and statistics related to technology transfer. We also plan to visit enterprises to which we have transferred technologies in the past, and to conduct interviews to hear directly from them, how NICT technologies are being used. We will report on these in upcoming issues.

Report on NICT Special Summer Open House for Children

For two days, on July 24 and 25, NICT held the "NICT Special Summer Open House for Children" at NICT headquarters in Koganei City, Tokyo. It was attended by 746 visitors.

The purpose of this event was to foster an interest in science and technology, mainly in children, by introducing details of research at NICT. This year we featured a science workshop, Antarctica class, experience areas, and guided tours on topics including Japan Standard Time, Space Weather Forecast, Polarimetric and Interferometric Airborne Synthetic Aperture Radar System (Pi-SAR2), and Space Optical Ground Station Center.

In the science workshop, participants made a planetarium while learning from experiments on the properties of light. In the Antarctica class, they listened to lectures from a researcher who participated in an expedition to the Showa Station in Antarctica. We also familiarized participants with some of NICT's research activities by showing them the actual facilities and giving explanations of topics including how Japan Standard Time is determined, the effects of solar activity on communications, remote sensing technologies using radio waves, and space optical communications. In the experience areas, visitors got hands-on experience of topics including a 4-dimensional digital globe, types of encryption, how clouds are formed, and the wonder of light using polarizing plates and diffraction grating.

Event photos

Workshop class (Making a planetarium using the properties of light)

Let's talk to a member of a Japanese Antarctic Research Expedition!

■Guided tours

Polarimetric and Interferometric Airborne Synthetic Aperture Radar System (Pi-SAR2)

Japan Standard Time

■Experience areas

Touch the ice of Antarctica (Materials provided by the National Institute of Polar Research)

Wonder of light

4-dimensional digital globe (Dagik Earth)

Antarctic mail

Types of encryption

Let's make clouds

Space Weather Forecast

Space Optical Ground Station Center

Report on Facility Open House 2014 of Advanced ICT Research Institute

—Experience the Future of Information and Communications Technology!!—

Toshifumi TERUI
Planning Office, Advanced ICT Institute

The Advanced ICT Research Institute in Kobe held its 2014 Open House on July 26. The weather was fine and 613 visitors attended. Many of the visitors participated in the quiz rally, which is popular every year, and enjoyed visiting the various booths to meet with the researchers and experience the displays they had prepared.

7th public lecture was also held at the same time, explaining latest research results in the nano, bio, and neuro fields, through examples familiar to all. The event was a success, with nearly all seats filled.

The Kinki Bureau of Telecommunications, of the Ministry of Internal Affairs and Communications, also participated, as well as the Akashi Municipal Planetarium, which held a special program. It was a good opportunity for the local residents to learn about the activities of NICT in Kobe.

Exhibit booths

Experiencing the very low temperature world (below -120 degrees Celsius) where superconductive phenomenon appear

Studying information processing mechanisms of biomolecules using a homemade optical microscope

Phased array weather radar (Applied Electromagnetic Research Institute)

Easy introduction to radio wave monitoring equipment (Kinki Bureau of Telecommunications)

Special Feature: Astronomy superheroes SHIGOSENGER (Akashi Municipal Planetarium)

Lecture

7th public lecture

Awards

Recipient ● Ryouichi NISHIMURA／Research Manager, Spoken Language Communication Laboratory, Universal Communication Research Institute

Co-recipient:
Kotaro SONODA (Nagasaki University)

◎Award date: May 15, 2014

◎Name of Award: EMM Best paper award

◎Details:
The paper contributes to the expansion of research on multimedia information hiding and enrichment and has been recognized as an excellent paper.

◎Awarding Organization:
Technical Committee on Enriched Multimedia, IEICE

◎Comment from the Recipient:

The 3D sound technology has steadily advanced through accumulated research, but a remaining difficulty is the lack of opportunities to experience it. This award recognizes a method of transforming audio sources in ordinary 5.1 channel surround sound format such that users can listen to them as 3D sound, even on conventional stereo playback devices. We would like to thank all those who worked with us on this, and we hope to continue to contribute to developing audio communications technology.

Recipients ● Kentaro ISHIZU*i Keiichi MIZUTANI*ii Zhou LAN*iii Ha Nguyen TRAN*ii Stanislav FILIN*i Takeshi MATSUMURA*i Homare MURAKAMI*i Hiroshi HARADA*iv

*i Senior Researcher, Smart Wireless Laboratory, Wireless Network Research Institute
*ii Researcher, Smart Wireless Laboratory, Wireless Network Research Institute
*iii Former: Senior Researcher, Smart Wireless Laboratory, Wireless Network Research Institute
*iv Managing Director, Social ICT Research Center

Co-recipients:
Keigo HASEGAWA, Masayuki TAKEKAWA
Kei YANAGISAWA, Keat-Beng TOH
Seishi SASAKI, Masahiro ASANO
(Hitachi Kokusai Electric Inc.)

◎Award date: May 22, 2014

◎Name of Award: Technical Committee on Software Radio Special Award

◎Details:
For the most excellent technical demonstration in the IEICE technical committee on software radio with title "IEEE802.11af/IEEE802.22 White Space communications network to protect primary users and to coexist with secondary users"

◎Awarding Organization:
Technical Committee on Smart Radio, IEICE

◎Comment from the Recipients:

To implement radio communications using frequencies within the television broadcast bands that will not affect broadcasts (white spaces), we have developed the first-ever long and medium-range radio and a database to manage frequencies, and have built a system linking them together. This work has been highly evaluated. We demonstrated this system last year in Iwate Prefecture, achieving the first ever wireless broadband communication over a distance of 12.7 km and speeds over 10 Mbps .

From the left: Kei SAKAGUCHI (representing the awarding organization), Kentaro ISHIZU, Keiichi MIZUTANI, Keigo HASEGAWA

Recipients ● Koki WAKUNAMI*i Yasuyuki ICHIHASHI*i Hisayuki SASAKI*ii Ryutaro OI*iii Takanori SENOH*iii Kenji YAMAMOTO*iv

*i Researcher, Ultra-realistic Video Systems Laboratory, Universal Communication Research Institute
*ii Research Expert, Ultra-realistic Video Systems Laboratory, Universal Communication Research Institute
*iii Senior Researcher, Ultra-realistic Video Systems Laboratory, Universal Communication Research Institute
*iv Director of Ultra-realistic Video Systems Laboratory, Universal Communication Research Institute

◎Award date: May 30, 2014

◎Name of Award: Best Paper Award

◎Details:
In recognition of an excellent poster presentation

◎Awarding Organization:
The 6th International Conference on 3D Systems and Applications (3DSA2014)

◎Comment from the Recipients:

This presentation describes hologram generation based on the mutual conversion between geometric and wave optics, which are conventionally handled separately. We are very happy that our research on high-quality 3D image display using holography is being recognized in this way. We would like to express sincere thanks to all members within and outside the institute who are related to the laboratory's electronic holography system, which we used for these optical reproduction experiments. Encouraged by this award, we will continue working to contribute to research in the field of 3D image display.

Koki WAKUNAMI

Recipient ● Naoyuki SHINOHARA／Researcher, Security Fundamentals Laboratory, Network Security Research Institute

Co-recipients:
Tsuyoshi TAKAGI (Institute of Mathematics for Industry, Kyushu University)
Takeshi SHIMOYAMA (FUJITSU LABORATORIES LTD.)

◎Award date: June 5, 2014

◎Name of Award: Achievement Award

◎Details:
For pairing-based cryptography, which is being standardized as the next generation of cryptography, we have achieved a world record in successfully cryptanalyzing the cryptography with a 278-digit key, which could not previously be cryptanalyzed. This result can be used to derive key-lengths needed for safe encryption, so it is a major contribution to advancing this field.

◎Awarding Organization:
The Institute of Electronics, Information and Communication Engineers (IEICE)

◎Comment from the Recipient:

Use of pairing-based cryptography is expected to contribute to the safety of cloud-based information services and diversification of such services, so its implementation as the next-generation cryptography is much anticipated. This result will be used to set parameters for safe pairing-based cryptography. We would like to express sincere thanks for the broad support we received from many people for this research.

Naoyuki SHINOHARA (on the right)

Keihanna Information and Communications Fair 2014

—Science from Kansai Science City, Connecting with the Future—

Admission Free
No Registration Necessary

Date/Time: **November 6–8, 2014 (Thu.–Sat.)**

Location: Keihanna Plaza, ATR, SCSK
http://khn-fair.nict.go.jp/ (Japanese only)

The NICT Universal Communication Research Institute will be holding the "Keihanna Information and Communications Fair 2014," in cooperation with organizations located in Kansai Science City, as a local, collaborative event. The goals of the event are to announce research results in information and communications technology and to promote interaction among the organizations involved. We encourage all to participate!

Main Exhibits

- Disaster-information analyzer on SNS
- Multilingual communication support application software for initial hospital examinations
- Peer aware communication network that works independently from infrastructure
- Captioning system using neural-net-based speech recognition
- Cyber-physical social data collection and analysis platform
- Report on demonstration of glasses-free multi-view images at Grand Front Osaka
- Expansion of multi-sensory evaluation technology in society

Multilingual communication support application software


Peer aware communication network that works independently from infrastructure

Main Lectures

- Spreading multilingual speech translation system towards Tokyo 2020 Olympic Games
  —Global Communication Project—
- Peer aware communication network that works independently from infrastructure
  —Network testbed using the Seika Kururin Bus—

There will also be many other exhibits and presentations of advanced research results.

Related Events

- **Keihanna Information and Communications Fair 2014 @ The Knowledge Capital**
- **"Keihanna" Experience Fair 2014 @ The Knowledge Capital**

Date/Time: **October 17–19, 2014 (Fri.–Sun.)**
Location: Grand Front Osaka, The Knowledge Capital, The Lab. (2F, 3F)

A special public presentation of content from the Daian-ji temple on a 200-inch glasses-free multi-view image system is planned.

Open House planned for FY2014

◆ Okinawa Location

Okinawa Electromagnetic Technology Center (Onna Village, Kunigami District, Okinawa)
November 22, 2014 (Sat.), 10:00-16:30 (No admittance after 16:00)

◆ Koganei Location (NICT Open House 2014)

NICT Headquarters (Koganei City, Tokyo)
November 27 and 28, 2014 (Thu.-Fri.), 9:30-17:00 (till 16:30 on 28 (Fri.))

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〈Recycled Paper〉