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National Institute of Information and Communications Technology

Leadoff Interview

Supporting Information and Communications Technology as Societal Infrastructure

R&D for Improving Reliability and EMC Provisions at the Board and Component Levels

Kaori Fukunaga 1

NiCT

Supporting Information and Communications Technology as Societal Infrastructure

Kaori Fukunaga
Research Manager, Electromagnetic Compatibility Group, Applied Electromagnetic Research Center

After completing a master's course in engineering, worked at Fujikura Ltd. and obtained a doctoral degree. Joined the Communications Research Laboratory (current NICT) in 1994, and has been engaged in research on high frequency characteristic and reliability evaluation methods for dielectric materials and applications of non-destructive inspection using millimeter-wave and terahertz technology. Doctor of Engineering.

EMC technology, which preserves a radio frequency environment allowing unobstructed use of communications, supports information and communications technology, which forms a base for our society. Measurement technology is a fundamental part of EMC technology.

"Measurement and Evaluation" attracts little attention

Please tell us about your work in the EMC Group.

Fukunaga: As the name implies, Electromagnetic Compatibility (EMC) is a kind of tolerance concerned with whether electromagnetic noise emitted by electrical or electronic devices affects surrounding systems and devices, and conversely, whether devices are resistant to the effects of electromagnetic noise emitted by surrounding systems or devices.

For example, depending on conditions, EM noise emitted from communications devices such as PCs can affect broadcasts or other communication, and the EM signals used by mobile phones could have an effect on some medical instruments. Work at the EMC Group centers on research on measurement, evaluation, and measures to prevent this sort of interference from occurring, as well as contributing to setting technical standards that support unobstructed operation of these devices. Normally we do not attract much attention, but we do get put in the spotlight when there is a problem.

It sounds like behind-the-scenes support...

Fukunaga: That's right. And the field which I work in, the reliability of communications device hardware, receives even less attention. Also, communications networks are part of societal infrastructure, comparable to power lines, so they really should be evaluated for reliability with the same rigor, but the focus is always on new functions and low cost, and because parts of switching equipment in base stations, for example, can be fixed by simply swapping, we rarely get to the cause of the problem.

When you evaluate physical reliability, are you measuring properties of the material?

Fukunaga: The physical reliability of a communications device depends on the characteristics of the materials from which it is made, within the environment where it is used. It is important to measure device characteristics at DC and AC, 50 Hz or 60 Hz if it is a power source, or at signaling frequencies if it is a signal line. The Electromagnetic Compatibility Group belongs to the Applied Electromagnetic Research Center, and the main group of the Center uses EM radiation to measure the terrestrial and space environments, so measurement is a major theme of the Center. Evaluation of materials is an area closely connected to industry, so an important part of our work is making the results of NICT research, including the development of new materials, available to the public.

Can you give us a concrete example?

Fukunaga: One example is a liquid used to create human-body mock-ups for evaluating mobile-phone safety. The Specific Absorption Rate (SAR) mentioned in mobile phone manuals is computed by placing a liquid with electrical characteristics similar to a human head in a body-shaped container, positioning the mobile phone as though it was being used, and measuring the electrical field strength inside the liquid. We were involved in the development and commercialization of that liquid.

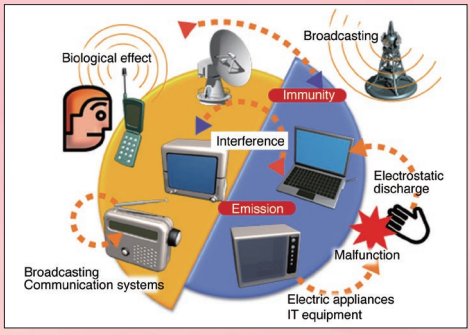


Figure 1: EMC Concepts

Was this NICT development the first of its kind?

Fukunaga: A similar product from another manufacturer had been imported together with a test system, but the product gave of an unpleasant smell. So, we wanted to make our own, odorless and non-polluting product, incorporating other benefits such as good temperature characteristics.

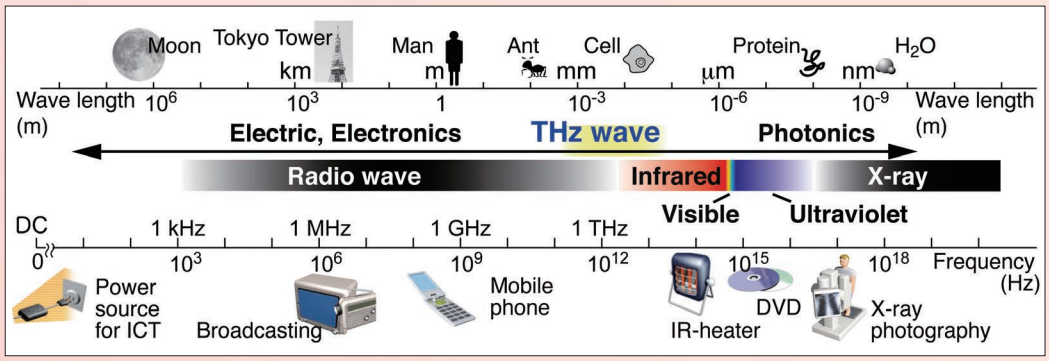


Figure 2: Application Fields from DC to the Terahertz Waves

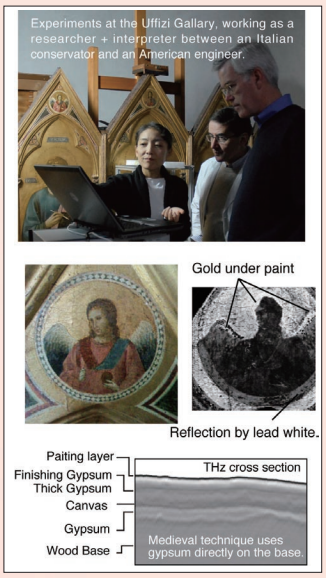


Figure 3: Analysis of a Painting by Using Terahertz Waves (Altarpiece by Giotto, Tempera Painting, around 1300 A.D.)

Therefore, we did the basic study at NICT and NTT-AT did the actual commercialization. The product is now used widely in Japan and overseas by organizations like TELEC (Telecom Engineering Center).

Do you have any other practical examples which you can tell us about?

Fukunaga: We have also developed a variety of equipment, including systems to evaluate the internal charge accumulated in materials for spacecraft such as communications satellites, the long term reliability of insulating materials, for evaluating the high-frequency characteristics of dielectrics and development of new materials, and to evaluate shielding characteristics over 1 GHz. What we are currently focusing on are non-destructive inspection methods using terahertz (THz) waves. This technology was also introduced in the leadoff interview of the March issue this year (by Iwao Hosako, Group Leader of Advanced Devices Research Group) and major breakthroughs are being anticipated around the world in this field.

Increasing anticipation for the terahertz band

We've heard a lot about your analysis of the materials used in Renaissance paintings.

Fukunaga: I love the fine arts, so this is dream work for me. When I heard about the characteristics of the terahertz band and that it could be used for spectroscopy, it occurred to me that it could reveal structure in tempera paintings not visible with x-rays or infrared. Around the end of 2006, we did a comprehensive analysis of the spectra for materials used in classical western paintings as well as those used for conservation work. When we published the database, it quickly spread around the world. I was so happy to hear conservators say how it was just what they needed!

That really provided good publicity informing people about the terahertz band, didn't it?

Fukunaga: This as-of-yet untapped frequency band can also be used for communication, but I believe it will expand in spectroscopy and imaging technology first. It has only just started to receive notice, and with cooperation from specialists within and outside the institute, we plan to advance development of various industrial applications beyond cultural materials, as a general non-destructive sensing technology. We already know that the terahertz band is useful, so now if we can increase the number of users and nurture technology for their various applications, it would be utilized more for general purposes.

Can you tell us about your aspirations for the future?

Fukunaga: General technology for evaluating and measuring dielectric and electrical insulating materials for high-frequency bands above micro-wave has not yet been standardized internationally. From the materials development perspective, the GHz band is a different world, and for the materials user, material properties change with temperature and humidity. These factors are not yet being taken into account in design. As the most urgent assignment, we need to be established for evaluating materials in terms of both the reliability of communications devices themselves and for EMC design. It's not particularly eye-catching work, but I intend to tackle it in a way as attractive as possible.

Thank you for speaking with us today.

Figure 4: Examples of Technology Transferred to Industries: Human-body-equivalent liquid used for evaluating mobile-phone safety (Right); Electrode for spatial-charge measurements used in evaluating items such as space materials, copy-machine drums and electrical power cables (Left Front: Invention by Takashi Maeno, Senior Researcher of Environment Sensing and Network Group); 1-GHz-and-over shield-characteristic measuring equipment, developed through collaborative research with Tokyo Institute of Technology (Left Rear).

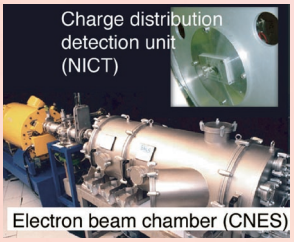


Figure 5: NICT's Charge-Distribution Observation Unit Installed in the French Space Agency's Electron-Beam Exposure Equipment

Finding Credible Web-Content from Mixed Information on the Internet

Introducing the "WISDOM" Credibility-Analysis Engine

Profile

Yutaka Kidawara

Group Leader, Knowledge Clustered Group, Knowledge Creating Communication Research Center

After completing a master's degree, worked at KOBE Steel, Ltd. before joining the Communications Research Laboratory (current NICT) in 2001. Engaged in research and development in ubiquitous-content technology. Transferred to the executive office of the Council for Science and Technology Policy in 2006. Current employment since 2007. Currently engaged in research and development on information-credibility analysis technology and knowledge-cloud building technology. Doctor of Engineering.

Dealing with the web-content from mixed information on the Internet

We are currently in an age of information explosion, in which the general public who were formerly information consumers can now publish information by using blogs and other means. This is creating an explosive increase in information. Blogs and Social Network Service (SNS), which allow the general public to publish information easily, are called Consumer Generated Media (CGM), and the information published by so many people through CGM is forming a Collective Intelligence. This change has been called "Web 2.0", suggesting that different from the conventional Web, it is a qualitatively new change. The explosive increase in information brought by CGM is also causing new types of problems.

General search engines like Google find Web content by using search key words, but the ranking applied does not take the validity of the content into consideration. Even if a search result ranks first on the list, it does not mean that information always is of good quality. Thus, it becomes the responsibility of the user to find credible and high-value information among the results listed. This is very difficult when key words entered in a search engine return a million or more hits, because it is extremely difficult to ascertain questions such as: who prepared the information; how many people agree with it; what other opposing opinions there are; or whether or not it was created under a proper policy.

As a result, most people just look at the top-ranked results on the page and take the information as correct if it appears to be the same.

Overall vision of WISDOM

At the Knowledge Clustered Group of the NICT Knowledge Creating Communication Research Center, we are advancing research in data-analysis technology, attempting to solve the problem of how to find credible and high-value information within the huge amount of content on the Web.

When deciding the credibility or value of information written in a blog (e.g. "such-and-such is good for dieting"), much depends on individual users' values, so we cannot expect a simple result like "not reliable because unproven scientifically" to satisfy users. It can be said that users could clarify their questions with information such as: who wrote the blog; what is the distribution of supporting and opposing information; what sorts of things are written on related Web sites; and what sort of opposition exists.

In response, the Knowledge Clustered Group has been researching and developing the information analysis technology which analyzes Web content based on high-level Natural Language Processing (NLP), and using this technology to develop an information-analysis engine called "Web Information Sensibility and Discreetly Ordered and Marshaled" (WISDOM). WISCOM can be used as easily as a conventional search engine. An overview of WISDOM is shown in Figure 1, and the system architecture is shown in Figure 2.

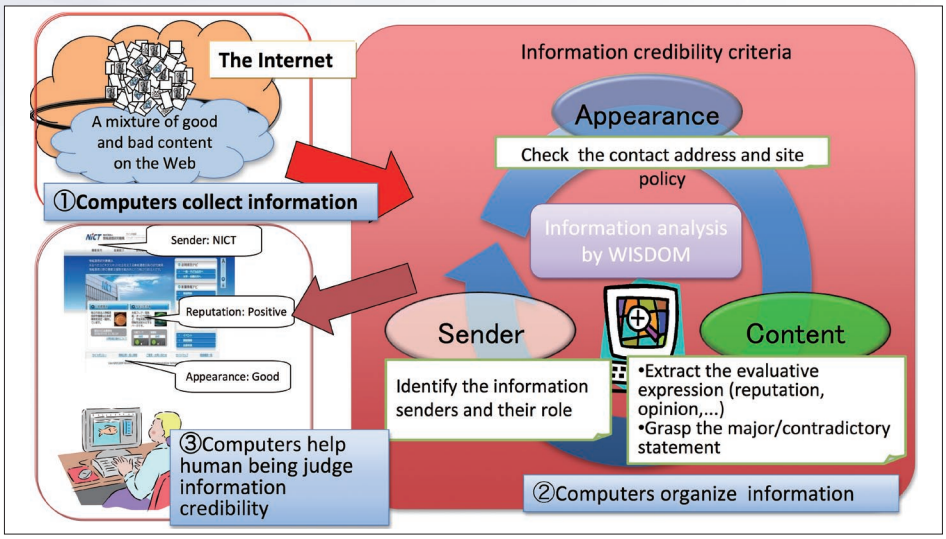


Figure 1: Overview of WISDOM

A user enters a topic to be investigated into WISDOM for analysis in the form of keywords or sentences equivalent to key words in a search-engine. These are sent to the TSUBAKI (*Note) search engine to find relevant Web pages. Then, the appearance, content and authorship of each Web page are analyzed and the results are displayed. To perform this analysis, we have developed the following technologies.

[Development of a Data Infrastructure]

For development of WISDOM, we perform our own crawling (gathering Web data) rather than using the results from existing search engines, allowing us to store the Web pages and perform a more detailed analysis. At this time, we have collected a database of approximately 700 million pages, and are using 100 million of those pages in our information-analysis-technology research and development. This database is shared with TSUBAKI, allowing implementation of seamless collaboration and high-speed analysis (Figure 2(a)).

[Analysis of Major and Contradictory Sentences]

Noun phrases and predicate-argument structures (sentences) are extracted as phrases that occur frequently in related Web pages. By presenting both the major and contradictory expressions at the same time, both the facts and the points in question regarding the matter being analyzed are shown (Figure 2(b)).

[Analysis of Evaluative Expressions]

Various opinions and evaluation information are included in the text of a Web page. We are conducting R&D into methods for classifying evaluation data into six types and polarities (affirming/opposing) using machine-learning techniques (Figure 2(c)).

[Analysis of Information Source]

We then determine the source of the Web pages from the page content or the person or organization responsible for publishing them, including not only author, but also other factors such as: where it was quoted and who operates the site, and then classify the sources into six source types (Figure 2(d)).

An example of information analysis by using WISDOM is shown in Figure 3.

Towards building new information-utilization basic technology

As introduced above, the objective of WISDOM is to analyze Web-page content and provide information that helps users use information on the Web appropriately. By helping clarify what biases or opposing opinions exist for content that a user is interested in, the user should better be able to determine the credibility of the information.

This type of information-analysis technology can be applied to other scenarios as well. For example, the voice conversation system being developed in cooperation with the Spoken Language Communication group of the Knowledge Creating Communication Research Center is also using the evaluative-data analysis function from WISDOM to suggest famous sites in a Kyoto tourism scenario.

A beta (β) version of WISDOM is currently open to the public for testing purposes (http://wisdom.nict.jp/). The current version uses an older Web archive, so the output of analysis contains some old content, but we are continuing R&D towards realizing a full release during this fiscal year which will involve regular crawling and analysis results that are even more accurate.

Please try to access it!

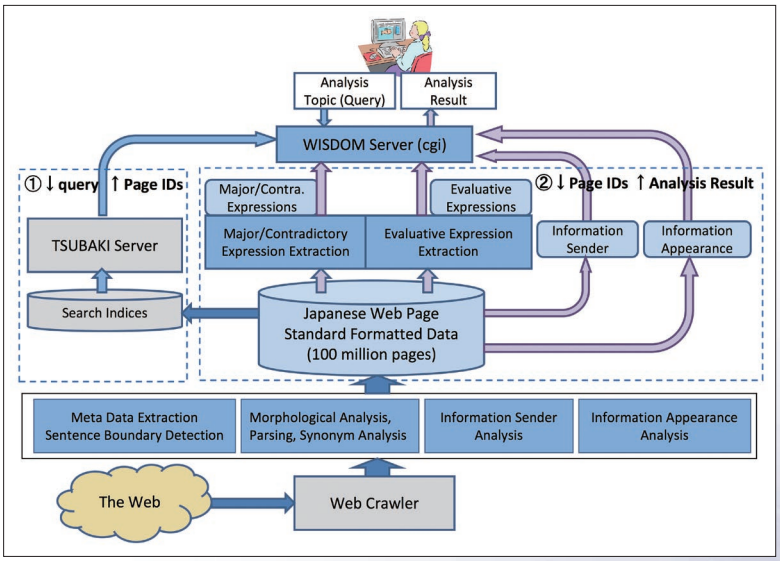


Figure 2: System Architecture of WISDOM

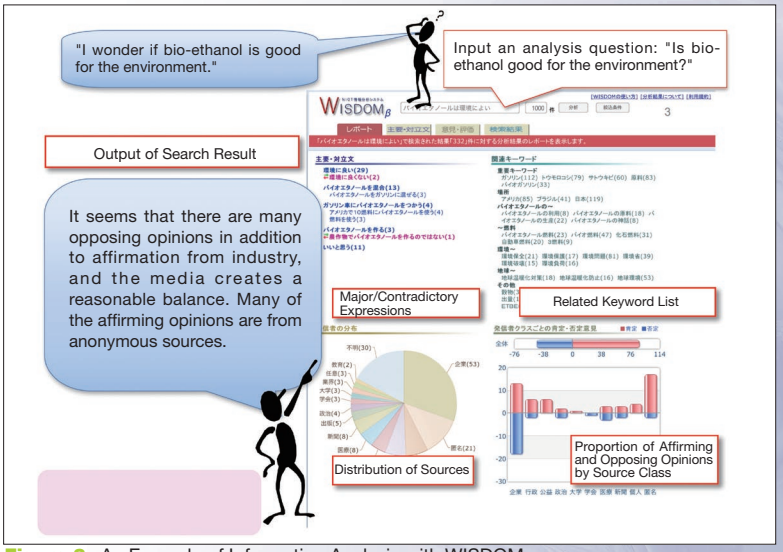


Figure 3: An Example of Information Analysis with WISDOM

*Note: TSUBASA is a search engine specializing in natural-language-processing which has been developed at Kyoto University under the "Research on New IT Fundamental Technologies towards Information Explosion Era" special research field supported by MEXT Grant in Aid of Scientific Research.

Minna no Hon'yaku

Profile

Masao Uchiyama

Senior Researcher, Language Translation Group, Knowledge Creating Communication Research Center

After completing a doctorate, joined the Communications Research Laboratory (current NICT) in 2001. Engaged in research in natural language processing, and particularly natural language translation. Doctor of Engineering.

A Web Site Supporting Volunteer Translators and Free Distribution of Translations

Translation by volunteers

Various types of documents are being translated by volunteers including, for example, manuals for open source software that is developed in a collaborative way, blogs, and documents from NPOs and NGOs.

Volunteer translators make a significant contribution around the world through translation. For example, Japanese users are very grateful for manuals in Japanese, and blog translations shed light on various areas and people that are neglected by other media. As such, supporting volunteer translators can also be a significant contribution around the world.

In Japan, there are currently several thousand volunteer translators translating from foreign languages, and particularly from English, there may be as many as several tens of thousands of potential volunteer translators who are not currently active.

Because of this, providing an environment where people who are interested in translating can do it easily would encourage even more people to begin translating, making more information from other countries available in Japan, while spreading information from Japan more widely throughout the world.

With this as an incentive, the NICT Language Translation Group in collaboration with the Library and Information Laboratory at the University of Tokyo have created the "Minna no Hon'yaku" Web site (Figure 1).

The features of Minna no Hon'yaku include: (1) Providing access for anyone to the QRedit highly-functional translation-aid editor developed by the University of Tokyo; (2) Translations published through Minna no Hon'yaku are licensed allowing derivative

Figure 1: "Minna no Hon'yaku" Website (http://trans-aid.jp/)

works to be created and published, so they can be used by others, under appropriate conditions, and (3) the Grand Concise English-Japanese dictionary (with 360,000 entries) is made available to support translation, through the cooperation of Sanseido Bookstores Ltd.

QRedit highly-functional translation-aid editor

The basic design concepts used for the QRedit translation-support editor can be summarized in the following four points: (1) Economizing the translator's current workload rather than providing new information or functionality; (2) The translator, rather than the system decides what information is to be provided; (3) Presenting information that enriches the translator's expressiveness, and (4) Keeping it as simple as possible. These principles were decided based on interviews with translators and the current standard for translation-support technology.

QRedit looks up terms in the input text in many dictionaries and terminology lists registered by translators, so that the translator can easily understand the equivalent terms in translation with a click of the mouse. A high-level idiom search function is also provided for looking up idioms and other compounds.

These compounds are emphasized in QRedit with underlining and other means, as shown in Figure 2, so the translator does not overlook them. It is easy to make errors with idioms, even for skilled translators, so it is very helpful for the editor to be able to provide this sort of caution.

QRedit also provides Web search and terminology registration functions, allowing search for registered terms from within QRedit. This search can include terminology registered by other translators, as well as the current translator, so it will be possible to look up many terms not found in dictionaries as well, as more terminology is registered in Minna no Hon'yaku.

Sharing translations

It is necessary to consider the permissions for use of both the source text and the translation when sharing the results of a translation. For example, clearly, if the author of the source text does not provide permission to publish the translation, it cannot be made public.

Because of this, users of Minna no Hon'yaku are asked to confirm that the appropriate permission has been given for both the source and translated texts. Users are also asked to provide permission for secondary use of the translations which they have created. To do so, the system requires users of Minna no Hon'yaku to confirm permission for use when they save their translations, as described below (Figure 3).

(1) The system first asks for confirmation with the following message: "The document (source) which you

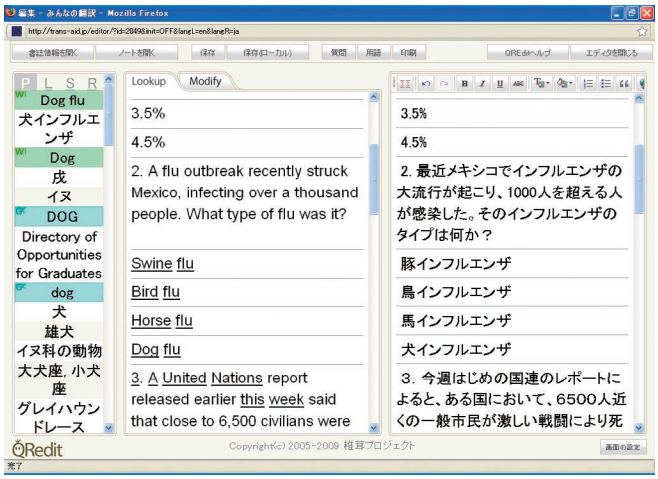


Figure 2: QRedit, Translation-Aid Editor

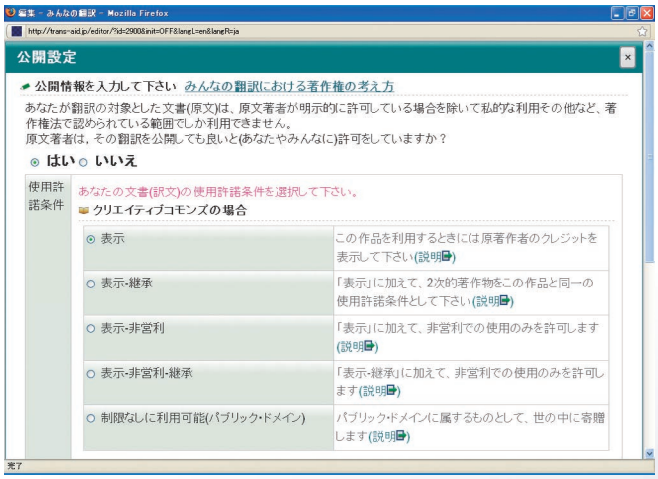


Figure 3: Document-use Consent Settings

have translated can only be used within specific scope, such as for private use, as stipulated by copyright law without the specific consent of the author. Has the author of the source given consent to publish this translation (to you or anyone else)?" ; (2) If answered "Yes", the system then asks the translator to provide permission to create and publish derivative works based on the translation and without contradiction to conditions using a license such as the Creative Commons License.

This allows Minna no Hon'yaku to provide a framework for translations to be shared, while still respecting the rights of the author and the translator.

Future research and development

Minna no Hon'yaku was opened to the public on April 8, 2009. Within about one month, approximately 500 users have registered so far. The system have also been used by four translation groups, including Amnesty International Japan.

The current Minna no Hon'yaku system only supports translation between Japanese and English, and vice versa but we are planning to expand to include more languages, and to continue research and development into linguistic processing technology to effectively utilize the translations and terminology shared in the system.

Development of a New Molecular-Communication Analysis Technique with Living Cells

Creating and Using Cells with Embedded, Artificially Controllable Devices

Profile

Shohei Kobayashi

Researcher, Biological ICT Group, Kobe Advanced ICT Research Center

After completing a doctorate, joined NICT in 2005. Engaged in research introducing biological/non-biological hybrid devices into living cells, and clarifying the resulting dynamics inside the cells. Doctor of Engineering.

Significance of developing information and communications technology learned from living cells

Information and Communication Technology (ICT) supports comfortable life in society through various forms, such as telephone and the Internet. On the other hand, due to the explosive increase in the frequency and quantity of information communications, the increase in energy consumption and the difficulty ensuring the stability of systems in times of disaster are emerging as new problems. To find a fundamental solution to these problems, it will not be enough to simply improve the existing technology, but technology based on entirely new concepts will be needed to complement, or in some cases, replace current communications technology.

Accordingly, the Biological ICT Group at the Kobe Advanced ICT Research Center is approaching these types of problems from an entirely new perspective. In other words, we are attempting to clarify the excellent characteristics of autonomy and adaptability to environmental change that living organisms possess, and to apply that knowledge to information communications technology. Within our attempts, the Cell Biology Project is advancing research on living cells, which are the smallest functional units that make up living organisms and that have these excellent properties (Figure 1). For example, if we can clarify the mechanisms within cells which allow them to efficiently and uniquely identify and eject foreign materials introduced into them, or how cells (or cell populations) respond to changes in the surrounding environment, we could discover efficient information processing rules from them. Then, if information communications system using biological molecules as a medium could be built by humans, we could overcome the problems of energy consumption and system stability, opening up avenues for development of completely new types of information communications technology that are easy on the environment and humanity.

Molecular communication conducted by living cells

Molecular communication refers to a form of communication using nano-scale chemical substances (biological molecules such as proteins or DNA) as a communication medium. Because molecular communication has excellent properties of having compatibility with living things and being usable in an aqueous environment, it has the potential to complement the existing technologies using optical and magnetic media, and progress to development of new communications technology.

Living organisms are able to demonstrate incredible abilities like autonomy and responsiveness to their environment, preserving the life of the whole organism by controlling the operation of huge numbers of biological molecules within them. Referring to this survival strategy — controlling molecular communication of huge numbers of molecules operating in parallel — may provide insight into questions such as, for example, what sort of rules are needed for a stable and efficient system connecting computers scattered around the world in a single network. In order

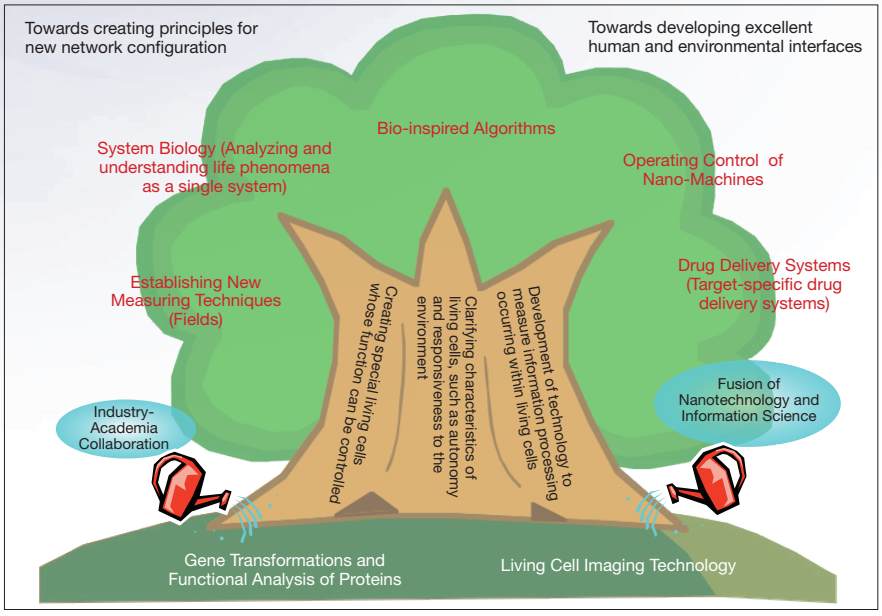


Figure 1: Outline of Research in the Biological Information Project

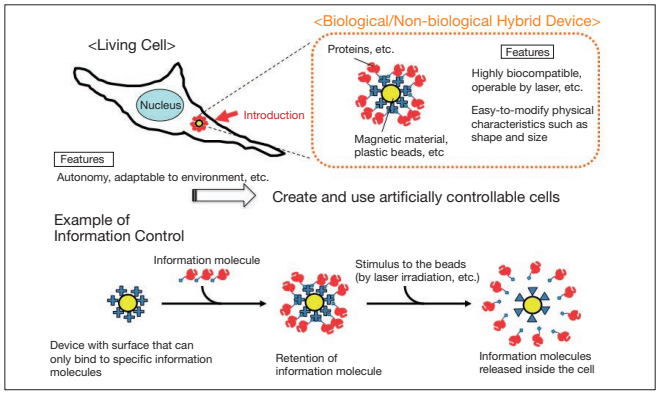


Figure 2: Creating Cells with Embedded Biological/Non-biological Hybrid Devices

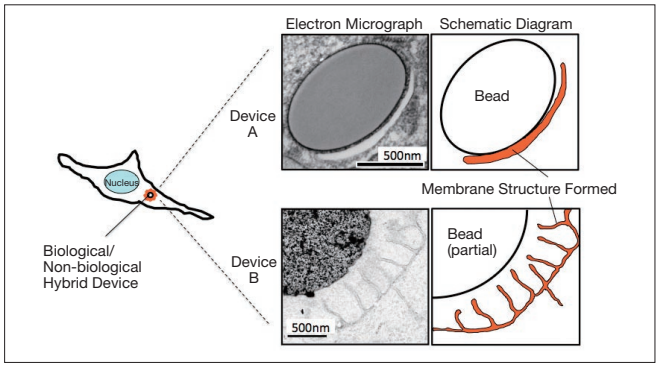


Figure 3: Controlling Formation of a Membrane inside a Cell Using a Device Device A and Device B (only 1/4 shown) are created with different bead material and biological-molecule coating.

to discover these types of rules, informed by biological organisms (bio-inspired algorithms), we must first analyze and understand the molecular communication mechanisms occurring in living cells, the smallest functional units that make up living organisms.

Creating controllable cells with embedded biological/non-biological hybrid devices

As the first step towards analyzing and using the molecular communication taking place in living cells, we conceived of an experimental system in which artificially controllable devices are embedded in living cells, and the cell's response to artificial stimuli can be analyzed (Figure 2). The most significant feature of this experimental system is that to increase affinity with living cells, the surfaces of non-biological material are coated with biological molecules. We call these biological/non-biological hybrid devices. Characteristics (size, materials, etc.) of these biological/non-biological hybrid devices can be adjusted easily according to the objectives of the experiment, so they should provide an extremely useful experimental tool. For example, by activating the stimuli from outside of a cell by laser irradiation under temporally and spatially-controlled conditions, it is considered that we could provide a more detailed analysis of not only the molecular communication within the cells, but also of the behavior of the overall cell (or cell population).

In our research so far, we have successfully embedded biological/non-biological hybrid devices into cultured living human cells, and artificially induced formation of a membrane surrounding the device (Figure 3). Next, by clarifying the mechanism by which differences arise in the membrane formed in response to the device, we should be able to induce desired phenomena at the desired location within the cells.

Future research activities

In order to further expand the current research and continue development of new communications technologies, two main steps will be required.

The first will be to attempt to make the biological/non-biological hybrid devices more usable. For example, by using hollow beads capable of storing a selection of different substances as the device material, or by using functional materials such as magnetic or biodegradable materials, the range of applications could be expanded. In order to realize this, research combining fields other than just biology and informatics, such as nanotechnology or organic and inorganic synthetic chemistry, will be extremely important.

The second step will be to continue promoting a vision for application development in the future. Currently, we are exploring applications using cells with embedded biological/non-biological hybrid devices as sensors or compact functional devices (processors) (Figure 4). For example, if we can advance our understanding of the behavior of magnetic substances (transmitting and receiving EM waves) in a biological environment, it may be useful for environmental monitoring or related to ideas such as body-area networks (BAN) in medical support fields. There could also be other engineering applications in which the device can be used as a reaction site to assemble complex bio-compatible devices in living cells.

By understanding and allocating the strengths of artificial machines as well as cells and biological molecules, better overall information communications systems will be created. We intend to continue active research and development on information communications technologies based on these new concepts.

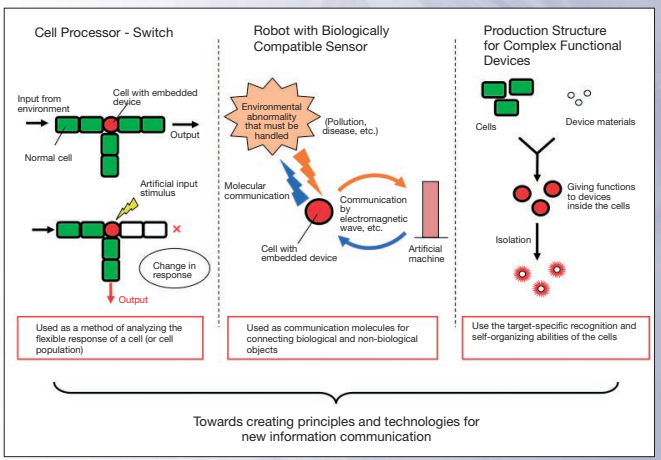


Figure 4: Example of a Future Application of a Cell with Embedded Device

Introduction of New Staff in Fiscal 2009

General Staff
Personnel Affairs Team
Personnel Affairs Office
General Affairs Department

Mana Kawasato

I'll work hard to learn my job and to become a full contributing member soon! Health is the most important thing!

General Staff
Property and Service Contract Team
Contract and Property Office
Financial Affairs Department

Kazune Takishima

This is my first year as a working member of society, but despite my short experience I'll work hard to be helpful to other members as soon as possible.

Researcher
Network Architecture Group
New Generation Network
Research Center

Hideaki Furukawa

I hope to contribute to societal development through information and communications technology.

Researcher
Network Architecture Group
New Generation Network
Research Center

Takaya Miyazawa

I plan to conduct R&D with a broad perspective, not limited to fields of past research.

Researcher
Advanced Device Research Group
New Generation Network
Research Center

Issei Watanabe

I ll utilize the experience gained as a Research Trainee and Limited Term Researcher to devote myself to being a Researcher.

Researcher
Biological ICT Group
Kobe Advanced ICT
Research Center

Hiroto Tanaka

I will make every effort and put much enthusiasm into biological research with a view to information and communications at the Kobe Advanced ICT Research Center.

Researcher
Security Fundamentals Group
Information Security
Research Center

Shinichiro Matsuo

I was hired from the private sector. I will work hard for the creation and dissemination of research results, making full use of my role at a national research facility.

Researcher
Electromagnetic Compatibility Group
Applied Electromagnetic
Research Center

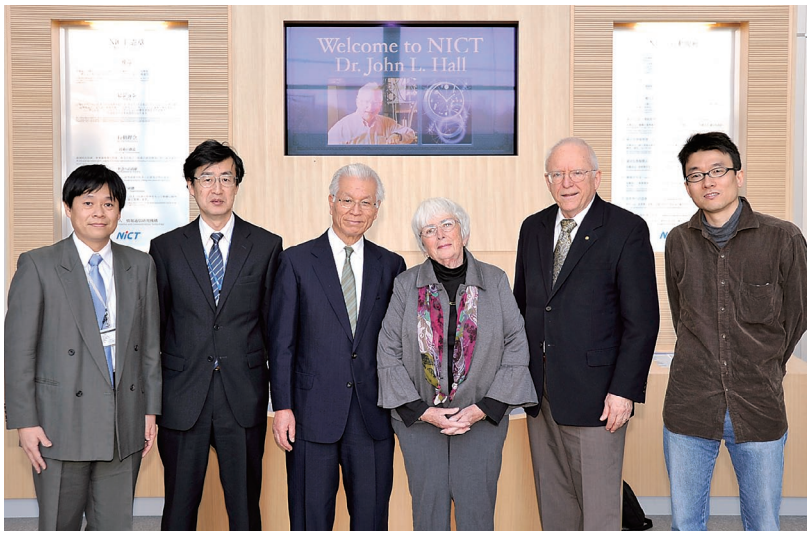
Rira Hamada

I feel embarrassed to be called a novice, but I'll work hard, not forgetting my initial goals. I look forward to working together.

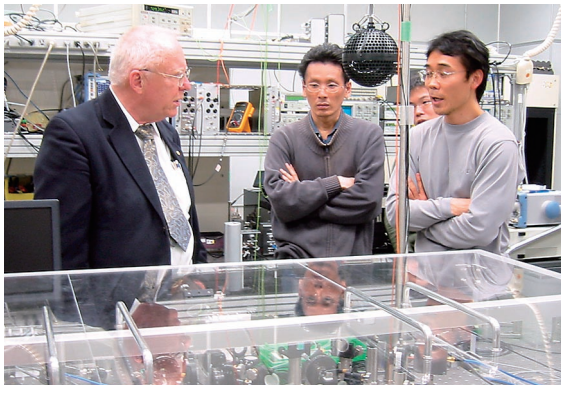
Dr. John L. Hall's Visit to NICT

On March 23, Dr. John L. Hall, an American physicist, visited the NICT Koganei Headquarters together with Prof. Emeritus Takuma from the University of Electro-Communications. Dr. J. Hall received the 2005 Nobel Prize in Physics for research on precision spectroscopy, including the frequency comb technique. His visit focused on NICT research facilities for frequency standardization and quantum ICT, and he provided a variety of advice from a specialist perspective.

Dr. J. Hall to be the second man from the right



Dr. J. Hall visiting one of the Laboratories



Prize Winners ◆ PRIZE WINNERS' PROFILES

Winner ● Shinichi Nakagawa

Senior Researcher, Project Promotion Office, New Generation Network Research Center

◎DATE: 3.11.2009

◎NAME OF THE PRIZE:
Contribution Award for Activities of Information Processing Society of Japan

◎DETAILS OF THE PRIZE:
As a member of the journal editorial committee for the past 3 years, made a large contribution to the society's journals, energetically planning and editing many special issues, series, and explanatory articles.

◎NAME OF THE GROUP:
Information Processing Society of Japan

◎Comments by the Winner:

Since we ran articles related to computer networks and the Internet about 10 years ago, we have proposed and edited articles and features related to the WIDE Project and the NICT Project called JGN for the journal of Information Processing Society of Japan. I would like to give particular thanks to those authors writing the features on IPv6 and JGN2 last year, giving us their very meaningful suggestions. I would like to encourage you to participate in the Information Processing Society of Japan in the future as well. Thank you very much.

Winner ● Masahiro Takeoka

Senior Researcher, Quantum Group, New Generation Network Research Center

◎DATE: 3.27.2009

◎NAME OF THE PRIZE:
Young Scientist Award of the Physical Society of Japan

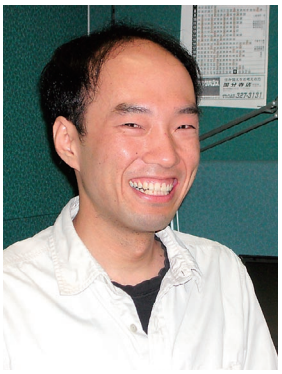
◎DETAILS OF THE PRIZE:
Theoretical Study on the Physical Implementation of Quantum Measurements in Optics

◎NAME OF THE GROUP:
The Physical Society of Japan

◎Comments by the Winner:

In this research, we established a design theory for realizing practical quantum measurements, as predicted by fundamental theories of quantum mechanics.

I am very pleased to be recognized for this result, which provides the fundamental theory for designing a quantum receiver to realize extreme performance in optical communication and measurement. Afterwards, using this award as encouragement, I plan to push this research and development strongly towards realizing such a receiver. I would like to express deep gratitude to everyone in the Quantum ICT Group, and the many other cooperating researchers within and outside of NICT.



Winner ● Harunobu Masuko

Executive Research Supervisor

◎Spring, 2009 Medal: The Medal with a Purple Ribbon for Scholarly Achievement

◎Comments by the Winner:

Upon this occasion of receiving the Medal with Purple Ribbon, I would like to express deep gratitude to the President, Vice President, the Board of Directors, and everyone at NICT. This award recognizes work done on aircraft-mounted synthetic aperture radar, so I see it as an award shared with everyone at the Applied Electromagnetic Research Center as well. I also must thank everyone in the General Affairs Department again for all of the support that they provided in financing and planning, advancing payments and other support when funds were short for contract bidding or development work. Compared to other radar, whose resolving power is essentially determined by antenna size, synthetic aperture radar is able to realize dramatic increases in resolving power by using principles similar to those used in medical CT scans. With applications in such a wide range of fields, it has been the radar technology of my dreams, and developing it has been my greatest ambition since we began making radar observations of the Earth in the days of the CRL. Because there was only one radio research facility in Japan doing this development, we had to strive to achieve world-class work. I had to ask many quite-unreasonable and selfish requests of everyone involved, but thanks to their

efforts, including the Ministry of Internal Affairs and Communications, the work is now highly evaluated and its circle is expanding. For me, this is like a dream come true. I am the third person from CRL to receive the Medal with Purple Ribbon, but in the future, recognition for research results in the information communications field at NICT will increase and spread, and it is my hope that this will produce many more award winners.

Getting Ready for Dreams towards the Next Generation

NICT Employment Information for
Permanent General Staff in Fiscal 2010

The National Institute of Information and Communications Technologies (NICT) is an incorporated administrative agency that conducts research and development on the information communications technology supporting the ubiquitous-network society of the future, with a consistent and integrated perspective from the fundamental to applied levels.

In order to advance research and development on information and communications technology at NICT, we are recruiting permanent general staff who are excellent and ambitious, and have an interest in science and technology, to support our permanent researchers.

Applicant Qualification	**Passed National Public Employee Type-II Exam (Class: Administration) in Fiscal 2009.**
Employment Date	**April 1, 2010 (in principle)**
Planned No. of New Employees	**A few general staff**
Job Description	**General affairs, financial and other corporate governance, public relations, R&D support, IP asset management, promotion of information and communications-related business, etc.**
Work Hours	**Full-time, five days a week.**
Annual Paid Holidays	**20 days a year, 5-days summer recess, maternity leave, family health care, etc.**
Social Insurance	**Employees enroll in MIC Mutual Aid Association, and employment insurance (unemployment insurance, worker's compensation).**

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For detailed information, please see "Employment Information" on the NICT Website.

NiCT National Institute of Information and Communications Technology

Information for Readers

In the next issue, we will feature the 20th Anniversary of the Kobe Research Laboratories.

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