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Development of Near Real-time Pi-SAR2 On-board Processing System

—Towards grasping disaster situation quickly—



KOJIMA Shoichiro

Senior Researcher,
Radiowave Remote Sensing Laboratory, Applied Electromagnetic Research Institute

After completing a doctoral degree, serving as a research fellow at Independent Administrative Institution Port and Airport Research Institute (PARI), he joined Communications Research Laboratory (currently NICT) in 2002. He is engaged in research on ocean radar and the Polarimetric and Interferometric Airborne Synthetic Aperture Radar System (Pi-SAR2). Ph.D. (Engineering).

Introduction

At NICT, we are conducting research and development of the latest version of the Polarimetric and Interferometric Airborne Synthetic Aperture Radar System (Pi-SAR2) with drastically improved spatial resolution. Pi-SAR2 is capable of observing the state of ground surface at more than 5 km in width from an altitude of 8,000–12,000 m regardless of the time, weather, cloud or smoke. It is also capable of imaging the ground surface in 30 cm resolution, the highest resolution in the world, by utilizing synthesizing aperture processing technology and pulse compression processing technology. At NICT, in case of large-scale disaster, we've contributed to disaster-stricken area by quickly grasping the situation and providing observation images to the related organizations, and conducting observation of the disaster-stricken area.

However, imaging observation data of Pi-SAR2 require complicated signal processing, and, by the on-board processing system on aircraft, it was unable to generate polarimetric pseudo color composite image which identifies the details of objects on the ground. Then we had to relocate the observation data to ground system in order to process. Therefore, after observation, it takes one day to provide polarimetric pseudo color composite image, and this was not the most appropriate timing for organizations that needed these data. So, in order for effective use of observation data of Pi-SAR2 in times of disaster, we initiated developing a near real-time on-board processing system to realize rapid processing of polarimetric pseudo color composite image in 2011, and completed in 2012, and finally we proved its effectiveness.

Development of high speed on-ground processing system

On an aircraft, the space and electric power are limited. Therefore, we need to take these limitations into consideration and balance well with the processing capacity in order to conduct system development for high-speed data processing on an aircraft. So, at first, we aimed to develop the new system which processed the images 10 times faster than the conventional ground processing system which facilitated little limitation of space and electric power. Specifically, we aimed to reduce the processing time from over

3 hours to less than 18 minutes at an area of 5 km square.

After considering the concept of the system and conceptual design of system, we have found it was difficult to develop on-board processing system at a limited space and with electric power when operation part is composed by solely CPU, because CPU makes processing device large. Therefore we decided to use latest GPGPU (General-Purpose computing on Graphics Processing Units) that are used for supercomputer in addition to CPU, to the operation part*, and developed processing software optimized for CPU and GPGPU in order to maximize performance of on-ground processing device. As a result of performance verification, on-ground processing system fulfilled the goal performance (7.5 minutes for image processing at an area of 5 km square) and we have found that with the technology used in on-ground processing system, it is possible to develop a near real-time on-board processing system.

Development of high speed on-board processing system

By utilizing know-how about newly developed on-ground processing system, we have succeeded in developing near real-time on-board processing system (15 minutes for image processing of 5 km square, 1.48 Tflops of performance of double-precision operation, size of 1 U, electricity consumption 930 W) that can generate polarimetric pseudo color composite image in high speed on aircraft. Conventionally, only single polarized image (monochrome image) could be generated on an aircraft. Now with the development of this system, generation of polarimetric pseudo color composite image on an aircraft with enhanced legibility became possible (Table 1). Furthermore, by utilizing satellite

Table 1 Comparison of processing time of polarimetric pseudo color composite imaging

	Processing time of polarimetric pseudo color composite image	
	Processing system in the past	New processing system
On-ground processing system	over 3 hours	7.5 minutes
On-board processing system	no feature (only monochrome image)	15 minutes

* When you make processing device with the same operation performance with the newly developed on-ground processing device (2.826 Tflops of performance of double-precision operation, size of 2 U, electricity consumption 1,800 W) in CPU (83.04 Gflops, electricity consumption 130 W) supposed in 2011, the construction of CPU becomes more than 34 CPU on the operation part, and the size of it becomes more than two racks of server, and electricity consumption would be more than 10,000 W.

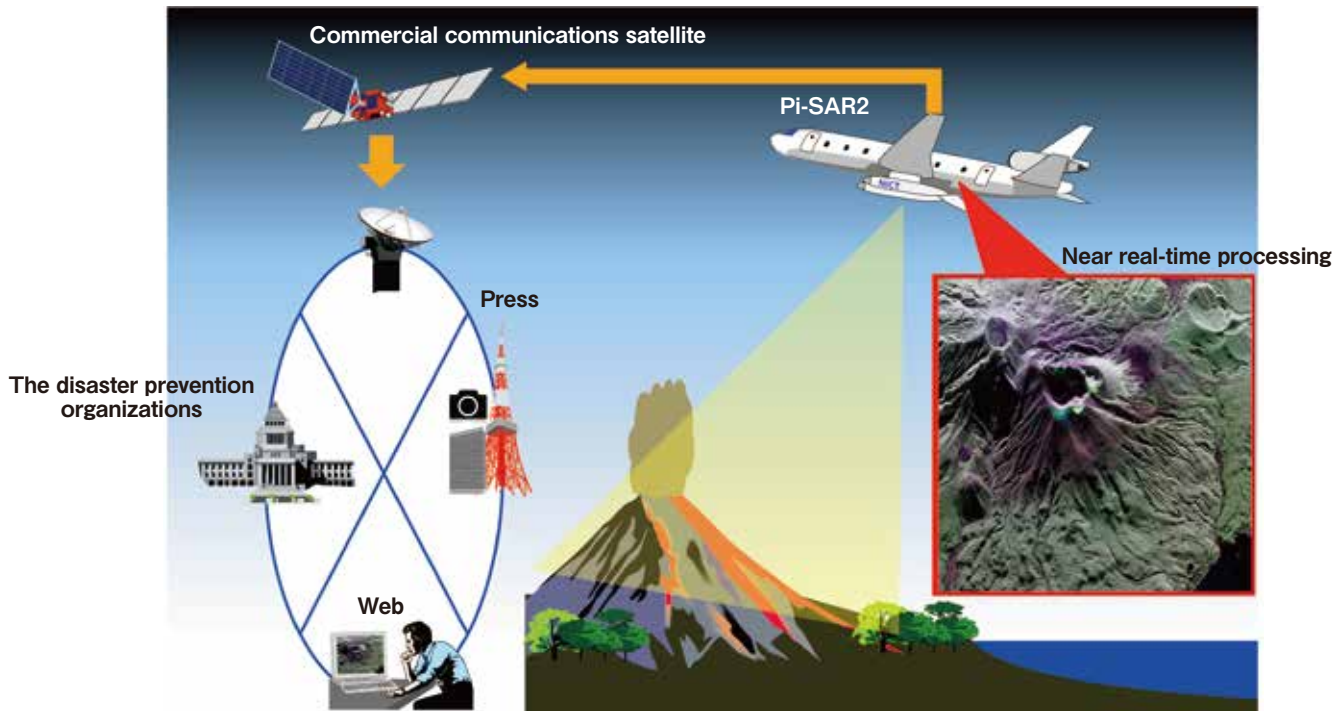


Figure 1 Overview of emergency observation using near real-time on-board processing system in times of natural disaster
It quickly processes observation data on-board and transmits to related organizations that need information.

communication and others, observation data of disaster stricken area can be directly transmitted to government organizations and researchers from the aircraft, providing disaster information more quickly in times of disaster. Figure 1 shows the overview of emergency observation using the system when natural disaster occurs.

Practical example of near real-time on-board processing system –Emergency observation of Mt. Sakurajima after the big eruption in summer 2013–

At NICT, we conducted emergency observation of areas around Mt. Sakurajima when the big eruption occurred in Showa crater of Sakurajima volcano on August 18, 2013. Figure 2 shows an aerial photograph and polarimetric pseudo color composite image of 2 km square of Mt. Sakurajima observed from southwestward direction. It is impossible to grasp the situation of the surface covered with clouds or smoke, but with polarimetric pseudo color composite image, we can detect the detail of Showa crater, ups and downs and shapes of the slope of the volcano. This color image was transmitted from an aircraft to the ground through a commercial communication satellite, and was promptly provided to related organizations via Coordinating Committee for the Prediction of Volcanic Eruption. Through this emergency observation, it was verified that the time to provide polarimetric pseudo color composite image has been shortened to just about 10 minutes, which had previously taken one day after observation.

Future Prospect

In order to grasp more details of disaster stricken area when disaster occurs, we would like to promote advancement of information transmitted from an aircraft (such as generation of orthoimage obtained by revising distortion because of advanced treatment of observation data, and numerical altitude map). Numerical altitude map can be used for grasping the geographical change around craters, for instance, by comparing that map before and after the eruption. Furthermore, we would like to consider shortening the time of transmission of wide-area processing image from aircraft, and try to shorten the time to provide the information to the public through website, etc.

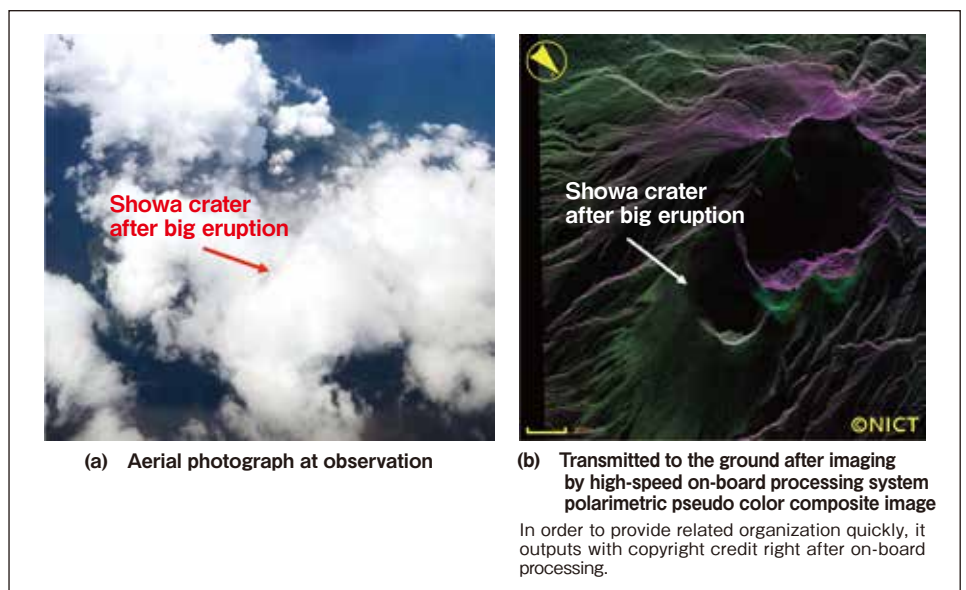
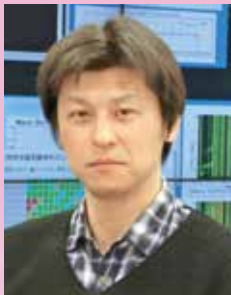


Figure 2 Example of emergency observation result conducted on August 20, 2013 after the big eruption of Mt. Sakurajima

Aerial photograph does not give you details of areas around crater due to clouds and smokes, but in polarimetric pseudo color composite image it is possible to check the details of ground surface conditions.

Space Weather Prediction from Observational Data

—How to forecast space weather phenomena—



KUBO Yûki

Senior Researcher, Space Weather and Environment Informatics Laboratory, Applied Electromagnetic Research Institute

After completing a master's degree, he joined Communications Research Laboratory (currently NICT) in 1998. He is engaged in research about solar radio observation, solar energetic particle, and solar wind related to space weather forecast. Ph.D.

AMeDAS for space weather?

Automated Meteorological Data Acquisition System: AMeDAS is a nationwide network of meteorological observation stations located in 1,300 spots, and plays significant role in weather forecast in Japan. It is easy to imagine that in order for NICT to provide space weather forecast, conducting observations from various points of view is significantly important. There are wide varieties of observations on space environment, and observations objects are on electro-magnetic phenomena between the sun and the earth such as the sun and solar wind, the magnetosphere and ionosphere of the earth. These observations about electro-magnetic phenomena between the earth and the sun are subjects of observation. These observations are much sparser network compared to AMeDAS, but countries all around the world have cooperated in employing terrestrial observation device, artificial satellites and probes. At NICT we conduct observation of solar radio from the ground, reception of the sun and the solar wind observation data from observation probe, geomagnetic observation inside Japan and Siberian region, ionosphere observation of Japan, Showa Station in Antarctica and Southeast Asian regions, and NICT contributes to the world as one of the important observation bases on the space environment. These observation data are used every day accompanied with various observation data sent from countries all around the world or artificial satellites to forecast space weather.

Solar observation and solar activities forecast

In order to forecast space weather, it is required to monitor solar activities at all time that attribute to space weather phenomena. Therefore, many artificial satellites and probes have been launched into space. Among them, the observation data from the following observations are frequently used for solar activities forecast; Solar Dynamics Observatory (SDO) that monitors the sun at all time by orbiting the earth,

Solar and Heliospheric Observatory (SOHO) that monitors the sun between the sun and the earth at all times, and Solar Terrestrial Relations Observatory (STEREO) that allocates space probe each anteroposteriorly on revolution orbit of the earth and watches the solar backside as one system. SDO is used to observe the emergence, growth and decline of active region (sunspot group), to judge on the complexity of active region magnetic field, and to grasp solar flare, which is an explosion occurring on the solar surface (Figure 1). As it has been revealed that solar flare tends to occur in active region with complicated magnetic field structure, the data from SDO gives important insight in forecasting solar flare occurrence. When the solar flare occurs, a plasma cloud blows out from solar corona which is called Coronal Mass Ejection: CME, and propagates through solar wind. To estimate the speed of propagation and direction of CME, is very important in forecasting space weather. Because when CME strikes the earth, the space environment around the earth is greatly disturbed. To estimate the propagation direction of CME and its speed, SOHO, STEREO and solar radio observation data from NICT are used. Coronagraph onboard SOHO and STEREO is an observational instrument to observe CME erupted from the sun, which cannot be observed by common instruments, by artificially occulting the extremely bright sun (it artificially causes solar eclipse). Three dimensional propagation direction and speed of CME can be estimated by coronagraph observations from three points; SOHO, two directions away from the earth by STEREO (Figure 2).

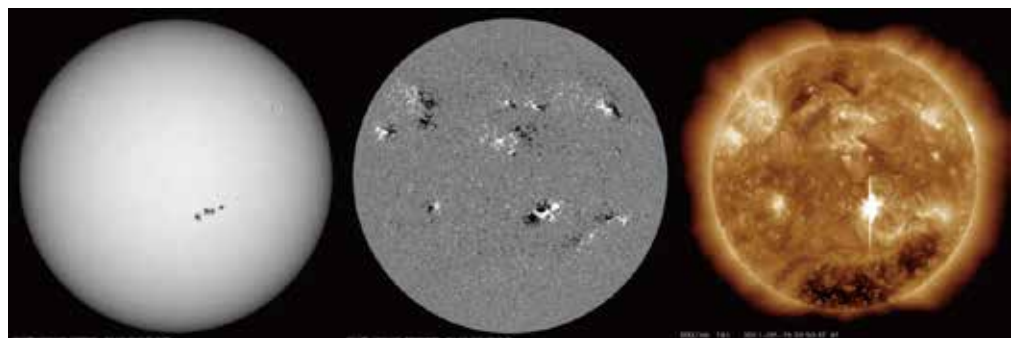


Figure 1 Observation of the sun by SDO

Observation of sunspots (left), photospheric magnetic field (center), and solar corona (right), when large solar flare on February 15, 2011. Solar flare occurred at sunspot group with complicated magnetic field structure around the center of the sun. (Courtesy of NASA/SDO and the AIA, EVE, and HMI science teams)

On the other hand, the solar radio observation data is useful in terms of promptness for estimating of the CME propagation speed, which takes just several ten minutes after eruption of CME, while the coronagraph takes usually several hours to do it, although solar radio observation cannot provide the estimation of the propagation direction (Figure 3).

Solar wind observation and geomagnetic storm forecast

When CME is propagating towards the earth, its arrival will be one to three days after the eruption of CME. The probe that monitors the arrival of CME at Lagrangian point (L1 point) is the Advanced Composition Explorer (ACE). As L1 point is located in approximately 1.5 million km away towards the sun, ACE can observe one hour in advance of the CME arrival on the earth while it is propagating from the sun. When CME strikes the earth, or solar wind speed, density, or magnetic field changes drastically, geomagnetic storm occurs in the magnetosphere of the earth. Therefore, monitoring the speed of solar wind, its density and magnetic field in real-time by ACE enables forecast of geomagnetic storm. At NICT we receive ACE observation data in real-time in order to scent ever changing solar wind and arrival of CME quickly and utilize them for space weather forecast (Figure 4).

Future of space weather forecast

I have explained briefly how observation data of the sun and solar wind are used to forecast space weather. Currently, researches on method to forecast space weather phenomena numerically through computer simulation by entering observation data are popular. By entering the information of solar surface and CME obtained by SDO, SOHO, STEREO, and solar radio observation to a numerical simulation that calculates propagation of solar wind and CME, it is expected to forecast when and in what scale of CME arrive (or not) to the earth numerically. Also, it is becoming possible to predict the occurrence of geomagnetic storm numerically by entering real-time observation data of ACE to magnetosphere simulator, thus providing important information in realizing safe and secure social infrastructure, for example, forecast of space radiation environment in quantity that causes errors in artificial satellite around the earth. Numerical forecast by coalesce of observation and simulation will be centered in space weather forecast in the future. In order to achieve it, we need to continue observation and monitoring of space environment even more precisely in detail like meteorological observation.

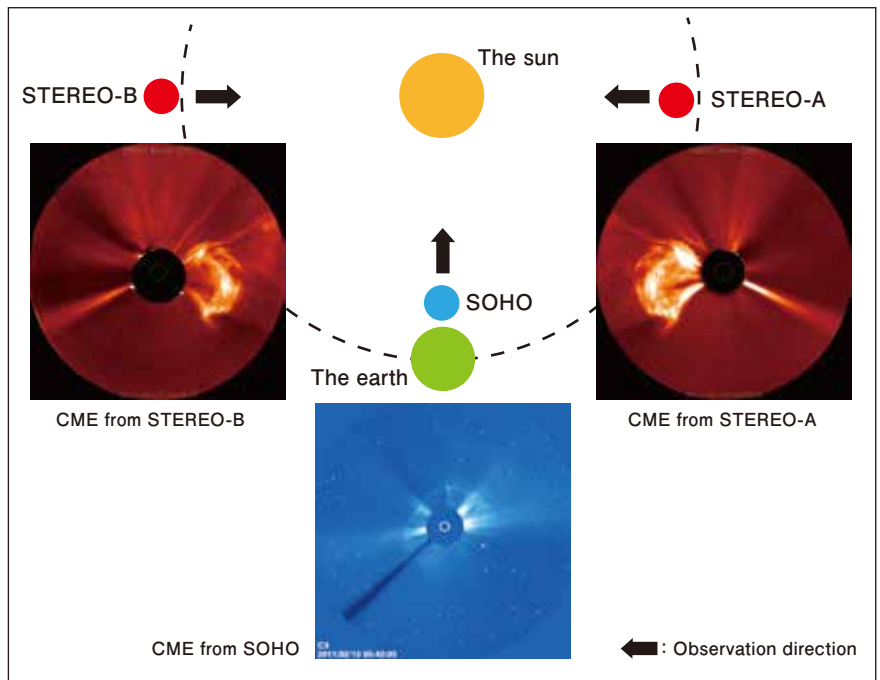


Figure 2 CME observation by coronagraph

Snapshots of CME observed by coronagraph onboard STEREO-B, SOHO, and STEREO-A. The CME is accompanied by solar flare occurred on February 15, 2011. These observations reveal that the CME was blown out towards the earth. (Courtesy of STEREO/COR2 and SOHO/LASCO consortium. SOHO is a project of international cooperation between ESA and NASA.)

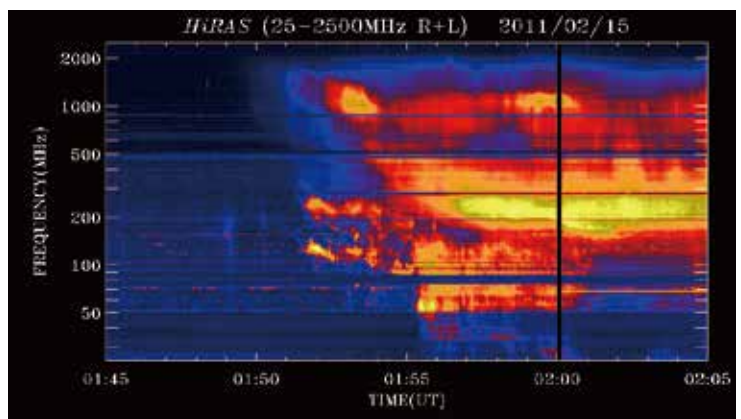


Figure 3 Observation by NICT's solar radio telescope

A strong solar radio burst was observed along with the solar flare occurred on February 15, 2011 (Red and yellow part). CME propagation speed can be estimated by the data from solar radio burst.



Figure 4 Parabolic antenna inside the premise of NICT for receiving ACE solar wind observation data

The ground station of ACE is located in four places around the world including the one at NICT.

Utilizing "The Subsidy Program to Assist the Development and Provision of Communications and Broadcasting for the Challenged"

Towards realization of information barrier-free **CASE 3**



Overview of interpretation using video telephone (the user on the left, translation operator is on the monitor)



Mr. HONJOYA Taku,
Director of the President's Office,
Tokyo Translation Center, PLUSVoice



Mr. TOYAMA Itaru,
Director of Translation Center,
Headquarters in Sendai

At NICT, we are working to realize an information barrier-free society by supporting projects with various subsidy programs. This is the last article in the series to introduce activities of corporations and organizations which provide communication/broadcasting services by utilizing this grant program, in order for the larger public to understand and be able to utilize these subsidies.

There are many people with hearing disability who want to call a taxi, have something delivered but give up doing so due to disability in making phone calls. In this article, we interviewed Mr. HONJOYA Taku, Director of the President's Office, Tokyo Translation Center, PLUSVoice who is eager to work on shifting barriers in communication for the hearing impaired, and Mr. TOYAMA Itaru, Director of Translation Center, Headquarters in Sendai.

—What is the background in founding the organization? Also, please give us an overview of major projects.

HONJOYA: Our company was founded in 1998. MIURA, President and CEO, was a master of ceremony at weddings before he founded the company. At one wedding, there was a bride with hearing disabilities. Some guests at the ceremony were also hearing impaired. He couldn't communicate with them despite he was proud of his talk, and they didn't enjoy the wedding party. This experience inspired him to explore ways to communicate with hearing impaired persons, and it was a time when PHS services were becoming full-fledged. One communication provider had short message service* feature on PHS, and he thought this was useful to communicate with hearing impaired persons in place of telephone, so the company's primary business was sales of PHS at that time.

Today, we have two primary businesses: one is "ICT business" that provides services to improve everyday life of hearing impaired persons by making use of information communication technologies. Another is "media business" in which we provide photography and editing with people with disabilities (Media business was launched as employment support project). The subsidy we are granted are to provide services of "telephone call agent service" and "remote (sign-language/writing) interpretation

service" in ICT business. We have six interpreters in Translation Center in Tokyo and three interpreters in Sendai.

—Please tell us more about "telephone call agent service" and "remote (sign-language/writing) interpretation service".

HONJOYA: Telephone call agent service mediates the communication of the hearing impaired and normal hearing listeners by using videophone/text chat capability of personal computer, mobile phone and tablet devices for individual customers (Figure 1). For example, when you want to make an appointment with a doctor in hospital, or you need to contact a plumber immediately to fix the broken water pipe, emails and faxes are another way to communicate, yet tend to be a time lag compared to making a phone call. Such interactions could be complicated, and is only troublesome for the hearing impaired and the normal hearing listeners. Telephone call agent service is a means to serve people in need of this type of communications to go smoothly. The pricing is different based on the frequency in using the service. One is no monthly price required, costs 315 yen per time 15 minutes at longest. You can also use the service any number of times with 5,250 yen per month. At the time of the contract, user applies what kind of devices (videophone, email, fax, etc.) one will be using and we create a dedicated account. The service is open from 8:00 to 20:00 and 4 to 5 staff members are always at work. Currently we serve about 600 customers.

This remote (sign-language/writing) interpretation service is provided for companies and organizations with contracts to set up videophone at their entrance, reception desk or store to help serve customers with hearing disabilities by supporting sign-language translation and writings.



Figure 1 Snapshot of sign-language translation via videophone

* Short message service
Direct exchange of e-mails between corresponding terminals.

—What are the special efforts you make in providing services?

TOYAMA: We provide interpretation for people with different age and gender, so we put value in business manners and paying extra attention in addition to the skill of sign-language. For example, when we communicate in sign-language via monitor, the interpreter adjusts his/her position, and dialect based on the customer's location to make sure the sign-language is easy to understand. When describing numbers, the interpreter writes phone dial and fax numbers on the white board so that the customer can take notes accurately.

Furthermore, customers can appoint a female operator when a female customer makes a phone call to a gynecologist, by doing so, we try to be as flexible as possible to meet the requests by customers.

HONJOYA: We are also developing an application named "hand-writing telephone" (see Figure 2). This application consists of simple features, allowing users to have a real-time conversation via writings with registered friends who are far apart. Users can save the written letters on the monitor. This application is now available on iPad and Android terminals, and now we are applying to be available on iPhone. I hope to make telephone call agent service easier to use by using this application.

—How do you widely promote these services to customers?

TOYAMA: We exhibit these services at conventions about hearing disabilities, welfare and IT devices, and demonstrate the service, introducing users with hands-on experience. Many hearing impaired persons tend to have a stereotype that telephones are useless, because they have never used telephones to communicate with normal hearing listeners. It takes time for them to find out about our services and realize the convenience of them. However, once they like it, it spreads quickly with word-of-mouth as they introduce our service to other hearing impaired persons, so users are increasing these days. Most frequent requests are using videophone: we consider that one of the contributing factor for increase users is that the environment more prepared for videophone with ubiquitous internet connection and device becoming smaller with advanced operability. Other factor is that the concerned parties are becoming eager to implement information communication technology after finding out about examples of countries outside of Japan making a national effort in improving the communication



Figure 2 Snapshot of communication using hand-writing telephone



Staff members at PLUSVoice

of the hearing impaired using ICT.

—What are the tasks?

HONJOYA: Although several staff members must be standing by at all time to respond request by customers, some hours have more requests and some other hours have fewer request. We are making efforts in making ends meet by assigning interpreters to take multiple roles other than interpreter such as supporting media business department while standing by for a time period with fewer requests. There are requests by customers that they want our service hours to be extended, or to open for 24 hours in emergency. Some customers voice that they wish the service not to be charged, given that in other countries, the government provides this type of service for free. These things are difficult to achieve at this point.

—What is your aspiration for the future?

TOYAMA: Our customers often say that "this service helps solve the problem that was bothering me in real-time". Some customers use our service in a very useful way that we had never expected, and I am happy to hear them say "this expanded my world", "I can't do without it". We would like to focus on human resource training in order to provide even better services.

Also in other countries, telephone call agent service is provided with no user-charge for 24 hours, 365 days, including devices needed to use the service. We would like to work on this type of services to be common, to be used at ease so that it will be recognized as a national system.

—Thank you so much.

About the subsidy program to assist the development and provision of communications and broadcasting for the challenged

This subsidy program seeks applications from private enterprise that either produce or develop communication/broadcast services for people with disabilities in using communication and broadcast to be used smoothly.

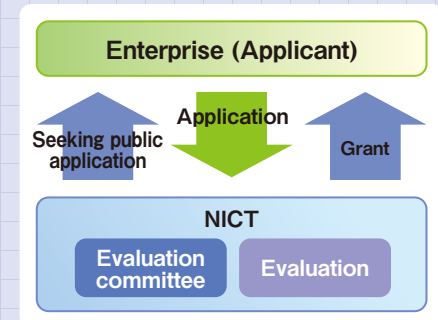
The application opens from March to April of every year and grants up to half of the required expenses in development/providing communication/broadcast for people with disabilities in using communication and broadcast.

Eligibility for the grant has the following requirements: 1. The service to be provided/developed by the grant should contribute to improving convenience for the challenged. 2. The project should be highly needed by the physically handicapped persons, and the effectiveness of the realized project should benefit nationwide. 3. Applicants must have business implementation capability and an appropriate management system. 4. Funding of the whole project is unable to be covered by the applicant itself. 5. The applicant must have capacity to fund itself for their own expenses.

The expenditure that is subject to the grant includes purchases cost, subcontract expenses, commission cost, labor cost and so on. Development itself alone will not be eligible for the grant.

If you seek funds from the grant program, please submit an application following the instructed format. After NICT examines the application documents, we will hear from an evaluation committee consisting of academics and experts of the field as necessary, upon which grantees will be decided.

A performance report should be submitted after completing the project. NICT will examine the report and proceed with grant payment.



For more information about the grant and application process, please contact the following:
TEL: +81-42-327-6022 FAX: +81-42-327-5706 E-mail: kakusa@ml.nict.go.jp
http://www2.nict.go.jp/ict_promotion/barrier-free/104/index.html (Japanese only)

Report on "National Science and Technology Fair 2013" in Thailand

"National Science and Technology Fair 2013" was held at the Bangkok International Trade & Exhibition Centre (BITEC) from August 6 – 21, 2013. The fair has been hosted by Thailand's Ministry of Science and Technology (MOST) almost every year since 2007 and NICT has been an exhibitor there every time since its start. This time, we introduced an easy to grasp sample of our advanced technology with exhibitions such as the whole-body voxel human model, the principle of electronic holography, combined with a demonstration of creating radio waves with light.

The event attracted about 1.1 million visitors (according to the host) from all over Thailand. It has become one of the most important annual events for elementary and junior high school children in Thailand, and, day after day, many students visited by chartered bus. Many of the children who visited NICT's booth showed interest in the 3D display of a human model and holography. Some even leaned back in astonishment at seeing the 3D human model. Adult visitors to the NICT booth were intrigued by the light to radio wave exhibition panel and expressed their hopes for putting the technology into practical use. The event was a good opportunity for NICT to introduce some of our research and development achievements.



Snapshot of the Fair



The building of BITEC packed with visitors day after day



NICT exhibition booth

Report on "40th Int. Home Care & Rehabilitation Exhibition 2013"

Information Barrier-free Office, ICT Industry Promotion Department

NICT exhibited a booth at "40th International Home Care & Rehabilitation Exhibition" from September 18–20, 2013 at Tokyo Big Sight (Tokyo International Exhibition Center), and introduced the result of subsidy projects granted by NICT on information barrier-free for the challenged and elder by demonstration and presentations.

This time, 14 parties presented results as well as exhibition of various services and equipments for the challenged and the elderly out of the business operators of subsidies in the past 5 years. The application software "KoeTra" for assisting hearing-impaired persons from NICT Universal Communication Research Institute, was also exhibited and attracted wide audience.

On the first day, Mr. YOSHIDA Yasushi, Director-General for Policy Planning, Ministry of Internal Affairs and Communications and other concerned parties visited the exhibition. People from wide range of fields including welfare industry, physically challenged, manufacturer, and students visited the booth, and asked questions about exhibiting devices and services eagerly. The exhibition welcomed more than 120,000 visitors, the largest number ever. NICT booth welcomed more than 1,500 visitors, and result presentation, demonstration exhibition as well as hands-on display ended with a great success.

We obtained the reply of 700 or more questionnaire from the visitors, and more than 90 percent of them answered that the exhibition was "useful". Also, according to the survey for the business operators of subsidies who exhibited at the event answered that they found new connection with related parties thanks to the exhibition and received many comments from users, fellow business operators and researchers. Such survey result showcases this exhibition provided a good opportunity for wide variety of related parties to find out about activities of business operators of subsidies.

In the future, we would like to continue to promote information barrier-free society by taking advantage of the exhibition as an opportunity to present achievement from the activity of NICT working to "support under-informed people" and strive for informing the achievement of our activities.



NICT booth



Mr. YOSHIDA Yasushi,
Director-General for Policy Planning,
Ministry of Internal Affairs and
Communications visiting the exhibition



Snapshot of result presentation



Hands-on display

Awards

Recipients ● **MIZUNO Maya** / Senior Researcher, Electromagnetic Compatibility Laboratory, Applied Electromagnetic Research Institute
FUKUNAGA Kaori / Research Manager, Electromagnetic Compatibility Laboratory, Applied Electromagnetic Research Institute

Co-recipients: FUKUCHI Tetsuo, FUSE Norikazu, OKADA Mitsutoshi, FUJII Tomoharu
 (Central Research Institute of Electric Power Industry)

◎Award Date: May 24, 2013

◎Name of Award:
 JCOT Chief Editor's Award

◎Details:
 In recognition to distinguished review article on "Nondestructive Testing of Thermal Barrier Coating for Gas Turbines Using Terahertz Waves"

◎Awarding Organization:
 Japan Coating Technology Association (JCOT)



From left, FUKUNAGA Kaori, MIZUNO Maya

◎Award Date: May 30, 2013

◎Name of Award:
 IEEJ Distinguished Paper Award

◎Details:
 For a peer-reviewed article "Measurement of Refractive Index and Thickness of Topcoat of Thermal Barrier Coating by Reflection Measurement of Terahertz Waves"

◎Awarding Organization:
 The Institute of Electrical Engineers of Japan (IEEJ)

◎Comment from the Recipients:

The Central Research Institute of Electric Power Industry and NICT have successfully applied terahertz imaging technique as a nondestructive inspection method of thermal barrier coating of turbine blade in a thermal power plant. We received "JCOT Chief Editor's Award" in recognition to a review article on the thickness measurement and defect detection of ceramic topcoating. "IEEJ Distinguished Paper Award" was given to our peer-reviewed paper in IEEJ magazine on the application of THz imaging to diagnosis of electric power apparatus. We would like to express our sincere appreciation to our colleagues who involved in this work.

Recipient ● **JIN Yong** / Researcher, Network Architecture Laboratory, Photonic Network Research Institute

Co-recipients: YAMAI Nariyoshi
 (Okayama University)
 OKAYAMA Kiyohiko
 (Okayama University)
 NAKAMURA Motonori
 (National Institute of Informatics)

◎Award Date: June 5, 2013

◎Name of Award:
 Journal of Information Processing Outstanding Paper Award

◎Details:
 In recognition to academic paper "An Adaptive Route Selection Mechanism Per Connection Based on Multipath DNS Round Trip Time on Multihomed Networks" at Information Processing Society Japan for 2012 Journal of Information Processing Outstanding Paper Award

◎Awarding Organization:
 Information Processing Society Japan

◎Comment from the Recipient:

This paper was written when I was in doctoral course of Okayama university, and we feel extremely honored to have my paper recognized by the Information Processing Society Japan as the distinguished paper. I continue to present papers related to this research after becoming the researcher at network architecture. We would like to express our deepest gratitude to my co-authors and everyone in the laboratory. We will work hard to contribute to the development of the research in the future.



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

Co-recipients: TAKAGI Tsuyoshi
 (Professor, Institute of Mathematics for Industry, Kyushu University)
 HAYASHI Takuya
 (Post-doctoral Researcher, Institute of Mathematics for Industry, Kyushu University)
 SHIMOYAMA Takeshi
 (Chief Researcher, Fujitsu Laboratories Ltd.)

◎Award Date: June 5, 2013

◎Name of Award:
 IPSJ Kiyasu Special Industrial Achievement Award

◎Details:
 For achieving the world record in decryption of pairing-based cryptography, an anticipated public-key cryptography of the next generation. This achievement makes significant contribution to the field of future of information and communication industry by international standard of cryptography.

◎Awarding Organization:
 Information Processing Society Japan

◎Comment from the Recipient:

We have achieved the world record of cryptanalysis based on the originally developed new attack theory: we carried out a cryptanalysis of the 278-digit pairing-based cryptography in 148.2 days, a task that had been thought to require several hundred thousand years. Pairing-based cryptography has been considered secure and anticipated as next generation cryptography for wide range of application. Our cryptanalysis result will be used to calculate secure digit number that would not be decrypted by the supercomputer with most advanced theory and highest level of performance, which leads to secure use of next generation cryptography.

We are grateful for many people supported us in achieving this award.



Announcement of "Keihanna Information and Communications Fair 2013"



–The future cultivated by Kansai Science City–

In partnership with Kansai Science City's information and communication-related institutes, NICT Universal Communication Research Institute will hold a community-based collaborative event, "Keihanna Information and Communications Fair 2013". This event aims to spread news on research achievements in information and communications technology and promote mutual collaborations between related institutes. Please join us.

Main Exhibits

- Remote control of construction machinery using ultra-realistic system technology



- Application software "KoeTra" for assisting communication between hearing-impaired person and normal listener
- Multi-lingual automatic (machine) translation with high precision
–Can you believe that patent translation is possible with machine translation?–
- Challenging language barriers
–Working towards expansion of speech input–
- WISDOM2013: Information analysis tool for everyone based on Big Data
- Real-world information collection and analysis platform which realizes your own sensor network
- Super-multi-view glasses-free 3D image technology



Application software "KoeTra" for assisting communication

Main Talk

- "Speech Communication Technology that Connects the World"
HORI Chiori, Director of Spoken Language Communication Laboratory,
Universal Communication Research Institute

There will also be many more exhibits and talks on leading-edge research results.

Period: November 7 to 9, 2013

Venue: Keihanna Plaza, ATR, SCSK

Website: <http://khn-fair.nict.go.jp/> (Japanese only)

This year, we will have a live broadcast of the event site at The Lab, on the 2 floor of Knowledge Capital, Grand Front Osaka which opened on April, 2013 (Admission free, no reservation needed).

Announcement of NICT's Facilities' Open House 2013



- **Kashima Space Technology Center –Become familiar with the space!–**



Date: November 23, 2013
10:00-16:00 (reception closes at 15:00)

Venue: Kashima Space Technology Center
893-1, Hirai, Kashima, Ibaraki 314-8501
<http://ksrc.nict.go.jp/>
Inquiry: +81-299-82-1211

Contents:

- Rescuing communication of disaster-stricken area by the Wideband InterNetworking engineering test and Demonstration Satellite KIZUNA (WINDS)
- Early detection of disaster by satellite communication
- Finding artificial satellite
- Touch the 34-meter antenna that observes the space

- **Okinawa Electromagnetic Technology Center**



Experience the aurora on the tropical island, guided facility tour, and more events!

Date: November 23, 2013
10:00-16:30 (reception closes at 16:00)

Venue: Okinawa Electromagnetic Technology Center
4484, Aza-Onna, Onna, Kunigami, Okinawa, 904-0411
<http://okinawa.nict.go.jp/>
Inquiry: +81-98-982-3705

Announcement of "NICT Open House 2013"

—Creating future with ICT—

November 28 and 29 9:30-17:00 ※(until 16:30 on 29)



NICT will hold "NICT Open House 2013," introducing a large variety of latest research achievements through lectures, demonstrations, poster sessions, etc.

Opening Ceremony November 28 10:00-11:00

■ Greeting from the host

SAKAUCHI Masao, President of NICT

■ Special lecture

The "Revitalization" for Japan

—Platinum revolution by ICT—

Dr. KOMIYAMA Hiroshi, President of Mitsubishi Research Institute, Inc., Special Adviser of the President, the University of Tokyo

Lectures

November 28 (afternoon) and 29 (morning and afternoon)

16 presentations: Research results of NICT and R&D results of commissioned research

Exhibition November 28 and 29

Various demonstrations and poster sessions of latest research results

Laboratory Tour (Advanced booking)

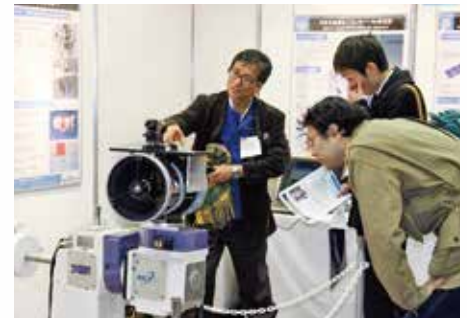
November 28 and 29

Introducing latest research activities through research facility tours (laboratory tours).

- Course A A telescope that enables optical communication with satellite
- Course B Terahertz wave transmission and receiving system: study of the unexplored frequency radio wave
- Course C SAR measurement of mobile devices
- Course D Advanced optical clock for next-generation
- Course E Display of electronic holography three-dimensional image
- Course F Quantum key distribution network testbed (Tokyo QKD Network)
- Course G Environment of creating advanced optical semiconductor device (clean room)

※For details about each course and application, please visit NICT Website.

Snapshot of NICT Open House in 2012



We are looking forward to seeing many visitors.

Venue: National Institute of Information and Communications Technology
4-2-1 Nukui-Kitamachi, Koganei, Tokyo 184-8795, Japan

For access and details, please visit the following URL in Japanese.

<http://www.nict.go.jp/en/index.html>

Inquiry: Secretariat of "NICT Open House 2013",
Public Relations Department

[Tel] +81-3-3370-2411

[E-mail] open-house@ml.nict.go.jp

Information for Readers

Next issue will feature dynamic control of multi-core fiber network, satellite-terrestrial integrated mobile communication system (STICS), and three dimensional acoustic system.

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4-2-1 Nukui-Kitamachi, Koganei, Tokyo 184-8795, Japan
Tel: +81-42-327-5392 Fax: +81-42-327-7587
E-mail: publicity@nict.go.jp
<NICT URL> <http://www.nict.go.jp/en/>