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Special Feature

Monitoring Safety and Security from Below
—Sensing a person's presence using RFID—

"hitoe", A Functional Material That Allows for Continuous Measurement of Biological Information

Current Initiatives of docomo Healthcare

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Toward Connectivity for All

Candidate for the Post of Deputy Secretary General of the Asia-Pacific Telecommunity (APT)

Mr. Kondo, with his wide-ranging experience, in-depth knowledge, and excellent coordination capability in the international field, has the ability to steer the APT Secretariat in the most advantageous direction and achieve the developmental tasks that lie ahead.

He would like to focus on 5 agenda for the future of the APT as follows:

1. Refocusing the APT as a regional ICT focal point
2. Responding to the needs of member countries especially LDCs and Small Island States
3. Strengthening the APT's function in Collaboration with ITU and other ICT Related Organizations
4. Facilitating Private Sector involvement in APT activities
5. Reinforcing an Efficient and Effective APT

Mr. Kondo serving as the Deputy Secretary General of APT will contribute to more enhanced ICT development of the Asia-Pacific Region.

Mr. Masanori KONDO

PROFESSIONAL CAREER

2013 Senior Director for International Cooperation Affairs
2011 Director, International Economic Affairs Division
2010 Senior Advisor, International Policy Division
2008 Director, International Affairs Office, Postal Policy Division
2005 Director of the Research Department, Institute for Information and Communications Policy
2001 Deputy Director, International Organizations Office, International Policy Division (MIC)
1996 First Secretary, Embassy of Japan in Hashemite Kingdom of Jordan
1990 Joined the Ministry of Posts and Telecommunications (currently, MIC)

INTERNATIONAL EXPERIENCE

2013 Chairman of the working group3 of APT preparatory meeting for ITU PP-14
2010 Chairman of the working group of APT preparatory meeting for WTDC-10
2010 Deputy Head of Japanese delegation to the ITU Plenipotentiary Conference 2010 (PP-10) at Guadalajara, Mexico
2002 Member of Japanese delegation to the ITU Plenipotentiary Conference 2002 (PP-02) in Marrakech, Morocco

EDUCATION

Keio University (BS in Economics)
The London School of Economics and Political Science (MSc in Economics)

ACADEMIC CAREER

2013- Lecturer, Keio University, Japan
2006-2007 Visiting Scholar, Rikkyo University, Japan
2006-2007 Visiting Scholar, Ohbirin University, Japan
2005 Lecturer, Waseda University, Japan
2004-2005 Associate, Harvard University (Weatherhead Center), U.S.A

Monitoring Safety and Security from Below

—*Sensing a person's presence using RFID*—

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Hiroshi Fukuda**, Kiyohiko Takahashi**, and Hiroyoshi Miyano*

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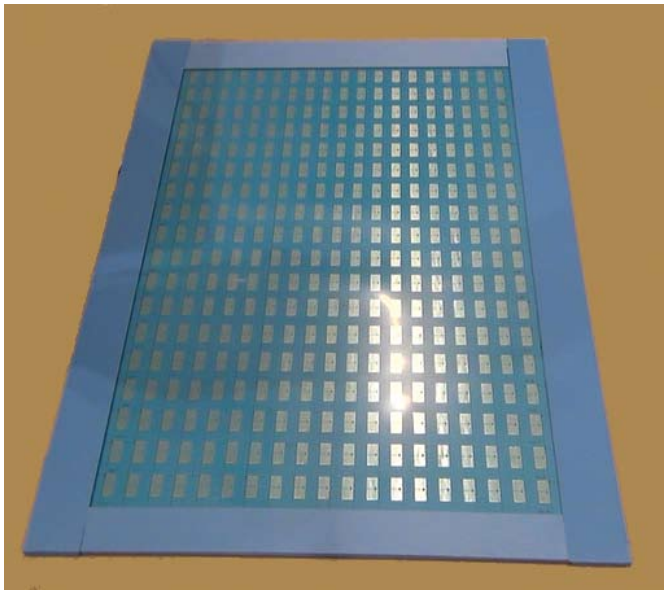
1. Introduction

The aging of populations is currently a worldwide trend. In countries belonging to the Organisation for Economic Co-operation and Development (OECD), the average of the old age support rate, which is the ratio of those in a population aged 20–64 (working age) to those aged 65 and over, has been predicted* to decrease from 4.2 to 2.1 between 2008 and 2050. Reducing the resulting burden on those of the working age is an urgent issue. Watching over the elderly all day long imposes a particularly high burden. Therefore, information and communication technology (ICT) for social care and safety monitoring is becoming more and more essential.

In terms of monitoring people, many approaches based on video camera analysis have been proposed, including intruder detection in a restricted area, trajectory extraction of a shopper in a store, safety monitoring for elderly people, and others. However, there are problems with the video-based approach. A camera has blind spots where persons cannot be seen due to being hidden by other persons or obstacles. For example, a child in a crowd of adults can hardly be seen from a camera. Moreover, camera usage is strictly restricted due to privacy issues in some locations such as restrooms and hospital rooms.

Unlike a video camera, which watches you from above, we propose monitoring safety and security from below. We have developed a practical sheet-type sensor to realize this idea and mitigate the problems facing the video-based approach.

Figure 1: Developed sheet-type sensor. RFID tags are aligned in a grid as sensor nodes.



2. Features of the proposed sheet-type sensor

Monitoring persons without video cameras can be achieved by detecting the footprints of individuals who stand on a sheet-type sensor installed on the floor. This solves the privacy problem because it senses only footprints within several centimeters above the floor. It also becomes possible to detect the existence of persons correctly even in a crowded situation because feet never overlap each other.

Conventionally, sheet-type sensors have not been practical, for two reasons. One, it is too expensive for conventional sheet-type

Figure 2: Sheet-type sensor covered with ordinary vinyl flooring material.

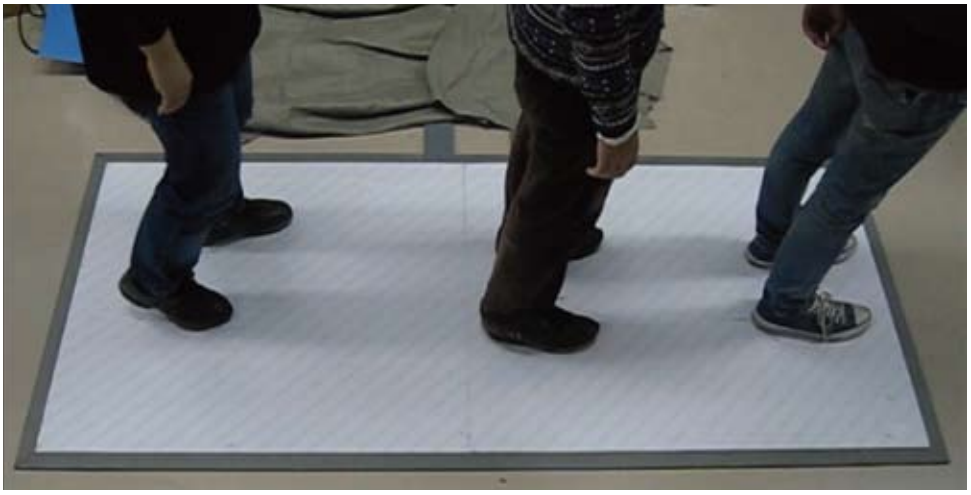
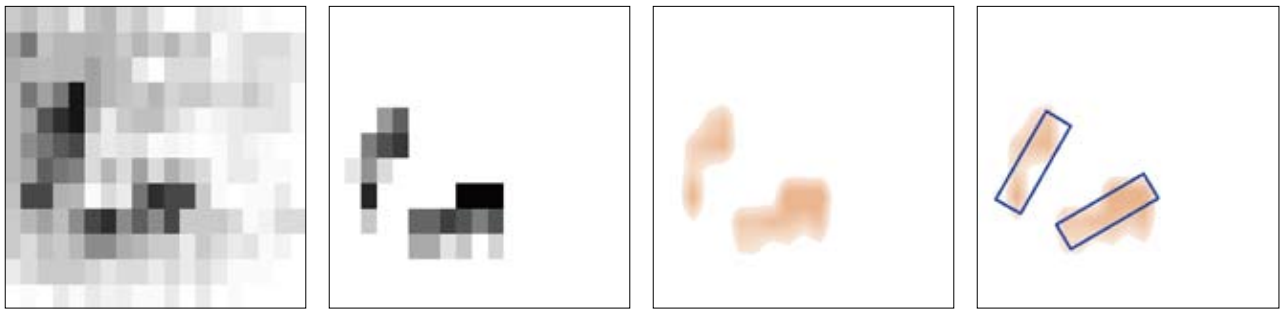


Figure 3: Data flow in footprint detection processing.



(a) Sensor output (b) Normalized data (c) Restored shape (d) Detected footprints

sensors such as an array of pressure sensors to be spread all over the floor, and two, the sensors are not stiff enough to withstand the load of the cane or heels of a walking person.

Our proposed sheet-type sensor can be used practically for the following two reasons: (1) production cost can be minimized by utilizing inexpensive radio frequency identifier (RFID) tags as sensor nodes, as shown in Figure 1, and (2) practical endurance can be achieved by installing sensors beneath ordinary flooring materials with normal stiffness while still maintaining radio wave detection, as shown in Figure 2.

The new sheet-type sensor has a simple composition: RFID readers, wires as antennas, and passive RFID tags as sensor nodes. The RFID reader activates the passive RFID tags and receives signals from each tag through the antenna. The signal strength of a tag changes when an object with high dielectric constants (such as a foot) comes close to the tag due to increased parasitic inductance or stray capacitance. By analyzing the signal changes of all tags, the existence of a foot on the tags can be detected.

3. Person presence sensing system

We also developed a person presence sensing system with our new sensor to identify the shape and direction of footprints. We apply signal and image processing techniques to solve the two primary weak points of the sensor, which are; variation of signal strength and low spatial resolution.

Figures 3(a)–(d) show an example of the data flow in the footprint detection processing.

The output signal strength of the sensor when two feet are on the sheet is visualized in Figure 3(a). It is quite difficult even for human eyes to recognize the existence of the two feet because of the variation of signal strength caused by the nature of the radio waves and the low resolution of the sheet-type sensor. By normalizing the variability of the signal strength, the sensor output can be corrected, as shown in Figure 3(b). Then it becomes possible to restore the footprint shapes, as shown in Figure 3(c), by applying spatial interpolation with the relationship between signal strength and the cover ratio of the object over the tag. Finally, each footprint can be extracted along with its direction, as shown in Figure 3(d). In this way, persons walking over the sensor can be monitored without any privacy issues because individuals cannot be identified only from the footprint shapes.

4. Future work

We argue that perceiving a person's presence while maintaining privacy is becoming increasingly important for people to live comfortably in both the public and private spheres. Our proposed sheet-type sensor is a type of technology that fulfills this requirement, and from now we intend to perform further experiments on its practical use.

* http://www.oecd.org/berlin/47570029.pdf

Cover Art

Fuji sanjurokkei Zoshigaya Fujimi chaya
(The Teahouse with the View of Mt. Fuji at Zoshigaya, from the series 36 Views of Mt. Fuji.)

Utagawa Hiroshige (1797-1858)

Woodblock print:
Courtesy of Sakai Kokodo Gallery

"hitoe", A Functional Material That Allows for Continuous Measurement of Biological Information

Seiji Kuno
Research Planning Division
Nippon Telegraph and Telephone Corporation

1. Introduction

NTT began developing a soft and conductive composite material that allows constant monitoring of heart rate and heart electric potential by coated fabric materials such as silk with a conductive polymer (PEDOT-PSS) for use in clothing items. Furthermore, through collaboration with Toray Industries Inc. in material development and sewing technologies, research and development efforts toward practical realization were accelerated and the material, named "hitoe", was released in January 2014. Here, we introduce the technology used to synthesize "hitoe" and practical examples with regard to the application of biosignals measured by "hitoe".

2. About the functional material "hitoe"

"hitoe" is a functional material developed by applying "conductive fabric technology", which is the impregnated fabric with a conductive material (PEDOT-PSS) developed by NTT, to a "nanofiber", an advanced fiber material developed by Toray Industries Inc. (Figure 1)

However, simply impregnated a general material (fiber diameter: around 15 μm) with a conductive polymer does not result in a material that can provide stable biosignal measurements due to the low contact between the cloth and the skin that results in gaps between them. Furthermore, the conductive polymer that impregnated in the material gradually peels off when washed, with repeated washings resulting in unstable biosignal measurements (Figure 2).

Figure 1: Functional material "hitoe"

Figure 2: Use of general fiber material

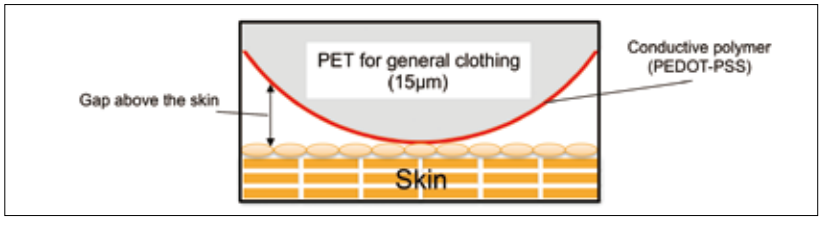
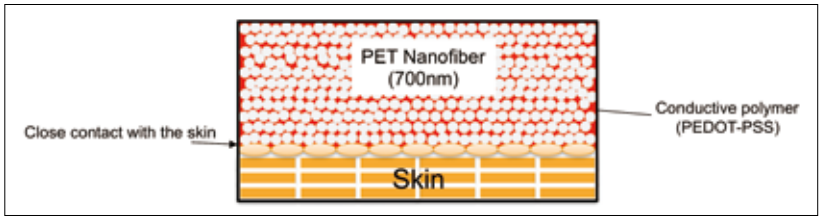


Figure 3: Use of the functional material "hitoe"



However, by using Toray's "advanced processing technology", high impregnation of the conductive polymer into the space around the "nanofiber" (fiber diameter: around 0.7μm) increases fiber contact to the skin thus producing stable biosignal measurements. Additionally, this high impregnation into the fiber results in a conductive polymer that is not easily peeled off, thereby offering durability even with repeated washings (Figure 3).

By combining the "hitoe" material with an inner shirt, we have developed a wearable sensor that can measure biological information such as heart beat and heart electric potential through the simple act of wearing a shirt (Figure 4). In order to function with various body types, the base fabric is made from a stretch material that applies an approximately constant pressure on bodies of different sizes. In addition, the material can also be worn for an extended period of time and has high conformance when worn during exercise.

These characteristics, namely the ability to maintain a good fit on various body types and the ability to measure biosignals reliably, have enabled stable biosignal measurements to be obtained during the performance of various activities simply by wearing a shirt.

3. Examples of biosignal measurements using "hitoe"

Measurement of heart rate and heart electric potential over an extended period of time in daily activities is now possible simply by wearing an undershirt made from "hitoe". Below are 3 examples of measurements and occasions for their usage.

- Measurement of heart electric potential that conventionally could only be performed in hospitals has been made possible using a combination of an undershirt composed of "hitoe", a measurement terminal and a smartphone. By employing an electrode configuration on the undershirt that was developed and optimized in

Figure 4: An undershirt made of the functional material "hitoe"

this study, we were able to obtain a waveform similar to the CC5 induction used in the Holter electroradiogram. In the future, it is expected that this method will be applied in the health care and medical field to manage and understand health conditions through long-term measurements taken in the home or other locations. (Figure 5)

- The use of a material from Toray that can control pressure in the shirt's fabric has made it possible to measure biological information even during activities that require significant body movement such as sports. Figure 6 shows the heart rate variability exhibited on a golf course, in which heart rate was seen to increase before and after each shot, with mistakes observed on shots while the heart rate remained high. Not only it is possible to observe a wearers physical condition during activities such as golf, but in sports that are affected by a person's mental state, it is possible to simultaneously observe heart rate variability during play, for example, with the aim of achieving a higher score.

- Figure 7 indicates the degree of stress and relaxation as heart rate variability. In general, heart rate fluctuation decreases during stress, indicating that the sympathetic nerve, a part of autonomic nervous system that controls heart beat, is dominant. On the other hand, heart rate fluctuation increases during relaxation, indicating that the parasympathetic nerve, a part of autonomic nervous system, is dominant. Heart rate variability can be visualized using a visualization tool called a Poincare plot. With a Poincare plot, the spacing between two R waves (R-R spacing) over a certain period is plotted along the x-axis and the R-R spacing during the subsequent period is plotted along the y-axis. The plot is more concentrated during periods of stress, with a low variability in heart rate. In contrast, during periods of relaxation, the plot is more distributed. Using this figure, it is possible to assess whether an individual is in a nervous or relaxed state.
  With this method, it is therefore possible to determine a person's mental state simply by having him/her wear an undershirt made of "hitoe".

Figure 5: Measurement of heart electric potential using a smartphone

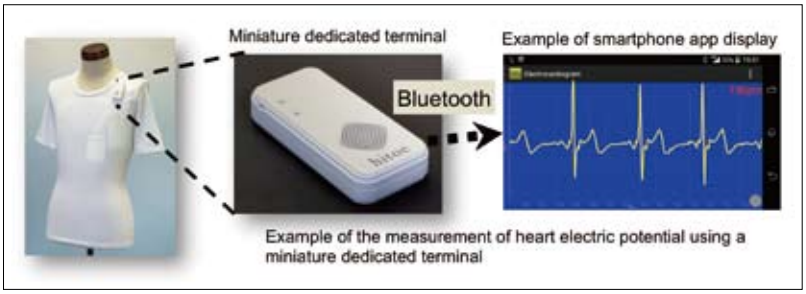


Figure 6: Example of heart rate fluctuation on a golf course

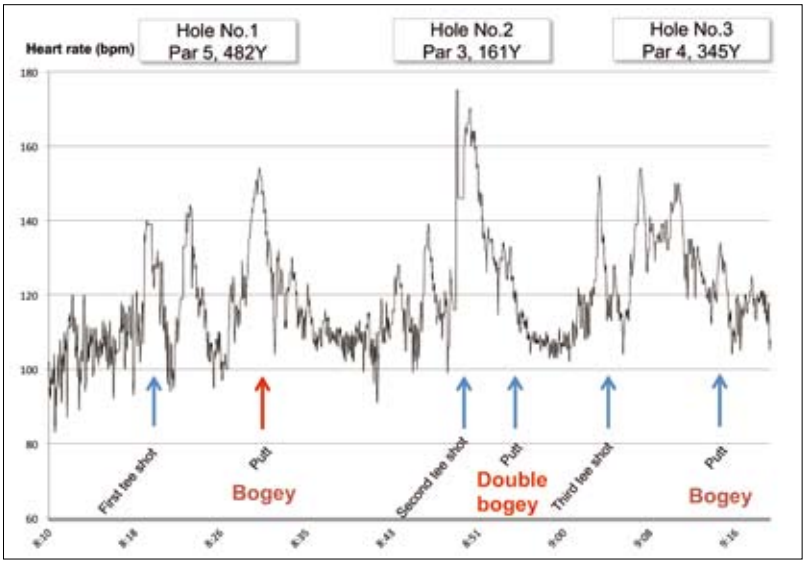
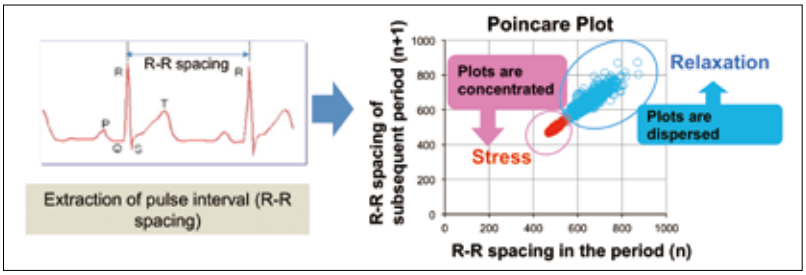


Figure 7: Fluctuation of heartbeat interval during stress/relaxation moments



4. Future developments

Clothing items made of "hitoe" have the following features: high durability, good fit, comfortable even when used for extended periods and able to measure biological information even during exercise.

We aim to utilize these features to make products that can be applied in training while measuring biological information during sports activities. Moreover, we also aim to further develop products that can monitor various health conditions for extended periods during daily life to contribute to the promotion of health. With the ability to store biological information obtained under various conditions in the cloud via the internet utilizing smartphones, computers or other tools, analysis of big data and combinations with other sources of information can be developed, which we believe can provide new value.

Furthermore, together with population aging, the need for various medical examinations performed in the home is rising. In such situations, this product can be used to acquire biological information over extended periods without the wearer ever leaving the home. We are also considering applications of this product in the aforementioned field of medical care.

Through the application of "hitoe", with its unique features that had never been achieved until now, in a variety of usage scenarios, we will continue to contribute to a variety of fields such as sports, health care and the medical field.

Current Initiatives of docomo Healthcare

Kyoji Murakami
Senior Vice President NTT DOCOMO, INC.
Senior Executive Vice President, docomo Healthcare, Inc.
and head of Medical and Healthcare Business Promotion

1. Introduction

docomo Healthcare, Inc. (hereinafter referred to as "the company") was established in July 2012 by NTT DOCOMO, INC. and OMRON HEALTHCARE Co., Ltd. with the mission of "helping each and every customer lead a smart life through the promotion of healthcare". The company aims to create new value by delivering life-long healthcare support services based on customers' health-related data. Here I would like to outline the two mobile services the company provides and the devices associated with these services.

2. NTT DOCOMO healthcare services

2.1 WM (Watashi Move) mobile healthcare platform for data-driven lifestyle recommendations

Our company is pioneering the use of body data for life-long health care. These "body data-driven lifestyle recommendations" aim to create new value for our customers, and in April 2013 we launched the WM healthcare platform to deliver these recommendations. Developed in collaboration with alliance partners, the WM platform offers an array of lifestyle services to customers that combine three essential elements: the services must be "good for the body", "identify with the body" and "always be accessible". (Figure 1)

2.2 Karada-no-Kimochi (Body Mood) healthcare service for women

Karada-no-Kimochi is a healthcare support service for women that enables users to grasp their daily biorhythms by recording data on menstruation cycles and basal body temperature. It also tracks hormonal changes and offers healthcare advice for improved wellbeing. The service costs around $3 / month (excluding consumption tax) and is compatible with both DOCOMO Android smartphones and iPhone/iPad devices. (Figure 2)

Major Features

1. Delivers optimal and ample healthcare advice throughout the day (morning, mid-day, afternoon and evening) that is suited to the user's physical fitness, as well as the prevailing weather and seasonal conditions.
2. Early detection and notification of physical changes and payment of cash benefits when medical treatment is sort from a qualified medical professional.
3. Users can access basal body temperature data on their smartphones by connecting to a personal digital thermometer that takes readings in just 10 seconds.

Other menstrual management applications predominately track menstruation / ovulation days to assist users target or avoid pregnancy. Karada-no-Kimochi, however, takes this one step further to provide healthcare advice that is tailored to an individual's menstrual cycle in an effort to improve overall wellbeing. As advice is delivered at just the right time by the mobile application's female character, users develop a sense that they are actually conversing with their own bodies.

When basal body temperature readings and other recorded data detects signs of gynecological disease, the service sends a message recommending the user seek medical advice, and will even offer a cash benefit when treatment is received from a qualified medical professional. These benefits are offered to encourage users to seek medical advice for early detection of gynecological disease. This new type of service, offering cash benefits for medical treatment, is made available through a joint venture with Tokio Marine & Nichido Fire Insurance Co., Ltd. and is currently patent-pending.

The DOCOMO Shop has also commenced sale of dedicated digital thermometers for women to promote basal body temperature as more than just a gauge for women attempting to fall pregnant, but also as a means of managing everyday physical wellbeing. By recommending this thermometer as a peripheral device for smartphone users the company is witnessing a growing awareness of the basal body temperature's role in physical conditioning, as well as uncovering potential areas of new demand.

Figure 1: WM (Watashi Move) mobile healthcare platform

2.3 Karada-no-Tokei healthcare service for biological clock adjustment

Karada-no-Tokei ("Karada" means body and "Tokei" means clock) is a healthcare support service that helps regulate a user's

Figure 2: Screen images of the Karada-no-Kimochi service

Figure 3: Screen images of the Karada-no-Tokei

body clock and offers useful lifestyle and health-related advice by monitoring a wide range of body data, including food intake and hours of sleep. The mobile service is available for DOCOMO Android smartphones and iPhone/iPad devices and costs 300 yen / month (excluding consumption tax) (figure 3).

Major Features

1. Makes recommendations on ways users can structure their day and offers advice on diet, ways to relieve fatigue and anti-aging tips using input data such as timing of meals, as well as sleep records collected via “moveband 1” and “moveband 2”.
2. Access to around 1,000 healthcare contents, including exercise videos and music, to help users put into practice the advice offered by Karada-no-Tokei to improve their physical health.
3. Discounts of up to 50% on health checkups at registered medical facilities and even smartphone access to checkup results, as well as access to a free over-the-phone consultation hotline manned by doctors, nurses and other medical professionals. This service is available 24 hours a day, 365 days a year.

The timing of meals and the amount of sleep a user gets play an important role in rebalancing the body’s clock. It is, however, extremely difficult for the modern consumer, time-poor and stressed, to achieve the ideal lifestyle cycle. In an effort to improve this situation, Karada-no-Tokei recommends “lifestyle rhythms” to help bring a user’s meal and sleep times gradually closer to the ideal range.

Figure 4: View of Moveband 2

Table 1: Outline of Moveband

Appearance	Wrist band
Size	Width: About 20mm (buckle: about 16mm), thickness: about 11mm
Weight	About 17g
Color	Turquoise, brown, black
Function	Measures number of steps, length of move, calorie consumption*, hours of sleep
Sensor	Acceleration
LED	One
Waterproof	For practical waterproof use (IPX5)
Continuous operating time	Around seven days**
Wireless standard	NFC/Bluetooth (4.0)
Internal battery/ charging method	Li-ion rechargeable battery (chargeable using a dedicated adapter)
Accessories	AC adapter/charger, instruction manual including warrant

*: Measures the calories consumed when walking.
**: Depends on usage conditions.

Tailored advice is also provided to educate users on what activity should be done at what time in order to meet individual goals (dietary, fatigue-relief, anti-aging). For total, one-stop convenience contents to help users put this advice into practice can be accessed from the same service platform (contents include dancercize and yoga videos, calming music and recipes suited to different purposes and/or physical complaints).

Also offered is a free, over-the-phone health consultation hotline that users can easily access in times of illness. Users can discuss health and medical issues with doctors, nurses and other medical professionals 24 hours a day, 365 days a year.

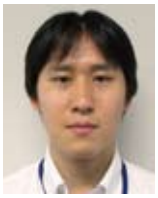
Wearable wristbands called movebands make the service even easier to use as health-related data is collected directly from the user’s body. These bands help users gauge the number of steps and exercise volume undertaken during waking hours, as well as collect data on sleeping conditions overnight, to offer a comprehensive picture of an individual’s level of activity at different periods throughout the day. Based on this data users receive accurately tailored advice for healthier living (figure 4 and table 1).

3. Conclusion

In addition to improving usability in line with user feedback, the company is eager to support the efforts of each and every customer in his/her quest for a healthier lifestyle, and as such, will look to expand beyond DOCOMO subscribers and open up these mobile healthcare services to multiple carriers in the future.

Development of Non-Intrusive Appliance Load Monitoring System to Easily Estimate the Power Consumption of Individual Appliances

Masaki Kouzai
Energy and Environment Systems Laboratories
Nippon Telegraph and Telephone Corporation



Yasunao Suzuki
Energy and Environment Systems Laboratories
Nippon Telegraph and Telephone Corporation

1. Introduction

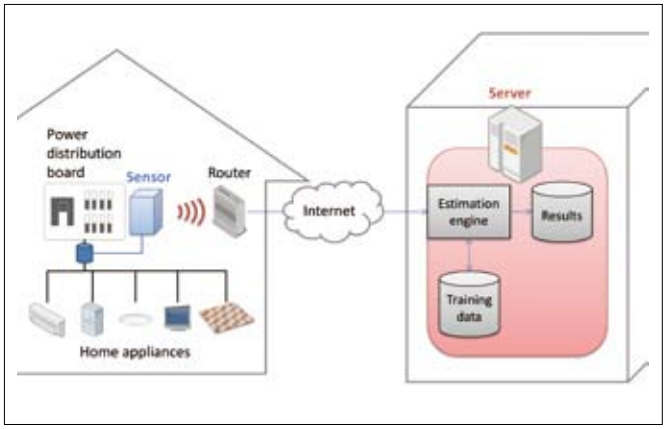
Since the Great East Japan Earthquake in 2011, there has been an increased interest in energy saving, and expectations for energy-saving techniques remain very high.

In order to continue saving energy at the level of the individual, it is important to both reduce waste and save energy without degrading the standard of living. However, wasted electricity varies depending on the household, so individuals typically follow only general advice such as "Turn off the light when you leave the room". Understanding the power consumption tendency of individual homes would enable us to save energy more effectively.

In terms of understanding power consumption tendencies, there are already a few systems in place that visualize total power consumption in a house for commercial use. However, these systems are not very user-friendly, and users need to guess where electricity is wasted. There is a great need to know not only the total power consumption but also a breakdown of this consumption, for example, with respect to individual appliances or rooms. Conventionally, to meet this need, sensors are attached to each appliance or each branch breaker, but this method necessitates the use of many sensors and often the replacement of power distribution boards, and thus its initial cost is very high.

There is currently a move to popularize a communication standard such as ECHONET Lite for home appliances. If most home appliances adopted such a standard, the power consumption of individual appliances could be understood and controlled automatically. However, because home appliances typically have a long life cycle, there may be some appliances that will not adopt the new standard for some time yet.

Figure 1: System overview



In response to these needs, we have developed a non-intrusive appliance load monitoring system (NIALMS) that estimates the power consumption of individual appliances by analyzing current data measured at a power distribution board.

2. NIALMS overview

In NIALMS, the current waveform is measured by a sensor attached to a power distribution board. The total power consumption is then calculated, and the power consumption of individual home appliances can be estimated. This system consists of a sensor installed in the home and a remote server that analyzes the current data sent from the sensor (Figure 1).

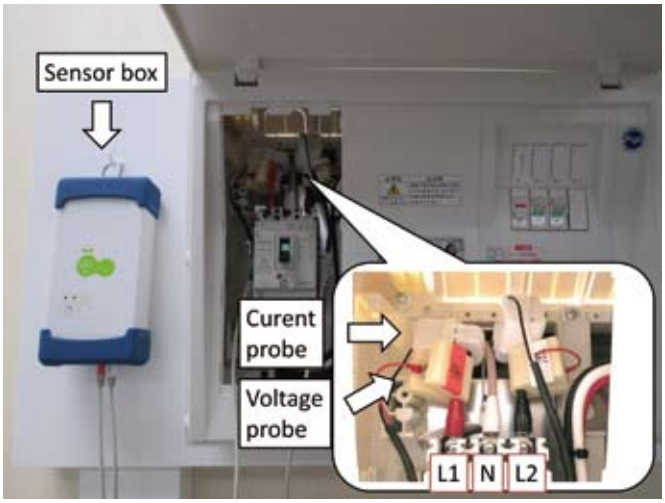
2.1 Sensor

In this system, the sensor is attached to a power distribution board and measures the current. If the system requires electrical work or that the power distribution board be replaced, this becomes a barrier in terms of reaching the masses, so it is desirable that we be able to install the system in an existing power distribution board easily. We therefore developed a sensor that consists of a current and voltage probe and a sensor box, as shown in Figure 2.

The current probe outputs the voltage proportional to the current that passes through itself and the voltage probe detects the electrical potential with capacitive coupling between the electrode and conductor in the cable and measures the voltage between two wires. These probes can easily be attached by the general user.

We use two current probes and two voltage probes so that the

Figure 2: Sensor attached to distribution board



system can accept the single-phase, three-wire system, which is the most prevalent in Japan.

The sensor box measures the current waveform, extracts the features, and transmits them to the server periodically, e.g., every three minutes. Using voltage as a trigger, we obtain the current waveform that has a fixed phase relation to commercial power and then split them into low ($f < 10$ kHz) and high (10 kHz $< f < 150$ kHz) frequency domains via frequency filter. The low frequency domain is measured to extract the component that contributes to power consumption and the high frequency domain is to extract the noise component coming from the power supply circuit.

In order to prevent any extra load on the network, the sensor extracts the peak frequency and level for the high frequency domain and reduces the communication traffic to 1 KB at a time.

Extracted features are encrypted and transmitted to the server with additional data (the sensor's serial number, etc.).

This sensor works on battery and AC power. If we set the measurement interval to three minutes, the sensor can function for a maximum of six months.

2.2 Server

The server estimates the breakdown of power consumption by analyzing the current data using previously obtained training data. The current that flows along the main breaker is the summation of the currents of all appliances. We synthesize the assumed current waveform using training data and then analyze using a support vector machine for the low frequency component. For the high frequency domain, we use the level as a threshold for whether or not to use the estimation and then perform the estimation on the basis of the existence of the frequency component.

Two independent results are obtained by the estimates using the low and high frequency components. We use the logical sum of both to suppress any oversight and then save the results to a database sequentially.

2.3 Installation

When users install this system in their homes, they must perform two operations: attaching the sensor and acquiring the training data.

First, they attach the current and voltage probes to the cables at the power distribution board and connect them to the sensor box.

Second, they acquire the training data for each appliance. They do not have to attach the sensor for each appliance; rather, they can use the sensor previously attached to the power distribution board and calculate the difference between the on-state and off-state of the current data.

Training data can also be shared among users. If training data are acquired by some other user, a new user can save time when installing the system.

Figure 3: User interface

2.4 User interface

Users can check the change and breakdown of the power consumption for individual appliances, as shown in Figure 3. By checking the power consumption of individual appliances, users can easily identify the source of wasted electricity.

3. Accuracy evaluation

We evaluated the estimation accuracy of the proposed system in a laboratory. Specifically, we tested five appliances with large power consumptions: an air conditioner, a ceiling light, a television, a refrigerator, and an electric carpet. We compared the actual state with the estimated state when these five appliances were connected to the distribution board. Results showed an accuracy of 90.6 % for all combinations of appliance state.

4. Field trial

We performed a field trial of the proposed system in 32 ordinary homes from February to August 2013. We evaluated the energy reduction effect and conducted survey research by questionnaire.

We found that, on average, there was a power consumption reduction of about 5% compared to the same term in the previous year. In addition, the questionnaire results indicated that many of the users check the power meter more frequently: over 80% of the users contributed to saving energy by using this system. This demonstrates the effectiveness of visualizing the power consumption of individual appliances.

Questionnaire data related to recouping initial costs indicated that both "less than 1 year" and "2 or 3 years" were about 40%. We therefore estimate that the allowable initial cost of a sensor for an average four-person household if they accomplished an energy reduction of 5% should be less than 18,000 yen.

At the beginning of the field trial, over 40% of the users accessed the server more frequently than once a week. However, this number decreased as time passed. To encourage users to perform more continuous monitoring, we need to add some extra motivation or push notification.

5. Conclusion

In this article, we introduced a non-intrusive appliance load monitoring system. The results of a field trial demonstrated its effectiveness in visualizing detailed power consumption. However, consumers require more functions to make it easier to use, so we are now developing such functions. Business customers, on the other hand, have a growing need for visualizing power consumption in detail, so we are expanding our target market to include business customers.

Public Viewing of 200-Inch Glasses-Free 3D Display System

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1. Introduction

Current research on ultra-realistic communication is expected to help make our daily lives more enjoyable and convenient. This research is being applied to the development of systems for enjoying 3D television programs in home living rooms (3D broadcasting) and communicating as if we are actually there with people in remote locations (more natural tele-communication). Applications such as medical training systems, cyber museums, 3D digital signage, and more are expected to emerge from this research. To realize the practical applications of this research goal, NICT has decided to tackle glasses-free 3D display systems. In this research project, we developed a prototype of a large glasses-free 3D display system, called REI, and set it up on the third floor of the Knowledge Capital located next to Osaka Station last spring. In this paper, we give an overview of the prototype system.

2. 200-inch glasses-free 3D display system

2.1 Configuration

NICT has developed a large size glasses-free 3D display using a projector array[1]. This display is configured with a special display screen and projector array, as illustrated in Figure 1. The projector array consists of several small high-definition projectors called "projector units" arranged horizontally and vertically as shown in the figure. The display screen combines a film featuring special diffusion characteristics with a condenser lens. This enables images from multiple projector units to be superimposed on the screen. The diffuser film has a wide diffusion angle in the vertical direction and a small diffusion angle in the horizontal direction. As illustrated in Figure 2, incident light rays on the screen go straight and are gathered onto the viewer's eyes by the condenser lens. A viewer can see the image from one projector unit on the left eye and in the same way can see a different image from a neighboring projector unit on the right eye. These diffusion characteristics result in a system that can produce different images at various horizontal angles, enabling a viewer to observe parallax images according to his/her horizontal position.

2.2 Specifications

Based on the above architecture, we developed a 200-inch glasses-free display with the system parameters listed in Table 1. The ideal gap of parallax images is less than the size of a pupil, making it difficult to create a practical 3D system. The gap of the parallax images in our previous system, which was used to display 3D images with natural motion parallax, was 29.4 mm[2]. However, in the current system, we set the interval of parallax images to 22.8 mm, which is approximately one third the interpupillary distance, so as to enhance smooth motion parallax in 3D

Figure 1: Configuration of 200-inch glasses-free display

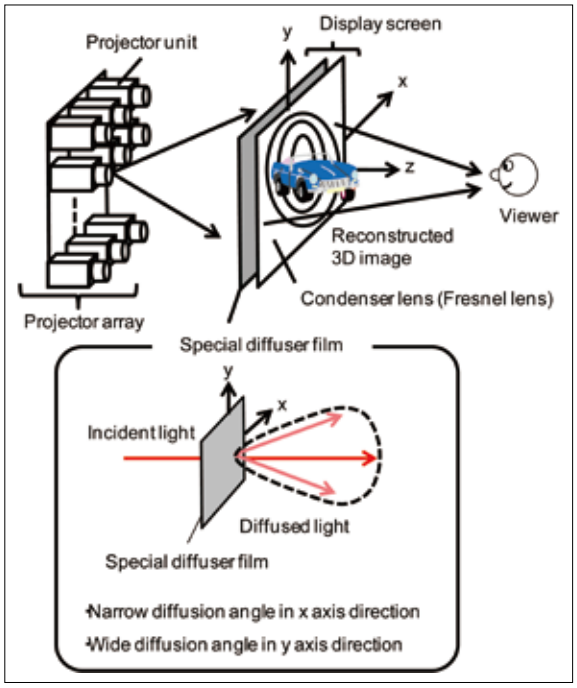

Figure 2: Basic arrangement of the display

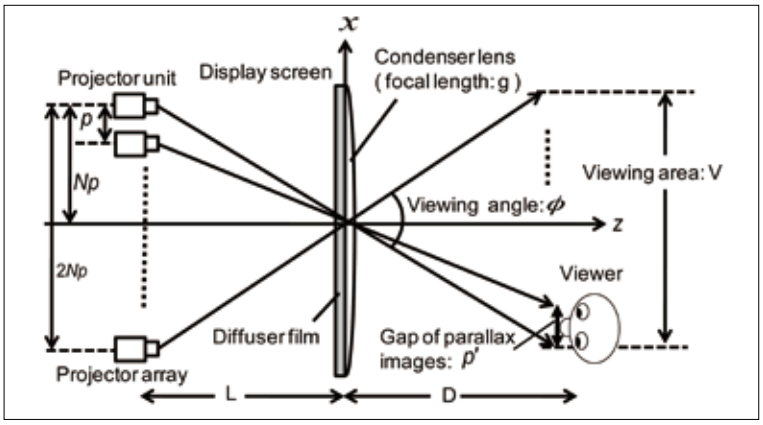

Table 1: Specifications of 3D display

Image size	200 inches, 16:9
Resolution	1,920 (H) × 1,080 (V) pixels
Frame rate	60 frame/second
Projector units	Almost 200 units
Interval of parallax images	22.8 mm (viewing distance 5.5 m)
Viewing angle	About 40°

Figure 3: Examples of reproduced 3D images

Figure 4: 3D images of real objects

images. As almost 200 projector units are used for our 200-inch glasses-free display, we set the width of the viewing area to 4 m, which is almost the same size as that of the 200-inch screen. The suitable viewing distance between the screen and the viewer was determined to be 5.5 m. From these parameters, the viewing angle is about 40°. Viewers can still see the 3D images even if they move more than ±2 m in the depth direction.

The on-screen surface resolution of the 3D images is 1,920 pixels horizontally and 1,080 vertically. Moving images can also be displayed at a frame rate of 60 fps.

2.3 Examples of 3D images

Figure 3 shows the image of a vehicle reproduced by 3D computer graphics. The reproduced image as viewed from the left, center, and right are also shown. Viewers can recognize that there is parallax by seeing different images of the car door and the interiors according to the viewing position.

We can also capture multi-view images of actual still objects using a moving high-definition digital camera[3]. The captured images are calibrated and corrected for the perspective of the images. The displayed 3D images of a real scene observed from the left and right sides are shown in Figure 4.

3. Public viewing of the Prototype

3.1 Setup of the prototype

The prototype of our large size glasses-free 3D display was set up on the 3rd floor of the Knowledge Capital in Grand Front Osaka next to Osaka Station. The location at which the display is set up is called "the Lab" and is open to the public with the aim of providing exposure to the most advanced technologies. Since Knowledge Capital opened last April, more than 1 million people have visited "the Lab". We planned to show 3D images of cultural properties at "the Lab" because there are many valuable cultural properties in the Kansai region and it is suitable for visitors who wish to explore the rich cultural characteristics of Kansai.

3.2 3D images for public viewing

As a first trial, we obtained 3D images of valuable cultural properties including Standing Juichimen Kannon (Ekadasamukha, eleven-faced Kannon, an important cultural asset) and Gojushoto (small five-storied pagoda, a national treasure) with the cooperation of Kairyuouji temple in Nara and displayed them on the 200-inch glasses-free 3D display. These images were very popular among the many visitors, as shown in Figure 5. Many people visited Kairyuouji temple after viewing these 3D images, and there were reports about Kairyuouji temple in newspapers and on TV.

Figure 5: Example of cultural properties on display

4. Conclusion

In this report, we gave an overview of a prototype of our 200-inch glasses-free 3D display, developed as part of an ultra-realistic communication research project, and introduced examples of 3D images. The prototype display was set up at "the Lab" attached to the Knowledge Capital located in Grand Front Osaka next to Osaka station. Since the display was opened to the public, many people have visited and observed glasses-free 3D images that they had never seen before. Consequently, use of the display to promote the many valuable cultural properties in the Kansai region was recognized, and we received a "Knowledge Innovation Award 2013" acknowledging concrete results in "creating new value causing change in the world."

Acknowledgments

We would like to thank Mr. Ishikawa, chief priest of Kairyuouji Temple, and personnel of Panasonic Visuals Co., Ltd. and of Toppan Printing Co., Ltd. for shooting the 3D images. We would also like to thank Mr. Ishii of the Kansai Economic Federation and Dr. Lopez-Gulliver, associate professor at Ritsumeikan University. A part of this research was performed as part of the "Research of glasses-free 3D image technologies" project supported by the Ministry of Internal Affairs and Communications.

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Making Emergency Services More Accessible: Aiming for the Seamless Handling of Calls to the Emergency Services

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1. Background and purpose of the Emergency Call Accessibility Working Party

Due to Japan's aging population, it is no longer uncommon for people to be affected by illnesses or disabilities such as muscle weakness. As a result, there has been a recent trend towards a universal social system where anyone can live independently with or without disabilities.

Although emergency phone services are an important part of the infrastructure in this sort of social system, Japan does not adhere to the above philosophy because it lacks a framework for making these calls accessible to everyone.

In the emergency call framework, once someone has called the emergency number (119, etc.), he or she must vocally explain what is being reported (purpose of the report, etc.) to the operator of the emergency report response agency. This means it is impossible for people with hearing impairments or temporary speech difficulties to call the emergency services. In Japan, there are reckoned to be around 20 million people (both with and without disability certificates) who would find it difficult to summon an emergency service with a voice call.

On the other hand, due to recent advances in globalization, there are also growing numbers of people who have not mastered the official language of the country in which they are living. This leads to a similar problem in that some people are unable to express their intentions verbally, and find it difficult to report emergencies by themselves.

As the proportion of elderly and foreign residents rises in the future, there will also be a corresponding increase in the number of people who have difficulty reporting emergencies verbally. We should therefore construct a new emergency reporting system that does not rely on voice communication.

The current status of non-vocal emergency reporting systems in Japan is borne out by statistics on emergencies reported to the Fire Defense Headquarters in 2010–11, which show that in most regions of Japan, people with hearing and/or speech difficulties are only able to report emergencies when inside a building that has a fax machine (e.g., at home or at work). When outdoors, these people therefore have to seek the assistance of a person with normal hearing in order to use conventional voice-based emergency reporting services.

Meanwhile, for everyday communications, these people have been shifting towards the use of services like email on mobile terminals like notebook PCs and mobile phones, which can also be accessed outdoors. By keeping up with these changes of primary communication tools, we should set up a system that makes it easy for people to report emergencies without relying on voice communication, and can adapt to the changing trends in the technology that people use to communicate.

From the viewpoint of infrastructure countermeasures in the event of a disaster, the voice-based emergency call framework (which is regarded as being robust in disaster situations) was itself affected by problems such as bad connections (lost calls) during the Great East Japan Earthquake Disaster of March 11, 2011, so we now know that it isn't completely dependable. On the other hand, it has also been confirmed that packet communication (as used by mobile phones and other such devices) can establish communications relatively easily. It is thus expected that voice-based emergency calls will be supplemented by a new means of communication other than voice communication as used on mobile phones, and not just for people with hearing or speech difficulties.

In 2012, an emergency call accessibility working party was established to resolve these issues. This working party is affiliated to the Smart Communication Advisory Group (AG) of the Telecommunication Technology Committee (TTC), and is studying the implementation of seamless emergency calls that can connect anyone, anywhere, and in any situation, and the international standardization of its interfaces. (Over the three year period from 2012–13 to the current business year (2014–15), there has been an active Promotion Program for Scientific Fire and Disaster Prevention Technologies.)

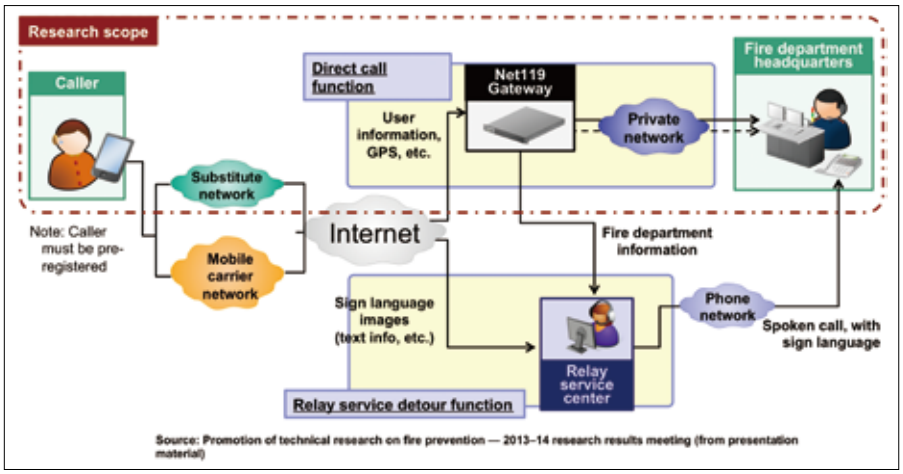
2. Progress made so far

We have made progress in research aimed at addressing the strong needs from people with hearing and language impairments, and dealing with fire and rescue situations where it is necessary to resolve issues with elevated priority. Specifically, we have been narrowing down the structure of technology for reporting emergencies to the fire department headquarters.

(1) Service model

We set up a service model (Net119) based on a rationalization of the requirements from

Figure 1: Service model (Net119)



people reporting emergencies (support for people with hearing/language impairments) and emergency call operators (fore department headquarters), and on the results of a survey on communications technology and services trends both in Japan and overseas. (Figure 1) To make it possible for disabled people to live independent lives, we are establishing a model that allows disabled people to report emergencies wherever possible.

The features of this model are briefly summarized as follows:

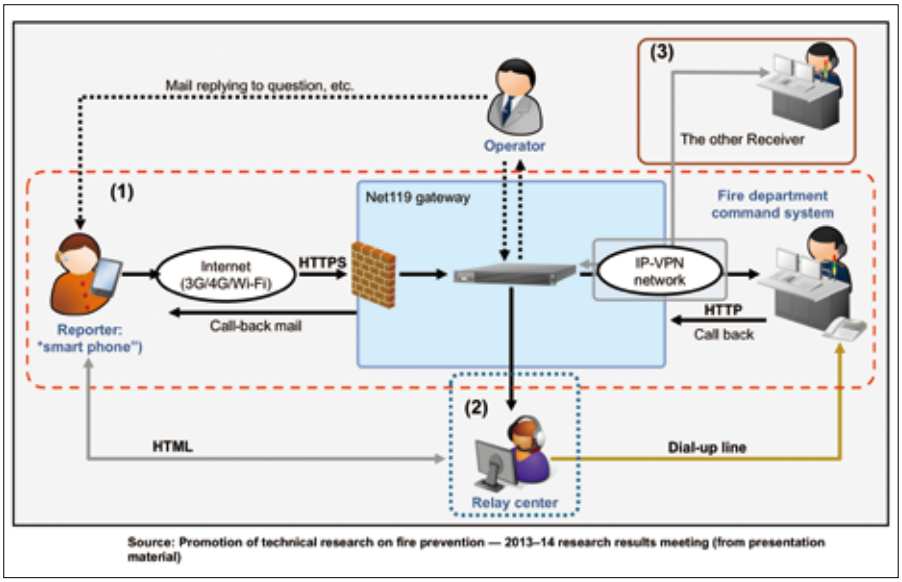
(1) The terminal used by the caller is assumed to be a mobile terminal such as a mobile phone or smart phone that is used as an everyday means of communication by people with hearing or language difficulties. In some foreign countries, services are provided not as applications but as web services.

(2) In the network, connections to the fire department headquarters are made by assuming a closed network with the current voice mechanism. Since the same closed network has limited bandwidth, for the time being we decided to use a text-based format for the exchange of information (GPS position information, personal information). However, with future advances in technology, we anticipate being able to extend the bandwidth of the communication network and implement compressed transmission of large quantities of data, allowing the delivery of media such as still images and video pictures with sound by two-way communication using diverse types of communication. This is the concept implemented by the "Total Conversation" standard proposed in ITU-T recommendation F.703.

(3) A gateway (GW) is set up to automatically distribute messages to their destinations and eliminate spam and other unwanted traffic when a reporter connects to the fire department headquarters or a relay service center via Net119. There are two automatic distribution functions — one that routes calls to the fire department responsible for the caller's location based on the caller's GPS position information, and one that routes calls to an available relay center (where operators are standing by).

Relay services that use operators to support sign language translation services are already commonplace information support services in many countries including the United States and Europe. Japan is lagging far behind other countries in the provision of such services, which is a major issue from the viewpoint of accessibility. We must promote these services as soon as possible so that Japan achieves parity with other countries.

Figure 2: Proposal for a 2014–15 demonstration, first version (before alteration)



Source: Promotion of technical research on fire prevention — 2013–14 research results meeting (from presentation material)

(2) Demonstration

We drew up a software design specification based on the above service model, and this year we are developing and verifying two prototypes — a gateway facility for the implementation of Net119, and a fire department headquarters receiver device. (Figure 2)

Ultimately, we plan to collect the results of the above verification trials and draw up a specification as a draft international standard.

3. International standardization efforts: Contribution to the ITU-T SG16 Sapporo meeting

Since the start of this study, we have been working to set up a service model with a view to achieving international standardization. We conducted a survey of technology trends and case studies of services similar to Net119 in other countries, and we roughed out a set of conditions that are capable of being adopted as an international standard. However, this was not fully adopted as an item for study by ITU-T. Evidently this is a service whose time has not yet arrived.

We therefore submitted a paper to the ITU-T SG16 Sapporo meeting held from 30 June to 11 July this year ("Proposal of a new study item to produce a new recommendation: Application layer information specification at the terminal to network interface for people with hearing and speaking difficulties to request rescue to emergency rescue agencies"). As a result, our proposed draft recommendation submitted with our contributed paper has been adopted as a baseline text for further study. Hopefully this will stimulate active discussions about this service in the future.

4. Future issues

(1) Entry criteria and rules for service operators

Our aim is to have the Net119 service launched in Japan in the next business year (2015–16), but due to the nature of emergency communications, we consider that it is necessary to set up rules and conditions that must be observed for service providers who want to join in with this service. We therefore plan to summarize the rules and conditions that must be maintained with regard to operational aspects, and to submit our demands to related organizations.

(2) Expansion of target users and purposes for use

As mentioned above, to make it easier to organize discussions, we have previously been studying how users with auditory or language difficulties can stimulate a fire and rescue situation and obtain fire department photos. On the other hand, it is possible that this technology will not only be used by people with hearing and/or speech difficulties, but will also be widely used by other people. It is also possible that it will be used for reporting not only fire and rescue situations but also similar emergency services (police, highway patrol, etc.).

We therefore consider that in discussions of international standardization, we will do what we can to increase the number of target users.

SoftBank

Toward "No. 1 in the Mobile Internet World"

SoftBank Mobile Corp.

1. Business description

SoftBank Mobile (Chairman & CEO: Masayoshi Son) provides mobile communications services for mobile phones and mobile data communications, and also sells mobile devices. The company offers attractive mobile devices, such as the iPhone, iPad and other smartphones, as well as a variety of content, and works to enhance the convenience of its communications network so it can offer mobile communications services of choice for customers.

Masayoshi Son Chairman & CEO

2. Initiatives to improve mobile services

In July 2012, SoftBank Mobile's communications services began using the 900 MHz band, called the "platinum band," which is able to cover wide areas efficiently. The platinum band is being used to expand the network coverage areas and to implement improvements in difficult to cover areas, such as behind buildings. Installation of Wi-Fi access points to offload rapidly increasing traffic is also progressing, and as of May 30, 2014, Softbank Mobile had 460,000 Wi-Fi access points, called "SoftBank Wi-Fi Spots," installed throughout Japan.

A high-speed data communications service called "SoftBank 4G LTE" that uses the FDD-LTE technology was launched in September 2012. A variety of devices, including the iPhone 5s, can use the SoftBank 4G LTE network, and 94,000 base stations for the service were in place as of the end of March, 2014.

In February 2012, the SoftBank 4G high-speed data service was launched, using the AXGP network. This network is maintained by Wireless City Planning Corp., a SoftBank Group company, and is highly compatible with TD-LTE technology. The SoftBank 4G network is used mainly by Android smartphones.

SoftBank Mobile is also conducting trials of an LTE-Advanced TDD system in the 3.4 - 3.6 GHz band in the Ginza area of the Chuo-ku, Tokyo. By using technologies such as carrier aggregation and advanced MIMO to increase communication speeds, peak rate of over 1 Gbps have been achieved. The 3.4 - 3.6 GHz band used in these trials is a new frequency band scheduled to be allocated in the future for next-generation mobile phone services in Japan.

3. Products and services

As mobile phone rates in Japan were considered expensive at the time, SoftBank Mobile launched a new rate plan called the White Plan in January 2007. Many people used this service due to its reduced rates. Then, in July 2014, the Smartphone Flat-rate service was launched, with a new fixed rate plan for voice and data and the ability to carry over unused data to the next month.

SoftBank Mobile began offering the iPhone in July 2008, prompting expansion of the smartphone market and innovation in Japan's mobile industry. Customers were highly satisfied with the iPhone and other smartphones and strong sales continued, so that SoftBank Mobile had net subscriber additions of 3,450,000 in FY2013, and has had the highest net additions for four consecutive years since 2010.

To meet various customer needs, SoftBank Mobile has also been creating new markets, including ones for the iPad, the PhotoVision digital photo frame with communications features, and mobile phones with features such as anti-theft buzzers or radiation detectors.

SoftBank Mobile also offers entertaining and convenient services such as the UULA integrated entertainment application service, which incorporates video from various genres such as movies and music, and SoftBank HealthCare, a healthcare service that uses a wristband to record users' daily activity and allows them to check the state of their health on their smartphones.

Figure 1: SoftBank SmartTV, compatible with UULA

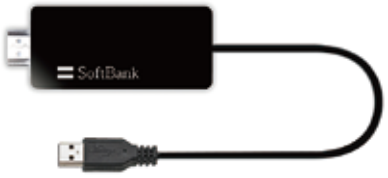


Figure 2: The SoftBank 301SI Smart body composition monitor, compatible with SoftBank HealthCare

4. Conclusion

SoftBank Mobile is striving to provide enticing mobile terminals and a variety of services, while always improving its communications network and providing mobile communications services that are attractive to customers. In July 2013, Sprint Nextel Corporation (now Sprint Corporation) joined the SoftBank Group. Sprint is the third largest mobile communications provider in the U.S.A. in terms of subscribers.

Going forward, the SoftBank Group is aiming for further growth, with the goal of being No. 1 in the mobile Internet world.

= A Serial Introduction Part 1= Winners of ITU-AJ Encouragement Awards

In May every year, the ITU Association of Japan (ITU-AJ) proudly presents ITU-AJ Encouragement Awards to people who have made outstanding contributions in the field of international standardization and have helped in the ongoing development of ICT.
These Awards are also an embodiment of our sincere desire to encourage further contributions from these individuals in the future.
If you happen to run into these winners at another meeting in the future, please say hello to them.
But first, as part of the introductory series of Award Winners in 2014, allow us to introduce some of those remarkable winners;

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Three Pillars for Achieving Our Goals in Standardization Meeting

First of all, I would like to thank my colleagues in the DOCOMO Beijing Labs and Radio Access Network Development Department for their cooperation and thank my bosses for their invaluable advice and support while I was conducting research in the field of standardization. These allowed me to make technical proposals and contribute to the field of radio access network for LTE/LTE-Advanced technology in 3GPP standardization and IEEE 802.11v. Furthermore, as the vice chairperson of WG5 in the FuTURE Forum in China, I had a chance to contribute to the consensus building towards the direction of the future mobile network by expediting technical discussions and collaboration between universities, enterprises, and the governments of Japan and China.

Through these experiences, I firmly believe that three key factors are crucial for achieving our goals at the standardization meeting. The first key factor is technical skill, which is self-explanatory. The second key factor is coordination skill, which includes but is not limited to fully utilizing English for debate purposes, strategizing each move to identify potential partners and opponents, and acting swiftly with the correct timing. In particular, understanding the situation and intent of our partners as well as rivals is the basis of coordination skill. Last but not least, the third key factor is the conviction to win negotiation, the so-called "battle". Only when you are absolutely confident about the advantages of your proposal can you convince others and come to an agreement. I want to emphasize that crucial as these skills are, they can be practiced and honed in various situations in everyday work, and as we all know, practice makes perfect. One step at a time, let's do it.

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Using ICT to resolve social issues in medicine and healthcare

I am greatly honored to have been awarded the ITU Association Award for Encouragement of International Activity in a Field of Achievement, and I am deeply grateful to all the many people in Japan and in other countries who have given me their guidance and cooperation.

My work in the field of e-Health (the use of ICT in medicine and healthcare) has been continuing now for about ten years, and in particular, I have been working on surveys, proposals, R&D, verification trials and promotional activities aimed at the creation of markets in EHR (Electronic Health Records) and PHR (Personal Health Records), which are frameworks for sharing information between the fields of medicine and healthcare. International standardization is extremely important for the realization of EHR and PHR.

In the course of these activities, a study on e-Health was conducted in the spring of 2012 by the ITU-T Focus Group on Machine-to-Machine Service Layer (FG-M2M). At the Telecommunication Technology Committee (TTC), I had the opportunity to work as the leader of the e-Health Working Party, where I was able to make progress on FG-M2M together with affiliated businesses in Japan. In FG-M2M, I also worked as editor of the use case results document while taking part in international standardization efforts for the first time, and although I had a lot of things going on at the same time, I managed to see the project through to completion with the cooperation of everyone who was involved with it.

On the other hand, in my own post at NTT, I have continued to work on the development of mobile Health (m-Health) systems compatible with the Continua Health Alliance Design Guidelines, the verification of global interoperability and promotion of business development in Japan, and promotion activities for global development including developing countries. As part of these activities, I worked in partnership with the ITU-T SG16 rapporteur to hold exhibitions at various ITU events, and was able to implement the ITU-T recommendations (H.810) for Continua Health Alliance Design Guidelines (December 2013).

As the world's population becomes increasingly elderly, the demand for ICT in the medicine and healthcare fields is growing rapidly. I hope that my work will make some contribution to solving this sort of issue.

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Fields of activity: ITU-T SG15

Optical Transport Network (OTN) standardization efforts

As the Internet spreads, network traffic is continuing to increase. This includes high-speed network connection services using optical fibers, and wireless access services as used by smart phones and tablet computers. Networks such as these are supported at their foundations by high-capacity long-distance optical fiber communication systems. Optical fiber communication systems that connect between major cities use wavelength division multiplexing (WDM) transmission technologies, whereby optical signals of different wavelengths are multiplexed together and transmitted along a single optical fiber. WDM transmission systems operating at a bit rate of 100 Gbit/s per wavelength are currently being put to practical use, and considerable effort is being put into research and development for the implementation of Beyond 100G transmission.

International standardization is one of the essential roles to be played in the practical application of high-capacity optical fiber communication systems of this sort. International standardization makes it possible to implement technologies that are more advanced by ensuring interoperability, and making mass production more efficient.

Since 2006, I have been involved in the international standardization of Optical Transport Network (OTN) technology at ITU-T. At that time, OTN technology was suitable for the transport of voice traffic, but with the increase in data traffic, it became necessary to expand the range of applicable traffic. However, the proposed extension of OTN to data traffic was not readily accepted. This is because optical communication systems are used over many years and must therefore be compatible with existing systems. On the other hand, it is thought that some form of extension is needed considering the future prospects of this technology. Although this has been widely discussed, a stalemate situation has continued for a long time. After the extensive discussion, agreement was reached through a gradual process of understanding.

This agreement could be described as a major turning point in the adaptation of OTN from voice communication to data communication. Witnessing this turning point of OTN has been a hugely valuable and highly stimulating experience. Next, I hope to promote the development of society by working on next generation optical communication technology.

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Fields of activity: ITU-R SG5 WP5A/WP5C

My activities in ITU-R

Achievements

Through my continued participation in ITU-R Working Parties 5A (WP5A) and 5C (WP5C) and the World Radiocommunication Conference (WRC), I have made substantial contributions to the development of revised ITU-R Recommendations and new ITU-R Reports in the fields of fixed wireless systems and land mobile wireless systems. My main achievements are as follows.

(1) Developing the ITU-R Report "Fixed wireless system use and future trends" at WP5C

While developing a new ITU-R report, including the proposal of a new Question relating to this report, I not only submitted contributions on my own behalf, but was also appointed as chairman of the drafting group (DG) at the WP5C meetings, and contributed greatly to effective discussions at the WP5C meetings by serving as chairman of the correspondence group (CG) that performed work between the meetings.

(2) Revision of Recommendations to facilitate sharing with space services and fixed services (FS)

Responding to requests for revisions to the

Recommendations from WP7B in order to protect data relay satellites (DRS), I succeeded in obtaining the agreement of all the related members by proposing contributions to satisfy this requirement while ensuring the operation of existing FS stations in consideration of members who already have FS stations in operation.

(3) Revision of Recommendation relating to standard technology for fixed broadband wireless access (BWA)

With regard to this Recommendation, I proposed contributions to keep up with recent technological developments and changing circumstances and to make structural modifications to simplify the Recommendation. I also saw through the revisions to this Recommendation by serving as chairman of the DG during the WP5A meeting.

(4) WRC-12 Agenda Item 1.8: Consideration of the progress of ITU-R studies concerning technical and regulatory issues relative to the fixed service in bands between 71 GHz and 238 GHz

I took part in the development of a Report relating to this Agenda Item at the ITU-R WP5C meeting. At WRC-12 and at the 5th meeting of the APT Preparatory Group for WRC-12 (APG12-5), I stated Japan's position actively and contributed to the achievement of consensus between all members, including Japan.

Future prospects and goals

In the future, I hope to continue participating in ITU-R WP5A/WP5C meetings, not only to emphasize Japan's leading position through developing documents on Japanese technology relating to fixed wireless and land mobile systems, but also to stimulate ITU activities by actively serving as a promoter of discussions at the workshops. I also hope to continue contributing to the enhancement of Japan's presence at the ITU.

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Fields of activity: 3GPP SA1

Thank you!

April 2001 (to March 2010): ITU-T SSG, SG19, SG13

From 2001 to 2008, in SSG and SG19, I contributed to the drafting of a series of Recommendations (Q.1702, Q.1703 and Q.1704) concerned with a long-term vision of mobile communication services and network capacity in around 2010. As a first attempt at the international deployment of TTC's next-generation all-IP mobile network research results, these results were brought to ITU-T before the 3GPP and IETF. In particular, I played a leading role in the drafting of Recommendation Q.1704 by taking charge of proceedings as the Q.1/19 rapporteur representative and working as editor.

June 2001 (to December 2005): EU IST MIND and WWI/E2R projects

From June 2001 to November 2002 (MIND), and from January 2004 to December 2005 (WWI/E2R), I participated in the European IST projects MIND and WW1/E2R on next-generation mobile networks, where I learned about the trends in European studies.

October 2006 (to March 2011): NGMN

From 2006 to 2011, I participated in and contributed to the NGMN Alliance as an international cooperative effort towards the realization of LTE. In 2006, I contributed as a member of the editing team that drew up the NGMN White Paper presenting the NGMN's overall vision. In 2010, I contributed as a member of the editing team that drew up the NGMN Technical Achievements 2007–2010 white paper. At the time, I was awarded a Certificate of Appreciation by the NGMN board chairman and NGMN secretary-general for the contributions I had made.

April 2011 (to present): 3GPP SA1, SA2, SA

Since 2011, I have been working on EPC standardization at the 3GPP Initially I was mainly involved with development feedback issues at SA2, but in November 2012 I transferred to SA1 where I have been contributing to the study of access control enhancements — specifically, (1) access restrictions during communication (working item name: PMOC), and (2) per-application access restrictions (working item names: ASAC, FS_ACDC, ACDC). With regard to (1), I played a leading role as rapporteur in drawing up the service requirements for the application of access restrictions during communication, which have hitherto only been effective during idle states. With regard to (2), I played a leading role as rapporteur in drawing up the requirements for optimizing access restrictions that are effective for individual applications, whereas hitherto they were only valid on a per-terminal basis (except for SSAC in the restriction of VoLTE voice calls).

In mobile communications, I am currently beginning studies aimed at 5G technology. From the viewpoint of being involved in standardization activities since the first studies of 4G, I feel strongly that I have gained a thorough grounding in all areas of this field. In the future, I hope to contribute with renewed enthusiasm to the standardization of 5G. Given the opportunity, I also hope to push forward with standardization efforts from a position of greater responsibility such as vice chairman or chairman.

ITU-T SG16 Sapporo Events

—Workshop on Multimedia Technologies—

Kiyoshi Tanaka
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Nippon Telegraph and Telephone Corporation

1. Introduction

On July 1, 2014, a Workshop on Multimedia Technologies was held in the Small Hall at the Sapporo Convention Center as a local event running concurrently with the ITU-T SG16 Sapporo meeting (Photo 1, 2). This paper presents a summary of the workshop and the content of the day's lectures.

2. Lecture summary

This workshop was tied in with another local exhibition event called *Showcasing on Cutting-Edge Multimedia Technologies* that ran from July 1 through July 4, and was planned by the Japanese companies that hosted the SG16 meeting. The workshop consisted of a technical session where technologies were introduced centered around the items presented at the exhibition, and keynote sessions by the platinum sponsors. The workshop was organized by the program committee. The make-up of this committee is shown in Table 1. The workshop was supported by the Ministry of Internal Affairs and Communications, with the cooperation of the Telecommunication Technology Committee (TTC). The technology sessions were organized by the TTC Multimedia Advisory Group (MM-AG), and in particular the session 1 lectures on IPTV (Internet Protocol Television) were organized by the TTC IPTV working group. The post of chairperson on the day was shared between Masahiro Serizawa of NEC and myself (Kiyoshi Tanaka, NTT), who are the vice-chairmen of each organizing group.

There were 81 participants in the workshop, of whom 56 were also participating in the ITU-T SG16 and JCT-VC meetings that were being held on the same day.

3. Lectures

The lecture program is shown in Table 2. The day's keynote session was started after welcoming addresses from representatives of the host, supporter, and cooperator (program committee representative Yushi Naito, Ministry of Internal Affairs and Communications representative Toshihiro Matsui, and TTC representative Yoichi Maeda). The keynote lectures were delivered by Toshiaki Fujita of NTT, Fumihiko Tomita of the NICT, and Kenichi Tanaka of Mitsubishi Electric Corporation, who described the state of R&D and standardization at their respective

Table 1

Program Committee	
Kiyoshi Tanaka,	Nippon Telegraph and Telephone Corporation
Michiko Fukahori,	National Institute of Information and Communications Technology
Yushi Naito,	Mitsubishi Electric Corporation
Kazuhiko Tanaka,	The ITU Association of Japan
Yosuke Endo,	Japan Broadcasting Corporation (NHK) / The Telecommunication Technology Committee IPTV Working Group Chair

Photo 1: The venue on the day of the event

Photo 2: The workshop in progress

Table 2

Keynote Speech		
13:15-13:30	Welcoming addresses: Yushi Naito, SG16 Chairman/Mitsubishi Electoric Corporation Toshihiro Matsui, Director, Standardization Division, Global ICT Strategy Bureau, Ministry of Internal Affairs and Communications Yoichi Maeda, CEO and SVP, The Telecommunication Technology Committee	
13:30-13:45	Toshiaki Fujita, Senior Vice President of Service Innovation Laboratory Group, Nippon Telegraph and Telephone Corporation	
13:45-14:00	Fumihiko Tomita, Vice President, National Institute of Information and Communications Technology	
14:00-14:15	Kenichi Tanaka, Fellow, Mitsubishi Electric Corporation	
Technical Session (Organized by TTC MM-AG)		
Special Session:		
14:15-14:45	**Invited Speech:** Beyond the content distribution, and its technology	Jay Kishigami, Professor, Muroran Institute of Technology
Session 1 (Organized by TTC IPTV-WG)		
14:55-15:10	H.265/HEVC Encoder for UHDTV	Mitsuo Ikeda, Senior Research Engineer, Supervisor, NTT Media Intelligence Laboratories, Nippon Telegraph and Telephone Corporation
15:10-15:25	8K-UHDTV HEVC Real-time Encoder	Atsuro Ichigaya, Research Engineer, Advanced Television Systems Research Division, Science & Technology Research Laboratories, Japan Broadcasting Corporation (NHK)
15:25-15:40	ITU-T standards based IPTV solutions and the global testbed	Hideki Yamamoto, Senior Manager, Broadband Media Department, Carrier Systems Division, Telecom Systems Business Division, Oki Electric Industry Co., Ltd.
15:40-15:55	ITU-T Standards for Multimedia Application Platforms	Fernando Masami Matsubara, Manager, Planning & Administration Department, Mitsubishi Electric Corporation
Session 2		
15:55-16:10	To Create a World Without Communication Barriers	Chiori Hori, Director, Spoken Language Communication Laboratory, Universal Communication Research Institute, National Institute of Information and Communications Technology
16:10-16:25	An advanced traffic management solution for big-data circumstances	Yoshito Sakurai, Director International Standardization, Strategy Planning & Development Office, Information & Telecommunication Systems Company, Hitachi, Ltd.

organizations.

These were followed by the technical sessions, which were prefaced by an invited speech from Professor Jay Kishigami of Muroran Institute of Technology, who is also a senior adviser for standardization strategy at NTT. Professor Kishigami gave an interesting lecture on the subject of metadata, including the similarities between ITU-T Recommendations F.750 and H.750 in relation to metadata, the importance of metadata in recent years, and the future direction of metadata.

Technical session 1 consisted of four lectures on subjects closely related to IPTV services. On the subject of video coding technology for the realization of high-definition video services, NTT's Mitsuo Ikeda gave a lecture on the roadmap for UHDTV services aimed at 8K video resolution, and on H.265/HEVC encoder technology for UHDTV, and NHK's Atsuro Ichigaya gave a lecture on codec technology for 8K UHDTV. Hideki Yamamoto of Oki Electric Industry then gave a description of IPTV and related services, and introduced the ITU IPTV IPv6 Global Testbed (I3GT). Next, Masami Matsubara of Mitsubishi Electric Corporation described the importance of standardization, centered on IPTV middleware technology. Session 2 consisted of a lecture on automatic translation by Chiori Hori of the NICT, and a lecture on big data by Yoshito Sakurai of Hitachi. All of the lectures were well received by the audience.

4. Conclusion

This paper presented an overview of the Workshop on Multimedia Technologies that was held alongside the ITU-T SG16 meeting. This workshop was planned, arranged and realized by volunteers from the Japanese companies that hosted the ITU-T SG16 event, and I would like to thank everyone who helped for their cooperation.

— Showcasing on Cutting-Edge Multimedia Technologies —

Rie Yamagata
Standardization Promotion Office
International Affairs Department
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Building on the theme of "Cutting-Edge Multimedia Technologies", the SG16 Sapporo Meeting Hosting Committee organized a Showcasing from 1 to 4 July 2014.

MIC, NICT, Mitsubishi Electric, NTT, Fujitsu, NHK, OKI, and 3Dragons participated in the exhibition (Table 1). There were several demonstrations on a variety of topics, including the ITU international standard.

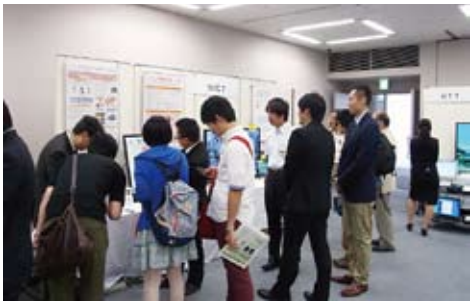
The Kamikawa State Secretary of MIC inspected the Showcasing on 1 July.

This inspection was broadcast on the news by the NHK Sapporo broadcasting station, Hokkaido Television Broadcasting (HTB), Hokkaido Broadcasting (HBC), and Sapporo Television Broadcasting (STV), and as a result, a high number of lay people—about 300 over the course of four days— who had seen the news on TV visited the exhibition and were able to experience "Cutting-Edge Multimedia Technology".

Table 1: Showcasing Exhibits

Organization	Exhibit
MIC (Supported by NHK, NICT, SHARP)	8K Video Demonstration using an 85-inch Monitor
NICT	(1) To Create a World Without Language Barriers (U-STAR) (2) "KoeTra": An application for the hearing impaired
NICT	Simple 3D Format (Global View and Depth)
MITSUBISHI ELECTRIC	IPTV terminal device based on ITU-T standards
MITSUBISHI ELECTRIC	High speed services over 10G-EPON access networks
NTT	Depth-based Free viewpoint TV
NTT	Reliable 4K H.265/HEVC Real-time Transmission by using MMT-FEC
FUJITSU	Application of Video Watermarking Technologies
NHK	8K-UHDTV H.265/HEVC Real-time Encoder
OKI	ITU-T standards based IPTV solutions
3Dragons	Full Color All-Round Parallax Display: "Holo-Deck"


Exhibition room packed with visitors.


Students from Hokkaido visiting a booth.


Inspection of the Kamikawa State Secretary of MIC.

ASIACCS 2014 Report

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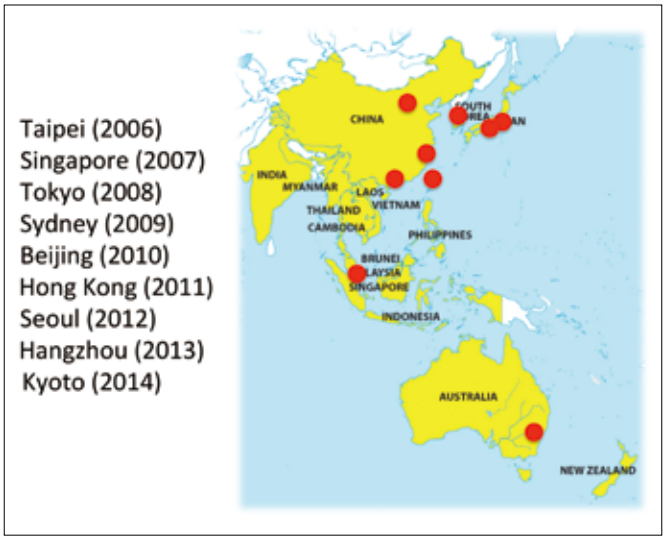
1. Introduction

The ACM Symposium on Information, Computer and Communications Security (ACM ASIACCS) was first held in the Asia-Oceania region in 2006 as a symposium related to the ACM conference on Computer and Communications Security (ACM CCS). Figure 1 shows the venues where ASIACCS was held from 2006 to 2014. This year, the event was held in Japan for the second time, following the 2008 symposium held in Akihabara, Tokyo. Amid growing awareness of the importance of information security techniques in an increasingly broad range of fields, it is very noteworthy that Japan hosted a top conference covering general information security techniques in addition to cryptography.

Figure 1: Previous venues of ASIACCS



2. ASIACCS 2014 overview

This section presents an outline of the ASIACCS 2014 symposium held at the Kyoto Garden Palace hotel on 4–6 June 2014.

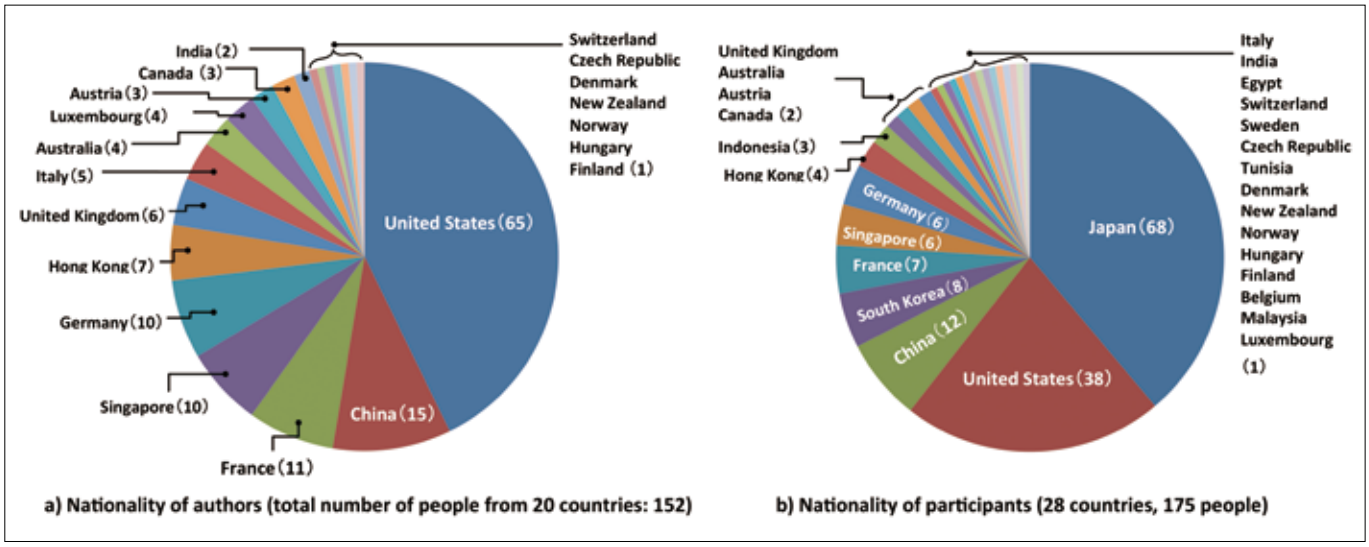
2.1 Selection of papers

There were 255 papers submitted to this symposium. These were reduced to 50 (42 papers and 8 short papers) through a strict peer review process. The presentations were grouped into 12 sessions held over three days: (1) Network, (2) Reputation and Location, (3) Processing encrypted data, (4) Applications 1, (5) Crypto, (6) Access control and Flow analysis, (7) Software and Systems security, (8) Applications 2, (9) Authentication, (10) Android, (11) Short 1 Network, (12) Short 2 Software. The acceptance rate of papers was 16.4%, which is on a par with previous years. Figure 2(a) shows a graphical representation of the nationality of the authors of accepted papers. A new feature at this year's symposium was the addition of 17 poster presentations. These were displayed in the area used for coffee breaks, and were hotly debated with some arguing that they were eating away at the time available for the main sessions.

2.2 Keynote

Professor Christopher Kruegel of the University of

Figure 2: Nationalities of (a) authors and (b) participants



a) Nationality of authors (total number of people from 20 countries: 152)

b) Nationality of participants (28 countries, 175 people)

California, Santa Barbara was invited as the symposium's keynote speaker. In his speech "Fighting Malicious Code — An Eternal Struggle", he commented on the threats of malware exploiting vulnerabilities in mobile devices, and highlighted the dwindling number of research publications in this field despite the growing sophistication and destructiveness of malware. It is clear that more researchers are needed in this field.

Photo 1: Geishas performing the Gion Kouta dance

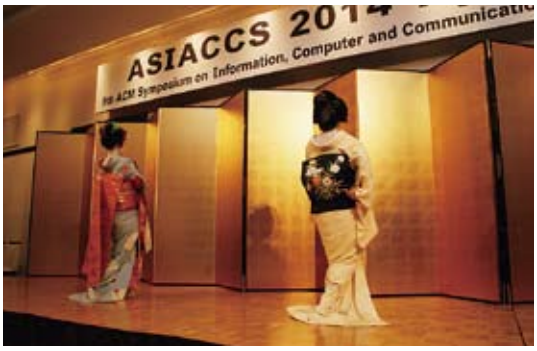


Photo 2: Closing remarks by Professor Robert Deng

2.3 Participants

This symposium was attended by 175 people from 28 countries. The graph in Figure 2(b) summarizes the nationality of this year's participants.

3. Co-located Workshops

Five workshops were held on 3 June (the day before the start of ASIACCS 2014): "2014 ACM Asia Public Key Cryptography Workshop (ASIAPKC'14)", "Second international workshop on Security and Forensics in Communication Systems (ASIACCS-SFCS 2014)", "The First International Workshop on Information Hiding and its Criteria for evaluation (IWIHC 2014)", "Asia Workshop on Security, Privacy and Dependability for CyberVehicle (AsiaCyCAR 2014)", and "The 2014 International Workshop on Security in Cloud Computing (SCC'14)". This section introduces the AsiaCyCar 2014 workshop, which was concerned with vehicle security.

3.1 AsiaCyCAR2014

Due to the increased use of electronics in vehicles and the growth of vehicle services that are connected to networks, protecting people's security and privacy and responding to cyber attacks are becoming issues of pressing importance. These themes were covered by the AsiaCyCAR 2014 workshop, which featured four invited lectures. Professor Tsutomu Matsumoto of Yokohama National University gave a lecture "How to Eliminate Unauthorized CAN Transmission" on the safety of an in-vehicle network called CAN (Control Area Network), and Camille Vuillaume of ETAS introduced the efforts being made in Europe relating to vehicle security in a lecture with the title "Automotive Security Initiatives in Europe". Dennis-Kengo Oka, also of ETAS, gave a speech on "The Trust Assurance Level (TAL) Concept — Towards a Common Security Evaluation Standard for V2X Senders" to introduce the security certification of vehicle-to-vehicle communications, and Mitsuru Matsui of Mitsubishi Electric Corporation gave a speech on "Minimalism of Cryptography on Embedded Devices", in which he described how to implement cryptography on embedded devices for vehicles with restricted memory.

4. Social events

On the evening of June 5, a reception was held to welcome the participants in the symposium and give them a chance to socialize. The reception began with a welcome address and toast from Makoto Imase, Vice President of NICT. Entertainment was provided by two geishas and a performer, who performed a traditional Kyoto dance called the Gion Kouta (Photo 1). During the reception, a prize-giving ceremony was held to confer awards for the best papers and best posters (see section 4.1). These awards were handed over by the program chair with the assistance of the geishas. Finally, Professor Robert Deng (Singapore Management University) brought the reception to a close by announcing the next symposium (ASIACCS 2015, 14–17 April 2015, Singapore). (Photo 2)

5. Awards for best posters and best papers

Two best paper awards and four best poster awards were granted at this symposium.

- Best paper awards (2 papers)
  - A. Das, N. Borisov, P. Mittal, and M. Caesar, "Re^3: Relay Reliability Reputation for Anonymity Systems"
  - M. Miettinen, S. Heuser, W. Kronz, A.-R. Sadeghi, and N. Asokan, "ConXsense — Automated Context Classification for Context-Aware Access Control"
- Best poster awards (4 posters)
  - S. Nakagawa, K. Emura, G. Hanaoka, A. Kodate, T. Nishide, E. Okamoto, and Y. Sakai, "Performance Evaluation of a Privacy-Enhanced Access Log Management Mechanism"
  - D. K. Oka, C. Vuillaume, and T. Furue, "Vehicle ECU Hacking"
  - Y. Suga, "SSL/TLs severs status survey about enabling forward secrecy (+ rapid survey after the Heartbleed Bug)"
  - T. Watanabe and T. Mori, "Understanding consistency between words and actions for Android apps"

6. Conclusion

The ASIACCS international symposium on the security of computers and communications has been held in Asia every year since 2006, and the number of participants has been steadily increasing year on year as the profile of this event grows. For ASIACCS 2014, there were 255 papers submitted, and 175 participants. Both these figures are the highest in the history of ASIACCS.

ASIACCS 2014 was also highly rated by researchers from overseas with regard to conference organizing methods. This is largely due to the contributions made by everyone involved in the symposium. We would especially like to thank Kyushu University, Ritsumeikan University and all those who helped us put the symposium together.

Toward Connectivity for All

Candidate for the Post of Deputy Secretary General of the Asia-Pacific Telecommunity (APT)

Masanori KONDO

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