External Awards

FY2016 Award of Director-General for Industrial Science and Technology Policy and Environment Bureau, METI, to Recognize Contributions to Industrial Standardization

Winner: Hisashi Izumita, NTT Access Network Service Systems Laboratories
Date: October 6, 2016
Organization: Ministry of Economy, Trade and Industry (METI)

For his contributions to international standardization on the International Electrotechnical Commission (IEC) Technical Committee 86 (Fibre optics).

Excellent Presentation

Winner: Masaya Nohara, Yoko Ono, Mikayo Iwata, Masahiko Hayashi, and Takeshi Komatsu, NTT Device Technology Laboratories
Date: December 7, 2016
Organization: EcoDesign Products & Service (EcoDePS) Symposium 2016

For "Proposal and Basic Performance of New Concept Batteries which Consist of Fertilizer Components."
Published as: M. Nohara, Y. Ono, M. Iwata, M. Hayashi, and T. Komatsu, "Proposal and Basic Performance of New Concept Batteries which Consist of Fertilizer Components," EcoDePS 2016, Tokyo, Japan, Dec. 2016.

2016 IEICE Communications Society OCS Young Researchers Award

Winner: Masanori Nakamura, NTT Network Innovation Laboratories
Date: December 20, 2016
Organization: The Institute of Electronics, Information and Communication Engineers (IEICE) Communications Society, Technical Committee on Optical Communication Systems (OCS)

For "A Construction Method and Basic Characteristic Evaluation of Optical 8-dimensional Modulation Using Square-QAM."
Published as: M. Nakamura, M. Yoshida, K. Yonenaga, and A. Hirano, "A Construction Method and Basic Characteristic Evaluation of Optical 8-dimensional Modulation Using Square-QAM," IEICE Tech. Rep., Vol. 115, No. 276, OCS2015-53, pp. 59–64, 2015.

Microsoft Most Valuable Professional Award (Data Platform Category)

Winner: Tsuyoshi Ozawa, NTT Software Innovation Center
Date: January 1, 2017
Organization: Microsoft Corporation

For his contributions to open source software projects concerning Apache Hadoop and enhancement of the Apache Hadoop ecosystem.

*Microsoft is a registered trademark of Microsoft Corporation in the United States and/or other countries. Apache Hadoop is a registered trademark of the Apache Software Foundation in the United States and/or other countries.

Young Scientist Presentation Award

Winner: Megumi Kurosu, NTT Basic Research Laboratories
Date: March 14, 2017 (awards ceremony to be held)
Organization: The Japan Society of Applied Physics (JSAP)

For "Dispersion Effects on Phonon Temporal Waveforms in a Phononic Crystal Waveguide."
Published as: M. Kurosu, D. Hatanaka, K. Onomitsu, and H. Yamaguchi, "Dispersion Effects on Phonon Temporal Waveforms in a Phononic Crystal Waveguide," The 77th JSAP Autumn Meeting, Niigata, Japan, Sept. 2016.

Young Scientist Presentation Award

Winner: Takuya Ikuta, NTT Basic Research Laboratories
Date: March 14, 2017 (awards ceremony to be held)
Organization: The Japan Society of Applied Physics (JSAP)

For "Implementation of Quantum State Tomography for High-dimensional Time-bin Entanglements."
Published as: T. Ikuta and H. Takesue, "Implementation of Quantum State Tomography for High-dimensional Time-bin Entanglements," The 77th JSAP Autumn Meeting, Niigata, Japan, Sept. 2016.

Papers Published in Technical Journals and Conference Proceedings

Channel Model Considering Frequency Dependency Based on Propagation Measurements with Multiple Frequencies for 5G Systems

M. Sasaki, M. Inomata, W. Yamada, N. Kita, T. Onizawa, and M. Nakatsugawa

Proc. of the European Wireless 2016, pp. 15–20, Oulu, Finland, May 2016.

A path loss model is described and the frequency dependency characteristics of path loss are presented. The characteristics are obtained from measurement results in multiple frequency bands, including those above 6 GHz. In order to analyze the frequency dependency, measurements are carried out with multiple frequency bands from 0.8 GHz to 37.1 GHz. The measurement environments are a street canyon and an indoor office, which respectively correspond to an urban micro cell and an indoor hot spot of mobile communication system scenarios. On the basis of the obtained measurement results, path loss characteristics are clarified and path loss models are proposed for the street canyon and indoor office environments. The models validity is also verified.

Path Loss Characteristics between Different Floors from 0.8 to 37 GHz in Indoor Office Environments

M. Sasaki, M. Inomata, W. Yamada, N. Kita, T. Onizawa, M. Nakatsugawa, K. Kitao, and T. Imai

Proc. of ISAP 2016 (International Symposium on Antennas and Propagation), pp. 66–67, Okinawa, Japan, October 2016.

This paper describes analytical results obtained for floor penetration loss characteristics and their frequency dependency by measuring in multiple frequency bands, including those above 6 GHz, in an indoor office environment. Measurement and analysis results show that the floor penetration loss depends on two dominant components: paths through floors and outside buildings. It was clarified that the characteristics of these paths determine the frequency dependency of the floor penetration loss.

Contextual Analysis on Geminate/Singleton Identification Difficulties for L2 Learners of Japanese Based on Perceptual Features

Y. Zhang, H. Nakajima, M. Sonu, H. Kato, and Y. Sagisaka

Proc. of the 5th Joint Meeting of the Acoustical Society of America and Acoustical Society of Japan, Honolulu, HI, USA, November/December 2016.

It is widely known that Japanese geminate/singleton consonant identification is one of the biggest problems for L2 learners. We have been analyzing identification error characteristics based on their perceptually motivated features.

Ancilla-driven Instantaneous Quantum Polynomial Time Circuit for Quantum Supremacy

Y. Takeuchi and Y. Takahashi

Physical Review A, Vol. 94, 062336, December 2016.

Instantaneous quantum polynomial time (IQP) is a model of (probably) nonuniversal quantum computation. Since it has been proven that IQP circuits are unlikely to be simulated classically up to a multiplicative error and an error in the l_1 norm, IQP is considered as one of the promising classes that demonstrates quantum supremacy. Although IQP circuits can be realized more easily than a universal quantum computer, demonstrating quantum supremacy is still difficult. It is therefore desired to find subclasses of IQP that are easy to implement. In this paper, by imposing some restrictions on IQP, we propose ancilla-driven IQP (ADIQP) as the subclass of commuting quantum computation suitable for many experimental settings. We show that even though ADIQP circuits are strictly weaker than IQP circuits in a sense, they are also hard to simulate classically up to a multiplicative error and an error in the l_1 norm. Moreover, the properties of ADIQP make it easy to investigate the verifiability of ADIQP circuits and the difficulties in realizing ADIQP circuits.

Vibration of the Feet Soles Inducing a Walk Sensation Expands Peripersonal Space

T. Amemiya, Y. Ikei, K. Hirota, and M. Kitazaki

Transactions of the Virtual Reality Society of Japan, Vol. 21, No. 4, pp. 627–633, December 2016 (in Japanese).

The representation of peripersonal space is remapped by body actions such as integrating tactile stimuli from the body's surface with multisensory stimuli presented within a limited distance from the body. Previous research showed that the boundaries of peripersonal space extend while walking when listening to a looming sound, but it is unclear whether the boundaries change when a sensation of walking is induced with no physical body motion. Here, we examine the change using a technique to induce a sensation of pseudo-walking by presenting vibrotactile stimuli of the sound of recorded footsteps at the soles of the feet. Experiments were performed to compare the reaction times to detect a vibrotactile stimulus on the chest while listening to a sound looming toward the body, taken as a proxy of the peripersonal space boundary. Experimental evaluations showed that the peripersonal space seems to expand when a sensation of pseudo-walking was clearly induced.

Resource Allocation Method of Service Chaining for Guaranteeing Minimum Bandwidth and High Resource Utilization

H. Yamazaki, K. Mochizuki, S. Homma, K. Sugisono, and M. Omotani

IEICE Transactions on Communications, Vol. E100-B, No. 1, pp. 98–109, January 2017.

Service chaining (SC) is a method for realizing a service by transferring flows among several service functions (SFs) that process packets. A route among SFs is called a service path (SP). Service chaining is being developed to reduce costs, increase flexibility, and shorten time-to-market. SC technologies are expected to be applied to carrier networks so that large communication carriers benefit from them. We assume that SPs process the traffic of services that treat all users in the same way such as an Internet access service for home users. An SP processes flows from several users. We do not assume that each SP is assigned to a user. Because a carrier network

accommodates many users, each service will be heavily utilized. Therefore, it is assumed that the amount of traffic of a service is larger than the resource of an SF apparatus. Several SPs are required to process the traffic. SPs are supposed to meet two requirements. One is guaranteeing minimum bandwidth. The other is reducing the number of SF apparatuses, i.e., high resource utilization. Resource utilization depends on the combination of the resource quantities of SF apparatuses. Network operators have to determine the bandwidth of each SP within the range from the minimum bandwidth to the resource quantities of SF apparatuses to maximize resource utilization. Methods for determining the bandwidth of each SP have not been proposed for meeting the two requirements. Therefore, we propose a resource allocation method for this purpose. The proposed method determines the bandwidth of each SP on the basis of the combination of the resource quantities of SF apparatuses for guaranteeing the minimum bandwidth and maximizing resource utilization and allocates necessary resources to each SP. We also evaluate the proposed method and confirm that it can guarantee the minimum bandwidth of SPs and achieve high resource utilization regardless of the combination of resource quantities of SF apparatuses. Although SF apparatuses are generally produced without considering the combinations of resource quantities of SF apparatuses in SPs, the proposed method can provide more options for selecting SF apparatuses.

Visual Area V5/hMT+ Contributes to Perception of Tactile Motion Direction: a TMS Study

T. Amemiya, B. Beck, V. Walsh, H. Gomi, and P. Haggard

Scientific Reports, Vol. 7, 40937, January 2017.

Human imaging studies have reported activations associated with tactile motion perception in visual motion area V5/hMT+, the primary somatosensory cortex (SI), and the posterior parietal cortex (PPC; Brodmann areas 7/40). However, such studies cannot establish whether these areas are causally involved in tactile motion perception. We delivered double-pulse transcranial magnetic stimulation (TMS) while moving a single tactile point across the fingertip, and used signal detection theory to quantify perceptual sensitivity to motion direction. TMS over both SI and V5/hMT+, but not the PPC site, significantly reduced tactile direction discrimination. Our results show that V5/hMT+ plays a causal role in tactile direction processing, and strengthen the case for V5/hMT+ serving multimodal motion perception. Further, our findings are consistent with a serial model of cortical tactile processing, in which higher-order perceptual processing depends upon information received from SI. By contrast, our results do not provide clear evidence that the PPC site we targeted (Brodmann areas 7/40) contributes to tactile direction perception.

Ad-hoc Mobile Network Architecture Using Distributed P-GW on Unlicensed Bands for LTE

K. Kawamura and N. Takaya

Proc. of IEEE CCNC 2017 (the 14th IEEE Annual Consumer Communications & Networking Conference), Las Vegas, NV, USA, pp. 749–754, January 2017.

Data traffic has been increasing rapidly in recent years on mobile networks. Several methods using unlicensed bands for LTE are proposed to increase wireless capacity. Stand-alone unlicensed LTE is also proposed as a technology that provides LTE service with only unlicensed bands. In this paper, we propose distributed P-GW systems for stand-alone unlicensed LTE base stations that can provide future mobile services by using an ad-hoc network architecture. Additionally, we evaluate the effectiveness of our proposal in terms of network load, handover latency, and user data plane latency in comparison with the full Cloud EPC model and IPsec model. We reveal that the proposed architecture has an advantage in terms of network loads and end-to-end latency and has an issue with handover latency.
