External Awards

Certificate of Appreciation
Winner: Yoshitaka Shimizu, Yasuo Suzuki, Satoshi Kotabe, Tetsuro Komukai, and Atsushi Yamamoto, NTT Network Innovation Laboratories; Hironori Kuroki and Yuki Takamiya, NTT Advanced Technology Corporation
Date: July 29, 2016
Organization: Municipality of San Remigio, Cebu, Philippines

For their great efforts in demonstrating the effectiveness of MDRU (movable and deployable information and communication technology resource unit) application.

Certificate of Appreciation
Winner: Nei Kato, Hiroki Nishiyama, Daiki Murayama, Naoki Miyashita, Naoto Yamada, Yuki Takahashi, and Hiroaki Takagi, Graduate School of Information Sciences, Tohoku University; Yoshitaka Shimizu and Yasuo Suzuki, NTT Network Innovation Laboratories
Date: August 2, 2016
Organization: Municipality of San Remigio, Cebu, Philippines

For their great efforts in demonstrating the effectiveness of Relay-by-Smartphone technology.

IEICE SRW Young Researcher's Award
Winner: Doohwan Lee, NTT Network Innovation Laboratories
Date: August 22, 2016
Organization: The Institute of Electronics, Information and Communication Engineers (IEICE) Communications Society, Technical Committee on Short Range Wireless Communications (SRW)

For "An Overhead-reducing Channel Estimation Sequences Design for Millimeter-wave Short-range MIMO Wireless Communication Systems."
Published as: D. Lee, K. Hiraga, K. Sakamoto, and T. Nakagawa, "An Overhead-reducing Channel Estimation Sequences Design for Millimeter-wave Short-range MIMO Wireless Communication Systems," IEICE Tech. Rep., Vol. 115, No. 474, SRW2015-75, pp. 29–34, 2016.

Outstanding Contributor
Winner: Tetsuro Inui, NTT Network Innovation Laboratories
Date: September 7, 2016
Organization: Open Networking Foundation (ONF)

Mr. Inui has spent substantial amounts of time working in different areas to support the efforts of the Carrier Grade SDN Working Group since its establishment. He is one of the editors of the carrier grade software-defined networking (SDN) use case document and has contributed valuable and influential use cases. He also works as a key reviewer of the carrier grade SDN group charter and other documents. His diligence and support are very valuable to the group.

Papers Published in Technical Journals and Conference Proceedings

Effects of Speaking Rhythm Naturalness on the Neural Basis of Speech Perception
S. Hiroya, K. Jasmin, S. Evans, S. Krishnan, M. Ostarek, D. Boebinger, and S. K. Scott
Proc. of Neuroscience 2015, Chicago, USA, October 2015.

Manipulation techniques of speech sound naturalness will give us a new possibility to investigate the neural correlates of speech perception. However, few studies have investigated the neural mechanisms of temporal information underlying speech perception, i.e., speaking rhythm. We first developed a novel method for decomposing speech signals into a speaking rhythm and phonetic information. Next we performed fMRI (functional magnetic resonance imaging) scans during passive listening that investigated the neural basis of speech perception. Result showed that left-lateralized premotor cortex and supplementary motor area (SMA) were more activated for Japanese rhythm than for English rhythm, and the areas overlapped that of vowel production. A series of our studies suggests that greater premotor cortex activation during speech perception would explain speech sound unnaturalness of both frequency and temporal information.

The Neural Basis of Perceiving Speech with a Non-native Rhythm
K. Jasmin, S. Hiroya, S. Evans, S. Krishnan, C. Lima, M. Ostarek, D. Boebinger, and S. K. Scott
Proc. of Cognitive Neuroscience Society 2016 Annual Meeting, New York, USA, April 2016.

Rhythm is a natural part of speech. We developed a novel method for decomposing speech signals in order to separate phonetic information from rhythmic structure. Audio recordings of English sentences spoken by a Japanese native speaker were manipulated such

that their rhythm was stress timed (like English), mora timed (like Japanese) or had phonemes with equal durations. Twenty-one healthy right-handed participants underwent behavioural testing and functional magnetic resonance imaging (fMRI) scans. The results confirmed subjects judged English sentences as being most natural. FMRI was used to image the brains of participants while they listened to the sentences. The result showed that the supplementary motor area (SMA), a region involved in speech production, was sensitive to rhythm naturalness. This suggests that integrating non-native speech rhythm with native language speech may rely on increased auditory-motor processing.

FRT-Skip Graph: A Skip Graph-style Structured Overlay Based on Flexible Routing Tables

M. Hojo, R. Banno, and K. Shudo

Proc. of ISCC (the 2016 IEEE Symposium on Computers and Communication), pp. 657–662, Messina, Italy, June 2016.

Structured overlays enable a number of nodes to construct a logical network autonomously and search each other. Skip Graph, one of the structured overlays, constructs an overlay network based on Skip List structure and supports range queries for keys. Skip Graph manages routing tables based on random digits; therefore, the deviation of them disturbs effective utilization of the routing table entries and increases path length more than the ideal value. We therefore propose FRT-Skip Graph, a novel structured overlay that solves the issues of Skip Graph and provides desirable features not in Skip Graph. FRT-Skip Graph is designed based on Flexible Routing Tables (FRT) and supports range queries similarly to Skip Graph. Furthermore, it provides features derived from FRT, namely, dynamic routing table size and high extensibility.

Proposal of a Simple Ultra-low Contention CD ROADM

A. Iwaki, A. Sahara, and M. Fukutoku

IEICE Transactions on Communications, Vol. E99-B, No. 8, pp. 1772–1779, August 2016.

We propose a simple configuration for colorless and directionless (CD) reconfigurable optical add/drop multiplexers that enables ultra-low contention add/drop operation to be achieved. In the configuration, we apply a combination of multiple small-port-count CD add/drop banks (CD banks) and round-robin CD bank assignment. Evaluation results show that the proposed configuration can substantially reduce intra-node contention rate, which is less than 0.1%. We also find that the proposed configuration can improve the utilization efficiency of wavelength resources and transponders. We discuss the mechanism of how the proposed configuration reduces intra-node contention by analyzing the status of wavelength assignments in direction ports and CD banks.

Speech Rhythm Measure of Non-native Speech Using a Statistical Phonemic Duration Model

S. Hiroya, K. Jasmin, S. Evans, S. Krishnan, C. Lima, M. Ostarek, D. Boebinger, and S. K. Scott

Proc. of the 8th Annual Meeting of the Society for the Neurobiology of Language, London, UK, August 2016.

Rhythm is a natural part of speech. English speech sounds spoken by a Japanese native speaker were manipulated such that their rhythm was stress-timed and mora-timed. FMRI (functional magnetic resonance imaging) experiments showed that the left-lateralized supplementary motor area (SMA), a region involved in speech production, was more activated for mora-timed rhythm (non-native rhythm) than stress-timed rhythm. However, a difference between mora-timed and stress-timed rhythm in English should be quantified for further analysis. In this study, we developed a statistical model of phonemic duration in English to be independent of a type of interval. An expectation-maximization algorithm created a state-transition model of the phonemic duration. Results showed that the variability among states of self-transition probability for the native Japanese speaker was significantly larger than for the native English speaker. This suggests that these structures of phonemic duration affected activity in the speech perception network.

A Study of Non-synthetic Region for Texture Synthesis Based Image Coding

T. Sasaki, R. Tanida, and A. Shimizu

IEICE Transactions on Information and Systems (Japanese Edition), Vol. J99-D, No. 9, pp. 865–867, September 2016.

In the coding method using cartoon-texture image decomposition and texture synthesis, a region not suitable for texture synthesis is also included in the texture components. It is possible to improve the subjective quality if this region is excluded from texture components. In this paper, we propose a method to determine the region.

Generation of a Frequency Comb Spanning More Than 3.6 Octaves from Ultraviolet to Mid Infrared

K. Iwakuni, S. Okubo, O. Tadanaga, H. Inaba, A. Onae, F.-L. Hong, and H. Sasada

Optics Letters, Vol. 41, No. 17, pp. 3980–3983, September 2016.

We have observed an ultra-broadband frequency comb with a wavelength range of at least 0.35 to 4.4 μm in a ridge-waveguide-type periodically poled lithium niobate (PPLN) device. The PPLN waveguide is pumped by a 1.0–2.4 μm wide frequency comb with an average power of 120 mW generated using an erbium-based mode-locked fiber laser and a following highly nonlinear fiber. The coherence of the extended comb is confirmed in both the visible (around 633 nm) and the mid-infrared regions.

Adaptive and Efficient Multilayer Elastic Optical Network Planning

T. Tanaka, T. Inui, A. Kadohata, A. Hirano, and W. Imajuku

Proc. of the 42nd European Conference on Optical Communication (ECOC 2016), Th.3.D.1, Düsseldorf, Germany, September 2016.

We overview our current works on the heuristic IP-over-elastic optical network (EON) planning algorithms including modulation-aware virtual topology planning in the planning phase and multiperiod multilayer network planning which adapts to dynamic traffic conditions in the operational phase.

32-core Inline Multicore Fiber Amplifier for Dense Space Division Multiplexed Transmission Systems

S. Jain, T. Mizuno, Y. Jung, Q. Kang, J. R. Hayes, M. N. Petrovich, G. Bai, H. Ono, K. Shibahara, A. Sano, A. Isoda, Y. Miyamoto, Y. Sasaki, Y. Amma, K. Takenaga, K. Aikawa, C. Castro, K. Pulverer, Md Nooruzzaman, T. Morioka, S. U. Alam, and D. J. Richardson

Proc. of ECOC 2016, Th.3.A.1, Düsseldorf, Germany, September

2016.

We present a high-core-count SDM amplifier, i.e., 32-core multi-core-fiber amplifier, in a cladding-pumped configuration. An average gain of 17 dB and NF of 7 dB is obtained for –5 dBm input signal power in the wavelength range 1544–1564 nm.

On Compositional Reasoning about Anonymity and Privacy in Epistemic Logic

Y. Tsukada, H. Sakurada, K. Mano, and Y. Manabe

Annals of Mathematics and Artificial Intelligence, Vol. 78, No. 2, pp. 101–129, October 2016.

In this paper, we exploit epistemic logic (or the modal logic of knowledge) for multiagent systems to discuss the compositionality of several privacy-related information-hiding/disclosure properties. The properties considered here are anonymity, privacy, onymity, and identity. Our initial observation reveals that anonymity/privacy properties are not necessarily sequentially compositional. This means that even though a system comprising several sequential phases satisfies a certain unlinkability property in each phase, the entire system does not always enjoy a desired unlinkability property. We show that the compositionality can be guaranteed provided that the phases of the system satisfy what we call independence assumptions. More specifically, we develop a series of theoretical case studies of what assumptions are sufficient to guarantee the sequential compositionality of various degrees of anonymity, privacy, onymity, and/or identity properties. Similar results for parallel composition are also discussed. Further, we use the probabilistic extension of epistemic logic to consider the compositionality of probabilistic anonymity/privacy. We show that the compositionality can also be guaranteed in the probabilistic setting, provided that the phases of the system satisfy a probabilistic independence assumption.
