

External Awards

Encouraging Award

Winner: Daisuke Hisano, NTT Access Network Service Systems Laboratories

Date: July 27, 2017

Organization: The Institute of Electronics, Information and Communication Engineers (IEICE) Technical Committee on Communication Systems

For “Evaluation of TDM-PON System Aggregating TDD-based Mobile Fronthaul and Secondary Services.”

Published as: D. Hisano, T. Shimada, H. Ou, T. Kobayashi, Y. Nakayama, J. Terada, and A. Otaka, “Evaluation of TDM-PON System Aggregating TDD-based Mobile Fronthaul and Secondary Services,” IEICE Tech. Rep., Vol. 116, No. 401, CS2016-66, pp. 13–18, 2017.

Encouraging Award

Winner: Takahiro Suzuki, NTT Access Network Service Systems Laboratories

Date: July 27, 2017

Organization: IEICE Technical Committee on Communication Systems

For “Parallel Implementation of Cipher on CPU/GPU for Programmable Optical Access Equipment.”

Published as: T. Suzuki, S. Kim, J. Kani, K. Suzuki, and A. Otaka, “Parallel Implementation of Cipher on CPU/GPU for Programmable Optical Access Equipment,” IEICE Tech. Rep., Vol. 116, No. 9, CS2016-1, pp. 1–6, 2016.

2018 OSA Fellow Member

Winner: Takashi Saida, NTT Device Innovation Center

Date: January 1, 2018

Organization: The Optical Society (OSA)

For his seminal contribution to advances in waveguide-type polarization devices for coherent optical networks.

Female Researcher Encouragement Award

Winner: Yoko Ono, NTT Device Technology Laboratories

Date: March 10, 2018

Organization: The Electrochemical Society of Japan

For her research and development of photocatalytic and battery electrode materials for energy-generation and energy-storage technologies.

Young Scientist Presentation Award

Winner: Tetsuhiko Teshima, NTT Basic Research Laboratories

Date: March 17, 2018

Organization: The Japan Society of Applied Physics (JSAP)

For “Reconstruction of Micro-scale Tissues in Self-folded Micro-rolls.”

Published as: T. Teshima, H. Nakashima, Y. Ueno, S. Sasaki, C. Henderson, and S. Tsukada, “Reconstruction of Micro-scale Tissues in Self-folded Micro-rolls,” The 78th JSAP Autumn Meeting, Fukuoka, Japan, Sept. 2017.

OFT Young Researcher’s Award

Winner: Shingo Ohno, NTT Access Network Service Systems Laboratories

Date: March 21, 2018

Organization: IEICE Technical Committee on Optical Fiber Technologies (OFT)

For “Distributed Spatial Mode Dispersion Measurement along Strongly Coupled Multicore Fiber Using Rayleigh Backscattering Interference Pattern.”

Published as: S. Ohno, K. Toge, D. Iida, and T. Manabe, “Distributed Spatial Mode Dispersion Measurement along Strongly Coupled Multicore Fiber Using Rayleigh Backscattering Interference Pattern,” IEICE Tech. Rep., Vol. 117, No. 323, OFT2017-48, pp. 23–28, 2017.

Young Researcher’s Award

Winner: Atsushi Nakamura, NTT Access Network Service Systems Laboratories

Date: March 22, 2018

Organization: IEICE

For his research on applications of highly sensitive microbending detection using a 1- μm -band mode-detection optical time domain reflectometer (OTDR) and on a long-range 1- μm -band mode-detection OTDR and its field test.

Young Researcher’s Award

Winner: Kenji Miyamoto, NTT Access Network Service Systems Laboratories

Date: March 22, 2018

Organization: IEICE

For “Experimental Evaluation of Mobile Fronthaul Optical Bandwidth and Wireless Transmission Performance for Base Station Architecture Splitting LTE PHY Layer Functions in Downlink” (in Japanese) and “Proposal of Low Latency Symbol Level Transmission Scheme in Intra PHY Split Base Station” (in Japanese).

Published as: K. Miyamoto, T. Shimizu, J. Terada, and A. Otaka, “Experimental Evaluation of Mobile Fronthaul Optical Bandwidth and Wireless Transmission Performance for Base Station Architecture Splitting LTE PHY Layer Functions in Downlink,” Proc. of the IEICE General Conference 2017, B-8-44, Nagoya, Japan, Mar. 2017. K. Miyamoto, T. Shimizu, J. Terada, and A. Otaka, “Proposal of Low Latency Symbol Level Transmission Scheme in Intra PHY Split Base Station,” Proc. of the IEICE Society Conference 2017, B-5-42, Tokyo, Japan, Sept. 2017.

Young Researcher’s Award

Winner: Saki Nozoe, NTT Access Network Service Systems Laboratories

Date: March 22, 2018

Organization: IEICE

For “Low Crosstalk 125 μm -cladding 2LP-mode 4-core Fiber with Air-hole Structure.”

Published as: S. Nozoe, T. Sakamoto, T. Matsui, Y. Amma, K. Takemura, Y. Abe, K. Tsujikawa, S. Aozasa, K. Aikawa, and K. Nakajima, “Low Crosstalk 125 μm -cladding 2LP-mode 4-core Fiber with Air-hole Structure,” IEICE Tech. Rep., Vol. 117, No. 323, OFT2017-54,

pp. 67–70, 2017.

Young Researcher's Award

Winner: Junki Ichikawa, NTT Network Innovation Laboratories
Date: March 22, 2018
Organization: IEICE

For “A Context Generation Method for Utilization of IoT-resources.”

Published as: J. Ichikawa, Y. Minami, J. Yamamoto, and K. Shimano, “A Context Generation Method for Utilization of IoT-resources,” Proc. of the IEICE General Conference 2017, B-18-28, Nagoya, Japan, Mar. 2017.

Young Researcher's Award

Winner: Hirofumi Sasaki, NTT Network Innovation Laboratories
Date: March 22, 2018
Organization: IEICE

For “An Analysis of Gaussian Beam Propagation for Orbital Angular Momentum (OAM) Multiplexing” and “An Experimental Evaluation of Gaussian Beam Propagation with Multiple Uniform Circular Array in 28 GHz Band.”

Published as: H. Sasaki, D. Lee, H. Fukumoto, T. Nakagawa, and H. Shiba, “An Analysis of Gaussian Beam Propagation for Orbital Angular Momentum (OAM) Multiplexing,” Proc. of the IEICE General Conference 2017, B-17-4, Nagoya, Japan, Mar. 2017.
 H. Sasaki, D. Lee, H. Fukumoto, and H. Shiba, “An Experimental Evaluation of Gaussian Beam Propagation with Multiple Uniform Circular Array in 28 GHz Band,” Proc. of the IEICE Society Conference 2017, B-17-29, Tokyo, Japan, Sept. 2017.

Young Researcher's Award

Winner: Takuro Fujii, NTT Device Technology Laboratories
Date: March 22, 2018
Organization: IEICE

For “1.3- μm InGaAlAs-based Directly Modulated Membrane Distributed Reflector Laser Array” (in Japanese).

Published as: T. Fujii, H. Nishi, K. Takeda, E. Kanno, K. Hasebe, T. Kakitsuka, T. Tsuchizawa, and S. Matsuo, “1.3- μm InGaAlAs-based Directly Modulated Membrane Distributed Reflector Laser Array,” Proc. of the IEICE General Conference 2017, C-3-21, Nagoya,

Japan, Mar. 2017.

SASIMI Young Researcher Award

Winner: Saki Hatta, NTT Device Innovation Center
Date: March 26, 2018
Organization: The Institute of Electrical and Electronics Engineers (IEEE) Council on Electronic Design Automation

For “Area-efficient Programmable Finite-state Machine Toward Next Generation Access Network SoC.”

Published as: S. Hatta, N. Tanaka, and T. Sakamoto, “Area-efficient Programmable Finite-state Machine Toward Next Generation Access Network SoC,” Proc. of the 21st Workshop on Synthesis and System Integration of Mixed Information Technologies (SASIMI 2018), Matsue, Japan, Mar. 2018.

Maejima Hisoka Award

Winner: Ken Nakamura and Takayuki Onishi, NTT Media Intelligence Laboratories; Koyo Nitta, NTT Device Innovation Center
Date: April 10, 2018
Organization: Tsushinbunka Association

For their development of H.265 video encoding compatible large-scale integrated circuit called NARA and the encoder incorporating NARA, as well as contribution to practical implementation of H.265 coding.

IPSJ Best Paper Award

Winner: Akihiro Miyata, Nihon University; Takashi Isezaki, Masanao Nakano, Tatsuya Ishihara, Reiko Aruga, NTT Service Evolution Laboratories; Takayoshi Mochizuki, NTT Research and Development Planning Department; Tomoki Watanabe, NTT Service Evolution Laboratories; Osamu Mizuno, NTT Intellectual Property Center
Date: June 6, 2018
Organization: Information Processing Society of Japan (IPSJ)

For “A Wheelchair Motion Estimation Model Using the Recent Control Ability.”

Published as: A. Miyata, T. Isezaki, M. Nakano, T. Ishihara, R. Aruga, T. Mochizuki, T. Watanabe, and O. Mizuno, “A Wheelchair Motion Estimation Model Using the Recent Control Ability,” IPSJ Journal, Vol. 57, No. 10, pp. 2316–2326, 2016.

Papers Published in Technical Journals and Conference Proceedings

Network Resource Management Architecture with Unified Information Models

S. Horiuchi, K. Akashi, M. Sato, and T. Kotani

Proc. of the 19th Asia-Pacific Network Operations and Management Symposium (APNOMS), Seoul, Korea, Sept. 2017.

With a view to the coming era of network virtualization, NTT is

working on network operations that can flexibly manage diverse types of networks including those currently in operation. This article introduces network resource management technology for comprehensively operating a wide range of networks by expressing management specifications based on a uniform information model.

Power of Uninitialized Qubits in Shallow Quantum Circuits

Y. Takahashi and S. Tani

Proc. of the 35th Symposium on Theoretical Aspects of Computer Science (STACS 2018), Article no. 57, Caen, France, Feb./Mar. 2018.

We study the computational power of shallow quantum circuits with $O(\log n)$ initialized and $n^{O(1)}$ uninitialized ancillary qubits, where n is the input length, and the initial state of the uninitialized ancillary qubits is arbitrary. First, we show that such a circuit can compute any symmetric function on n bits that is classically computable in polynomial time. Then, we regard such a circuit as an oracle and show that a polynomial-time classical algorithm with the oracle can estimate the elements of any unitary matrix corresponding to a constant-depth quantum circuit on n qubits. Since it seems unlikely that these tasks can be done with only $O(\log n)$ initialized ancillary qubits, our results give evidence that adding uninitialized ancillary qubits increases the computational power of shallow quantum circuits with only $O(\log n)$ initialized ancillary qubits. Lastly, to understand the limitations of uninitialized ancillary qubits, we focus on near-logarithmic-depth quantum circuits with them and show the impossibility of computing the parity function on n bits.

Batteryless Bicycle Speed Recorder with Hub Dynamo and FM/AM Radio as Time Stamp Function

A. Tanaka, T. Nishihashi, H. Sakamoto, R. Suematsu, T. Kawaniishi, and T. Douseki

IEEJ Transactions on Sensors and Micromachines, Vol. 138, No. 3, pp. 79–86, March 2018.

A batteryless bicycle speed recorder with a hub dynamo and FM/AM radio has been developed. The hub dynamo functions as both a power source and a speed sensor. It produces a voltage waveform with fourteen AC cycles per rotation of the bicycle wheel, which enables precise determination of speed and acceleration. Sound data of radio broadcasting was also used as a time stamp function. The data is stored in a magnetoresistive random-access memory (MRAM). A road test showed that a fabricated speed recorder mounted on a bicycle stored and reproduced accurate values of a large acceleration and its duration when the brakes were suddenly applied while the bicycle was being ridden.

Integer Nesting/Splitting for Golomb-Rice Coding of Generalized Gaussian Sources

R. Sugiura, Y. Kamamoto, and T. Moriya

Proc. of 2018 Data Compression Conference, p. 427, Snowbird, UT, USA, March 2018.

This paper presents a qualitative approach of combining *Golomb-Rice (GR) code* with algebraic bijective mappings which losslessly convert between arbitrary positive integers of different dimension and shape the distribution of generalized Gaussian sources. The mappings and integer nesting and splitting enable GR encoding, with a little additional computation, to compress more efficiently sources based on wider classes of distributions than Laplacian. Simulations showed, especially for some Gaussian sources, that almost optimal

average code length is achievable by performing integer nesting before GR encoding the integers. This scheme will be useful for applications dealing with various types of sources and requiring low computational costs.

Piecewise Linear Predictive Coding for Nonlinear Signal Analysis and Automatic Trend Extraction

F. Ishiyama

The IEICE Transactions on Fundamentals of Electronics, Communications and Computer Sciences, Vol. J101-A, No. 4, pp. 36–45, April 2018 (in Japanese).

Linear predictive coding (LPC) is a widely used method of time series analysis, and Yule-Walker equation is used for the analysis. However, as Yule-Walker equation replaces given time series with a periodic time series, it is not suitable for transient analysis. Therefore, we introduced a method of LPC without the replacement. In addition, we consider a short enough time width, apply our LPC within the width, and obtain instantaneous characteristics such as frequencies and decay rates within the width. We can find nonlinear characteristics of a given time series by applying the above analysis piecewisely and by comparing the neighboring pieces.

Access System Virtualization for Sustainable and Agile Development

A. Otaka

IEICE Transactions on Communications, Vol. E101-B, No. 4, pp. 961–965, April 2018.

This paper describes why we require access system virtualization. The purpose of access system virtualization is different from that of core network virtualization. Therefore, a specific approach should be considered such as the separation of software and hardware, interface standardization, or deep softwarization.

Optimal Golomb-Rice Code Extension for Lossless Coding of Low-entropy Exponentially-distributed Sources

R. Sugiura, Y. Kamamoto, N. Harada, and T. Moriya

IEEE Transactions on Information Theory, Vol. 64, No. 4, pp. 3153–3161, April 2018.

This paper presents an extension of Golomb-Rice (GR) code for coding low-entropy sources, in which the gap between their entropy and the conventional GR code length gets larger. We mention here the following four facts related to the proposed code, extended-domain GR (XDGR) code: it is represented by multiple code trees based on the idea of almost instantaneous fixed-to-variable length codes, with its algorithm being a generalization of unary coding; its structure naturally contains run-length coding; the gap between the entropy and its average code length is theoretically guaranteed to be asymptotically negligible as the entropy of the exponentially distributed sources tends to zero; and its coding parameter, corresponding to the negative-domain Rice parameter of GR code, can be estimated from the input source-symbol sequence. Experimental evaluations are also presented supporting the theorems. The proposed XDGR code, having a simple algorithm and high compression performance, is expected to be used for many coding applications that deal with exponentially distributed sources at low bit rates.