

External Awards

DBSJ Young Researcher's Achievement and Contribution Award

Winner: Hiroyuki Toda, NTT Service Evolution Laboratories

Date: March 4, 2019

Organization: The Database Society of Japan (DBSJ)

For his contribution to the activities of DBSJ and his outstanding achievement in the research areas that DBSJ targets.

Young Scientist Presentation Award

Winner: Ryuichi Ohta, NTT Basic Research Laboratories

Date: March 9, 2019

Organization: The Japan Society of Applied Physics (JSAP)

For "Radiative Lifetime of Bound Excitons in GaAs with Vibrational Strain."

Published as: R. Ohta, H. Okamoto, T. Tawara, H. Gotoh, and H. Yamaguchi, "Radiative Lifetime of Bound Excitons in GaAs with Vibrational Strain," The 79th JSAP Autumn Meeting, 20p-211A-14, Nagoya, Aichi, Japan, Sept. 2018.

Young Researcher's Award

Winner: Erina Takeshita, NTT Access Network Service Systems Laboratories

Date: March 21, 2019

Organization: The Institute of Electronics, Information and Communication Engineers (IEICE)

For "DF Re-election for Reduction of BUM Traffic Loss during Link Failure between PEs in EVPN Multi-homing Network" and "Reduction of Total Maintenance End Points in End-to-end Monitor Placement on Virtual Private Network Infrastructure."

Published as: E. Takeshita, G. Yazawa, H. Kimura, A. Morita, S. Yoshihara, and A. Otaka, "DF Re-election for Reduction of BUM Traffic Loss during Link Failure between PEs in EVPN Multi-homing Network," Proc. of the 2018 IEICE General Conference, B-8-3, Tokyo, Japan, Mar. 2018 (in Japanese). E. Takeshita, G. Yazawa, H. Kimura, and A. Morita, "Reduction of Total Maintenance End Points in End-to-end Monitor Placement on Virtual Private Network Infrastructure," Proc. of the 2018 IEICE Society Conference, B-8-17, Kanazawa, Ishikawa, Japan, Sept. 2018 (in Japanese).

Young Researcher's Award

Winner: Shingo Ohno, NTT Access Network Service Systems Laboratories

Date: March 21, 2019

Organization: IEICE

For "Measurement Accuracy Improvement in Distributed Measurement of Spatial Mode Dispersion along Strongly Coupled Multicore Fiber" and "Measurement Range Improvement in Distributed Measurement of Spatial Mode Dispersion along Strongly Coupled Multicore Fiber."

Published as: S. Ohno, K. Toge, D. Iida, and T. Manabe, "Measurement Accuracy Improvement in Distributed Measurement of Spatial Mode Dispersion along Strongly Coupled Multicore Fiber," Proc. of the 2018 IEICE General Conference, B-13-19, Tokyo, Japan, Mar. 2018 (in Japanese). S. Ohno, K. Toge, and T. Manabe, "Measurement Range Improvement in Distributed Measurement of Spatial Mode Dispersion along Strongly Coupled Multicore Fiber," Proc. of the

2018 IEICE Society Conference, B-13-14, Kanazawa, Ishikawa, Japan, Sept. 2018 (in Japanese).

Young Researcher's Award

Winner: Ryota Shiina, Kazutaka Hara, and Satoshi Ikeda, NTT Access Network Service Systems Laboratories

Date: March 21, 2019

Organization: IEICE

For "Optical/RF Hybrid Wireless Systems for Realizing Stabilized Wireless Environment."

Published as: R. Shiina, K. Hara, and S. Ikeda, "Optical/RF Hybrid Wireless Systems for Realizing Stabilized Wireless Environment," Proc. of the 2018 IEICE Society Conference, B-8-2, Kanazawa, Ishikawa, Japan, Sept. 2018 (in Japanese).

Young Researcher's Award

Winner: Ryo Miyatake, NTT Network Innovation Laboratories

Date: March 21, 2019

Organization: IEICE

For "A Study on Measurement Area Reduction Method for Efficient Wireless Site Survey of LPWA."

Published as: R. Miyatake, Y. Asai, K. Suzuki, and H. Shiba, "A Study on Measurement Area Reduction Method for Efficient Wireless Site Survey of LPWA," Proc. of the 2018 IEICE Society Conference, B-17-19, Kanazawa, Ishikawa, Japan, Sept. 2018 (in Japanese).

Young Researcher's Award

Winner: Akira Masuda, NTT Network Innovation Laboratories

Date: March 21, 2019

Organization: IEICE

For "Quadrature-amplitude-coding PAM to Improve Bandwidth-limitation Tolerance" and "Achievement of 90-Gbaud PAM-4 with NL-MLS and 2.88-Tb/s O-band Transmission Using 4- λ LAN-WDM and 4-core Fiber SDM."

Published as: A. Masuda, S. Yamamoto, S. Kawai, and M. Fukutoku, "Quadrature-amplitude-coding PAM to Improve Bandwidth-limitation Tolerance," Proc. of the 2018 IEICE General Conference, B-10-11, Tokyo, Japan, Mar. 2018 (in Japanese). A. Masuda, S. Yamamoto, H. Taniguchi, and M. Fukutoku, "Achievement of 90-Gbaud PAM-4 with NL-MLS and 2.88-Tb/s O-band Transmission Using 4- λ LAN-WDM and 4-core Fiber SDM," Proc. of the 2018 IEICE Society Conference, B-10-41, Kanazawa, Ishikawa, Japan, Sept. 2018 (in Japanese).

IEEE VR Best VRSJ Demo Award

Winner: Munezazu Date, Megumi Isogai, and Hideaki Kimata, NTT Media Intelligence Laboratories

Date: March 26, 2019

Organization: The 26th IEEE (Institute of Electrical and Electronics Engineers) Conference on Virtual Reality and 3D User Interfaces (IEEE VR 2019)

For "Full Parallax Table Top 3D Display Using Visually Equivalent Light Field."

Published as: M. Date, M. Isogai, and H. Kimata, "Full Parallax Table Top 3D Display Using Visually Equivalent Light Field," IEEE VR 2019, Demo ID: D31, Osaka, Japan, Mar. 2019.

Maejima Hisoka Award

Winner: Hiroyuki Oto and Yasuyuki Uchiyama, NTT DOCOMO; Kazuaki Obana, NTT Network Innovation Laboratories

Date: April 10, 2019

Organization: Tsushinbunka Association

For the commercial deployment of network functions virtualization technology enabling multi-vendor EPC (evolved packet core) software.

Papers Published in Technical Journals and Conference Proceedings

Anomaly Detection for Mixed Transmission CAN Messages Using Quantized Intervals and Absolute Difference of Payloads

T. Koyama, T. Shibahara, K. Hasegawa, Y. Okano, M. Tanaka, and Y. Oshima

Proc. of the ACM Workshop on Automotive Cybersecurity 2019, pp. 19–24, Richardson, TX, USA, March 2019.

The control of vehicles can be taken over by injecting malicious controller area network (CAN) messages. To detect malicious messages, anomaly-detection systems based on intervals or payloads of CAN messages have been proposed. However, these systems cannot accurately detect malicious messages injected into mixed CAN messages, which include periodic and sporadic transmissions. Moreover, sophisticated systems leveraging machine learning are not deployable because the computers in vehicles have limited computational resources. Therefore, we propose a lightweight system to detect malicious messages injected into mixed CAN messages. The proposed system extracts features essential for detecting such messages from CAN messages; thus it is deployable in vehicles. Specifically, we use the quantized intervals and the absolute difference of payloads. We collected 44 hours of running data from 4 types of vehicles and injected 7788 malicious messages into 33 mixed and 8 periodic CAN messages. Our result shows that our system achieved high detection performance: a true positive rate of 97.55% and a false positive rate of 0.003%.

Resource-efficient Verification of Quantum Computing Using Serfling's Bound

Y. Takeuchi, A. Mantri, T. Morimae, A. Mizutani, and J. F. Fitzsimons

npj Quantum Information, Vol. 5, Article no. 27, April 2019.

Verifying quantum states is central to certifying the correct operation of various quantum information processing tasks. In particular, in measurement-based quantum computing, checking whether correct graph states are generated is essential for reliable quantum computing. Several verification protocols for graph states have been proposed, but none of these are particularly resource efficient: multiple copies are required to extract a single state that is guaranteed to be close to the ideal one. The best protocol currently known requires

$O(n^{15})$ copies of the state, where n is the size of the graph state. In this paper, we construct a significantly more resource-efficient verification protocol for graph states that only requires $O(n^3 \log n)$ copies. The key idea is to employ Serfling's bound, which is a probability inequality in classical statistics. Utilizing Serfling's bound also enables us to generalize our protocol for qudit and continuous-variable graph states. Constructing a resource-efficient verification protocol for them is nontrivial. For example, the previous verification protocols for qubit graph states that use the quantum de Finetti theorem cannot be generalized to qudit and continuous-variable graph states without tremendously increasing the resource overhead. This is because the overhead caused by the quantum de Finetti theorem depends on the local dimension. On the other hand, in our protocol, the resource overhead is independent of the local dimension, and therefore generalizing to qudit or continuous-variable graph states does not increase the overhead. The flexibility of Serfling's bound also makes our protocol robust: our protocol accepts slightly noisy but still useful graph states.

Quantum Key Distribution with Simply Characterized Light Sources

A. Mizutani, T. Sasaki, Y. Takeuchi, K. Tamaki, and M. Koashi
arXiv:1904.02364 [quant-ph], April 2019.

To guarantee the security of quantum key distribution (QKD), several assumptions on light sources must be satisfied. For example, each random bit information is precisely encoded on an optical pulse and the photon-number probability distribution of the pulse is exactly known. Unfortunately, however, it is hard to check if all the assumptions are really met in practice, and it is preferable that we have a minimal number of device assumptions. In this paper, we adopt the differential-phase-shift (DPS) QKD protocol and drastically mitigate the requirements on light sources. Specifically, we only assume the independence among emitted pulses, the independence of the vacuum emission probability from a chosen bit, and upper bounds on the tail distribution function of the total photon number in a single block of pulses for single, two and three photons. Remarkably, no other detailed characterizations, such as the amount of phase modulation, are required. Our security proof significantly relaxes demands for light sources, which paves a route to guarantee implementation

security with simple verification of the devices.

Dialogue Breakdown Detection Using BERT with Traditional Dialogue Features

H. Sugiyama

The 10th International Workshop on Spoken Dialogue Systems Technology (IWSDS 2019), Siracusa, Sicily, Italy, April 2019.

Despite the significant improvements in Natural Language Processing with neural networks such as machine reading comprehension, chat-oriented dialogue systems sometimes generate inappropriate response utterances that cause dialogue breakdown because of the difficulty of generating utterances. If we can detect such inappropriate utterances and suppress them, dialogue systems can continue the dialogue easily.

Investigating the Perceived Timing of Sensory Events Triggering Actions in Patients with Parkinson's Disease and the Effects of Dopaminergic Therapy

Y. Yabe, M. A. Goodale, and P. A. MacDonald

Cortex, Vol. 115, pp. 309–323, June 2019.

Few studies have investigated if Parkinson's disease (PD), advancing age, or exogenous dopamine therapy affect the perceived timing of past events. Here we show a phenomenon of 'temporal repulsion' of a sensory event relative to an action decision in patients with PD. In these patients, the timing of a sensory event triggering an action was perceived to have occurred earlier in time than it really did. In other words, the event appeared to be pushed away in time from the performance of the action. This finding stands in sharp contrast to the 'temporal binding' we have observed here and elsewhere (Yabe et al., 2017; Yabe & Goodale, 2015) in young healthy participants for whom the perceived onset of a sensory event triggering an action is typically delayed, as if it were pulled towards the action in time. In elderly patients, sensory events were neither repulsed nor pulled toward the action decision event. Exogenous dopamine alleviated the temporal repulsion in PD patients and normalized the temporal binding in healthy elderly controls. In contrast, dopaminergic therapy worsened temporal binding in healthy young participants. We discuss this pattern of findings, relating temporal binding processes to dopaminergic and striatal mechanisms.
