

# External Awards

## 2016 LOIS Outstanding Service Award

**Winner:** Manabu Okamoto, NTT Media Intelligence Laboratories

**Date:** May 11, 2017

**Organization:** The Technical Committee on Life Intelligence and Office Information Systems (LOIS), Institute of Electronics, Information and Communication Engineers (IEICE) Information and Systems Society

For his significant contribution to the operation and development of LOIS.

## Presidential Citation

**Winner:** Munekazu Date, NTT Media Intelligence Laboratories

**Date:** May 23, 2017

**Organization:** The Society for Information Display

For his outstanding service as Executive Chair of the 2016 International Display Workshops (IDW).

## Niwa & Takayanagi Achievement Award

**Winner:** Shohei Matsuo, NTT TechnoCross Corporation; Yukihiro Bandoh and Seishi Takamura, NTT Media Intelligence Laboratories

**Date:** May 26, 2017

**Organization:** The Institute of Image Information and Television Engineers

For their pioneering research on a video encoding method and contribution to international standardization.

## IPSJ Yamashita SIG Research Award

**Winner:** Haruno Kataoka, NTT Service Evolution Laboratories

**Date:** August 24, 2017 (Award ceremony to be held in March 2018)

**Organization:** Information Processing Society of Japan (IPSJ)

For “Dynamic Guide Signs Control Pedestrians of Public Facilities.”

**Published as:** H. Kataoka, K. Hashiguchi, K. Wago, Y. Ichikawa, and H. Tezuka, “Dynamic Guide Signs Control Pedestrians of Public Facilities,” IPSJ SIG Technical Report, Vol. 2016-UBI-50, No. 13, May 2016.

## IPSJ Yamashita SIG Research Award

**Winner:** Tomohiro Kokogawa, NTT Secure Platform Laboratories

**Date:** August 24, 2017 (Award ceremony to be held in March 2018)

**Organization:** Information Processing Society of Japan (IPSJ)

For “Visualization and Study of Incident Response Capability of Organizations Based on ISO 22320.”

**Published as:** T. Kokogawa, Y. Maeda, A. Amano, and Y. Kohno, “Visualization and Study of Incident Response Capability of Organizations Based on ISO 22320,” IPSJ SIG Technical Report, Vol. 2017-GN-101, No. 23, Mar. 2017.

## Best Paper Award

**Winner:** Akinori Hosoyamada and Kazumaro Aoki, NTT Secure Platform Laboratories

**Date:** September 1, 2017

**Organization:** The 12th International Workshop on Security (IWSEC 2017)

For “On Quantum Related-key Attacks on Iterated Even-Mansour Ciphers.”

**Published as:** A. Hosoyamada and K. Aoki, “On Quantum Related-key Attacks on Iterated Even-Mansour Ciphers,” Advances in Information and Computer Security—Proc. of IWSEC 2017, Hiroshima, Japan, Aug./Sept. 2017, pp. 3–18, in Security and Cryptology Series, Vol. 10418, Springer, 2017.

## Young Scientist Presentation Award

**Winner:** Kenta Takata, NTT Basic Research Laboratories

**Date:** September 5, 2017

**Organization:** The Japan Society of Applied Physics

For “Controllable One-dimensional Photonic Topological Phase with PT-symmetry Breaking.”

**Published as:** K. Takata and M. Notomi, “Controllable One-dimensional Photonic Topological Phase with PT-symmetry Breaking,” The 64th Spring Meeting, 15p-E205-5, Yokohama, Kanagawa, Japan, Mar. 2017.

# Papers Published in Technical Journals and Conference Proceedings

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## **Analysis of Inversely Proportional Carrier Sense Threshold and Transmission Power Setting**

K. Yamamoto, X. Yang, T. Nishio, M. Morikura, and H. Abeyssekera

Proc. of the 14th Annual IEEE Consumer Communications & Networking Conference (CCNC 2017), pp. 13–18, Las Vegas, NV, USA, January 2017.

In this paper, an asymptotic analysis of the inversely proportional setting (IPS) of carrier sense threshold (CST) and transmission power in densely deployed wireless local area networks (WLANs) is presented. In densely deployed WLANs, CST adjustment is a crucial technology to enhance spatial channel reuse, but it can starve surrounding transmitters due to an asymmetric carrier sensing relationship. In order for the carrier sensing relationship to be symmetric, the IPS of the CST and transmission power is a promising approach, i.e., each transmitter jointly adjusts the CST and transmission power in order for their product to be equal to those of others. By assuming that the set of potential transmitters follows a Poisson point process, the impact of the IPS on throughput is formulated based on stochastic geometry in two scenarios: an adjustment of a single transmitter and an identical adjustment of all transmitters. The asymptotic expression of the throughput in dense WLANs is derived and an explicit solution of the optimal CST is achieved as a function of the number of neighboring potential transmitters and signal-to-interference power ratio using approximations. This solution was confirmed through numerical results, where the explicit solution achieved throughput with a loss of less than 8% compared to the numerically evaluated optimal solution.

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## **Starvation Mitigation for Densely Deployed WLANs through Distributed Channel Selection: Potential Game Approach**

B. Yin, S. Kamiya, K. Yamamoto, T. Nishio, M. Morikura, and H. Abeyssekera

Proc. of the 14th Annual IEEE Consumer Communications & Networking Conference (CCNC 2017), pp. 548–553, Las Vegas, NV, USA, January 2017.

A potential game based distributed channel selection scheme is proposed in this paper to mitigate the flow-in-the-middle (FIM) throughput starvation problem that frequently occurs in dense wireless local area networks (WLANs). The FIM throughput starvation occurs when neighbors of a given node are not within the carrier sense ranges of each other. Since they spatially reuse the channel and at least one of them transmits with a high probability, the node in the middle would detect the channel being occupied for a prolonged time and therefore experience extremely low throughput. The basic idea of the proposed scheme is to let each access point (AP) select the channel that reduces the number of three-node chain topologies on its two-hop neighborhood contention graph. The proposed scheme is proved to be a potential game, i.e., the proposed scheme is guaranteed to converge. Graph-based simulation shows that starvation occurs on 20% of nodes when nodes randomly select their frequency channels. The proposed scheme significantly reduces the number of starved nodes along with iterations, outperforming the compared traditional potential game based scheme.

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## **Manipulation of Self-folded Cell-laden Micro-rolls**

T. Teshima, H. Nakashima, Y. Ueno, S. Sasaki, C. S. Henderson, and S. Tsukada

Proc. of the International Conference on Manipulation, Automation and Robotics at Small Scales (MARSS) 2017, pp. 5–7, Montréal, Canada, July 2017.

In this paper, we demonstrated a cell-handling thin polymer film, termed a micro-roll, for encapsulating and manipulating adherent cells. The micro-rolls consisted of double layered films with silk fibroin hydrogel and parylene. The geometrically controlled strain of the films achieved self-folding into three-dimensional (3D) tubular architectures with controllable diameter. Furthermore, a release of the sacrificial hydrogel layer with chelating agents provided high biocompatibility; thereby, multiple cells could be wrapped in the individual micro-rolls. We demonstrated that the embedded cells within the micro-rolls were artificially reconstructed into hollow or fiber-shaped tissue-like structures without cytotoxicity. The cell-laden micro-rolls were selectively collected and freely manipulated with a micro-capillary. This system could potentially provide the mobile templates for bio-interfaces such as the reconstruction of functional tissues and implantable tissue grafts.

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## **Similarity Calculation Method for Binary Executables**

A. Nakajima

Proc. of Dagstuhl Seminar 17281, Dagstuhl, Saarland, Germany, July 2017.

This talk first gives an overview of the main ideas, challenges, and the major research papers in this area. Then we introduce our research on a method that can identify the similar function in two given binary executables, even the target binary executables that have some modifications. Lastly, we introduce the state-of-the-art research in this area, and discuss how it can be applied in today's malware analysis.

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## **Immersive Telepresence Technology “Kirari!”**

H. Takada

Journal of the Imaging Society of Japan, Vol. 56, No. 4, pp. 366–373, August 2017 (in Japanese).

To achieve natural telecommunication, we have been researching an immersive live experience system using several technologies. It reproduces a variety of events with an ultra-high realistic sensation modality using image, high-fidelity audio, and media transport technology. Our research results enabled us to propose an immersive telepresence concept called “Kirari!” for providing immersive live experiences and to develop a life-size “Kirari!” prototype system. Experiments were conducted to evaluate the influence of content expression from reality and experience in a platform for the “Kirari!” system. This result indicated that “Kirari!” is suitable for large-scale public viewing.

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### **Full Parallax Visually Equivalent Light Field 3D Display Using Linear Blending**

M. Date, H. Fujii, and H. Kimata

Proc. of the 9th International Conference on 3D systems and Applications (3DSA 2017), Digest version, p. 521, Busan, South Korea, August 2017.

Linear blending is a powerful method to interpolate images when disparities between the images are small enough. We have developed a real-time highly realistic video communication system using a multiple camera array and glasses-type 3D display with head tracking.

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### **TwinCam: Omni-directional Stereoscopic Live Viewing Camera for Reducing Motion Blur during Head Rotation**

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

Proc. of ACM SIGGRAPH 2017 Emerging Technologies (SIGGRAPH'17), p. 24, Los Angeles, CA, USA, July/August 2017.

We developed an omni-directional stereoscopic live viewing camera (TwinCam) system to reduce the motion blur and latency during head rotation of a remote user wearing a head mounted display (HMD). The TwinCam system consists of two omni-directional live cameras (THETA S, Ricoh), rotation mechanisms with a motor, an image control PC, and an HMD. The camera base rotates synchronously with the azimuth angle of the HMD that the observer is wearing, while each camera lens is at a constant azimuth angle. This camera configuration greatly reduces image flow on the CMOS image sensor in the camera, and eventually, the motion blur on the HMD screens when the HMD rotates. The apparent image latency during the head rotation is minimized by the buffered image. A user study demonstrated that both reduced motion blur and compensated latency were effective in reducing the virtual reality (VR) sickness symptoms.

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### **100-year History and Future of Network System Technologies in Japan**

H. Tode, K. Kawashima, and T. Ito

IEICE Trans. Commun., Vol. E100-B, No. 9, pp. 1581–1594, September 2017.

Telecommunication networks have evolved from telephony networks to the Internet, and they sustainably support the development of a secured, safe, and comfortable society. The so-called “switching technology” including the evolved “network system technology” is one of the main infrastructure technologies used for realizing information communication services. On the occasion of the completion of 100 years since the establishment of the Institute of Electronics, Information and Communication Engineers (IEICE), we summarize the history of network system technologies and present their future direction for the next generation. We mainly focus on a series of technologies that evolved through the discussions of the IEICE technical committees on switching engineering, launched 50 years ago, switching systems engineering, and network systems in action.

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### **Evolution and Future of Information Networks**

T. Asami, K. Yamaoka, and T. Kishida

IEICE Trans. Commun., Vol. E100-B, No. 9, pp. 1595–1605, September 2017.

This paper looks at the history of research in the Technical Committee on Information Networks from the time of its inception to the present and provides an overview of the latest research in this area based on the topics discussed in recent meetings of the committee. It also presents possible future developments in the field of information networks.

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