

External Awards

OFT Young Researcher's Award

Winner: Atsushi Nakamura, NTT Access Network Service Systems Laboratories

Date: February 17, 2017

Organization: The Institute of Electronics, Information and Communication Engineers (IEICE) Technical Committee on Optical Fiber Technologies (OFT)

For "Mode Field Diameter of LP11 Mode for Estimating Coupling Efficiencies at a Splice and Its Measurement Technique."

Published as: A. Nakamura, K. Okamoto, Y. Koshikiya, and T. Manabe, "Mode Field Diameter of LP11 Mode for Estimating Coupling Efficiencies at a Splice and Its Measurement Technique," IEICE Tech. Rep., Vol. 116, No. 198, OFT2016-12, pp. 5–10, Aug. 2016.

TELECOM System Technology Award

Winner: Shohei Kamamura, Daisaku Shimazaki, Yoshihiko Uematsu, NTT Network Service Systems Laboratories; Kouichi Genda, Nihon University; Koji Sasayama, National Institute of Informatics

Date: March 24, 2017

Organization: The Telecommunications Advancement Foundation

For "Multi-staged Network Restoration from Massive Failures Considering Transition Risks."

Published as: S. Kamamura, D. Shimazaki, Y. Uematsu, K. Genda, and K. Sasayama, "Multi-staged Network Restoration from Massive Failures Considering Transition Risks," 2014 IEEE International Conference on Communications, Sydney, Australia, June 2014.

Young Researcher's Award

Winner: Hiroshi Yamamoto, NTT Network Service Systems Laboratories

Date: March 24, 2017

Organization: IEICE

For "Availability Improvement Schemes for Multi-carrier Optical Transmission Systems."

Published as: H. Yamamoto, K. Kitamura, M. Yokota, H. Date, S. Kamamura, H. Maeda, and Y. Uematsu, "Availability Improvement Schemes for Multi-carrier Optical Transmission Systems," Proc. of the 2016 IEICE Society Conference, BS-5-3, Hokkaido, Japan, Sept. 2016.

Young Researcher's Award

Winner: Daisuke Goto, NTT Access Network Service Systems Laboratories

Date: March 24, 2017

Organization: IEICE

For "Validation of the Demodulation of the Multi-satellite/Multi-beam Systems in Time-frequency Asynchronous MIMO Channels."

Published as: D. Goto, F. Yamashita, and K. Kobayashi, "Validation of the Demodulation of the Multi-satellite/Multi-beam Systems in Time-frequency Asynchronous MIMO Channels," Proc. of the 2016 IEICE General Conference, B-3-11, Fukuoka, Japan, Mar. 2016.

Young Researcher's Award

Winner: Hirotaka Ujikawa, NTT Access Network Service Systems Laboratories

Date: March 24, 2017

Organization: IEICE

For "Skipping Power-on Self Test for Energy Efficient Optical Access Equipment" and "Evaluation of Constrained Performance of Optical Access Equipment with Limited Functionality."

Published as: H. Ujikawa, T. Harada, M. Yoshino, K. Suzuki, and A. Otaka, "Skipping Power-on Self Test for Energy Efficient Optical Access Equipment," Proc. of the 2016 IEICE General Conference, B-8-77, Fukuoka, Japan, Mar. 2016.

H. Ujikawa, T. Harada, M. Yoshino, K. Suzuki, and A. Otaka, "Evaluation of Constrained Performance of Optical Access Equipment with Limited Functionality," Proc. of the 2016 IEICE Society Conference, BS-8-30, Hokkaido, Japan, Sept. 2016.

Special Technical Award in Smart Radio

Winner: Doohwan Lee, Hirofumi Sasaki, Hiroyuki Fukumoto, Ken Hiraga, Tadao Nakagawa, and Hiroyuki Shiba, NTT Network Innovation Laboratories

Date: May 25, 2017

Organization: IEICE Technical Committee on Smart Radio

For "An Experimental Study of the Orbital Angular Momentum (OAM) Multiplexing."

Published as: D. Lee, H. Sasaki, H. Fukumoto, K. Hiraga, T. Nakagawa, and H. Shiba, "An Experimental Study of the Orbital Angular Momentum (OAM) Multiplexing," IEICE Tech. Rep., Vol. 116, No. 276, SR2016-56, pp. 7–8, Oct. 2016.

Best Paper

Winner: Hirofumi Sasaki, Doohwan Lee, Hiroyuki Fukumoto, Tadao Nakagawa, and Hiroyuki Shiba, NTT Network Innovation Laboratories

Date: May 25, 2017

Organization: IEICE Technical Committee on Smart Radio

For "Beam Propagation Control Method for OAM Multiplexing Using Gaussian Beam."

Published as: H. Sasaki, D. Lee, H. Fukumoto, T. Nakagawa, and H. Shiba, "Beam Propagation Control Method for OAM Multiplexing Using Gaussian Beam," IEICE Tech. Rep., Vol. 116, No. 276, SR2016-73, pp. 105–110, Oct. 2016.

Honorable Mention Award

Winner: Maya Okawa, Hideaki Kim, and Hiroyuki Toda, NTT Service Evolution Laboratories

Date: May 29, 2017

Organization: The 18th IEEE International Conference on Mobile Data Management (IEEE MDM 2017) General Co-Chairs

For "Online Traffic Flow Prediction Using Convolved Bilinear Poisson Regression."

Published as: M. Okawa, H. Kim, and H. Toda, "Online Traffic Flow Prediction Using Convolved Bilinear Poisson Regression," IEEE MDM 2017, Daejeon, South Korea, May/June 2017.

Best Paper Award

Winner: Yo Yamaguchi and Takana Kaho, NTT Network Innovation Laboratories; Ichihiko Toyoda, Saga University; Kazuhiro Uehara and Tadao Nakagawa, NTT Network Innovation Laboratories; and Kiyomichi Araki, Tokyo Institute of Technology

Date: June 1, 2017

Organization: IEICE

For “A Balanced Mixer Using Asymmetric Stacked Lines for a Quasi-millimeter Wave Band.”

Published as: Y. Yamaguchi, T. Kaho, I. Toyoda, K. Uehara, T. Naka-

gawa, and K. Araki, “A Balanced Mixer Using Asymmetric Stacked Lines for a Quasi-millimeter Wave Band,” *IEICE Trans. Commun.* (Japanese Edition), Vol. J99-C, No. 5, pp. 266–275, May 2016.

Papers Published in Technical Journals and Conference Proceedings

Presenting Changes in Acoustic Features Synchronously to Respiration Alters the Affective Evaluation of Sound

T. G. Sato, J. Watanabe, and T. Moriya

International Journal of Psychophysiology, Vol. 110, pp. 179–186, August 2016.

Synchronization of respiration to cyclic auditory stimuli is a well-observed phenomenon and known to have an effect on affective evaluation of the presented sound. However, no studies have separated the effect of the change in respiratory movement itself and that when there is synchrony between respiration and sound. In this study, we used a system that can change the acoustic features synchronously with the respiration phase and directly investigated the effect the synchrony has on affective ratings without changing respiratory movements. An acoustic stimulation was presented where the sound intensity (SI) or fundamental frequency (F0) was modulated in response to the participant’s respiration phase. Affective evaluations of the acoustic stimuli were made by using the Self-Assessment Manikin (SAM). The experiments compared synchronous and asynchronous conditions.

In the synchronous condition, SI (or F0) was increased with inhalation (decreased with exhalation) or decreased with inhalation (increased with exhalation). In the asynchronous condition, a sound identical to that presented in the synchronous condition was replayed. The participants evaluated sounds that were acoustically the same but where the temporal relationship differed between respiration and the acoustic features. In our results, significantly higher arousal ratings were observed when the change in SI and respiration (inhalation or exhalation) was synchronous and when the increase in F0 and inhalation was synchronous. This suggests that the synchronous phenomenon between respiration and auditory stimuli can play a critical role in affective evaluation.

Long-haul Dense Space Division Multiplexed Transmission over Low-crosstalk Heterogeneous 32-core Transmission Line Using Partial Recirculating Loop System

T. Mizuno, K. Shibahara, F. Ye, Y. Sasaki, Y. Amma, K. Takenaga, Y. Jung, K. Pulverer, H. Ono, Y. Abe, M. Yamada, K. Saitoh, S. Matsuo, K. Aikawa, M. Bohn, D. J. Richardson, Y. Miyamoto, and T. Morioka

Journal of Lightwave Technology, Vol. 35, No. 3, pp. 488–498, February 2017.

In this paper, we present long-haul 32-core dense space-division-multiplexed (DSDM) unidirectional transmission over a single-mode multicore transmission line. We developed a low-crosstalk heterogeneous 32-core fiber with a square lattice arrangement, and a novel partial recirculating loop system. The span crosstalk of the 51.4-km 32-core transmission line was less than -34.5 dB. This allowed the transmission of polarization-division-multiplexed 16 quadrature amplitude modulation (PDM-16QAM) signals through all 32 cores over a long distance exceeding 1000 km. We demonstrate 32-core DSDM 20 wavelength-division-multiplexed PDM-16QAM transmission over 1644.8 km with a high aggregate spectral efficiency of 201.46 b/s/Hz. Additionally, we examine the effect of crosstalk on the transmission performance of each core, and show that the Q-penalty has strong correlation with intercore crosstalk.

Outlier Management for Robust Visual SLAM in Dynamic Environments with Easy Map and Camera Pose Initialization

J. Shimamura, K. Sudo, M. Morimoto, T. Osawa, and Y. Taniguchi
IEEE Transactions on Image Electronics and Visual Computing, Vol. 5, No. 1, pp. 20–33, June 2017.

We present a robust monocular visual simultaneous localization and mapping (Visual SLAM) method, an algorithm capable of estimating robust camera poses in dynamic environments and reducing the user operation load for Visual SLAM initialization. In dynamic environments, standard monocular Visual SLAM using 3D/2D matched points between a recovered 3D map and feature points on a current frame tends to fail because the 3D map is distorted by moving objects with duration. To address this issue, we classify outliers from a robust estimator in the camera pose estimation into feature points on moving objects and mismatched points on occlusions, specular reflections, textureless regions, and so on. To achieve this, we first construct an angle histogram based on outlier flows that are vectors between reprojected points and matched points at a current frame, then approximate the obtained angle histogram using a mixture of Gaussian functions. Finally, we estimate the parameters for Gaussian mixtures by using an expectation maximization algorithm. We also introduce weighted tentative initial values of a 3D map and a camera pose to reduce the user operation load. Experimental results demonstrate that our system can work robustly in highly dynamic environments and initialize by itself without user assistance.

Heart Rate Measurement Based on Event Timing Coding Observed by Video Camera

T. G. Sato, Y. Shiraki, and T. Moriya

IEICE Transactions on Communications, Vol. E100-B, No. 6, pp. 926–931, June 2017.

The purpose of this study was to examine an efficient interval encoding method with a slow-frame-rate image sensor, and show that the encoding can work to capture heart rates from multiple persons. Visible light communication (VLC) with an image sensor is a powerful method for obtaining data from sensors distributed in the field with their positional information. However, the capturing speed of the camera is usually not fast enough to transfer interval information like the heart rate. To overcome this problem, we have developed an event timing (ET) encoding method. In ET encoding, sensor units detect the occurrence of heart beat event and send their timing through a sequence of flashing lights. The first flash signal provides the rough timing and subsequent signals give the precise timing. Our theoretical analysis shows that in most cases the ET encoding method performs better than simple encoding methods. Heart rate transfer from multiple persons was examined as an example of the method's capabilities. In the experimental setup, the developed system successfully monitored heart rates from several participants.

Vibration on the Soles of the Feet Evoking a Sensation of Walking Expands Peripersonal Space

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

Proc. of 2017 IEEE World Haptics Conference, pp. 234–239, Munich, Germany, June 2017.

Processing of audio-tactile multisensory stimuli presented within

the space immediately surrounding our body, i.e., peripersonal space (PPS), is known to be facilitated and the boundaries of the PPS extended by body action such as walking. However, it is unclear whether the boundaries change when a sensation of walking is induced with no physical body motion. Here, we presented several vibration patterns on the soles of the feet of seated participants to evoke a sensation of walking and examined the change in reaction times to detect a vibrotactile stimulus on the chest while listening to a looming sound approaching the body, which was taken as a behavioral proxy for the PPS boundary. Results revealed that a cyclic vibration consisting of lowpass-filtered walking sounds presented at the soles that clearly evoked a sensation of walking decreased the reaction times, indicating that the PPS boundary was expanded forward by inducing a sensation of walking.

100-Gb/s Transmission over a 2520-km Integrated MCF System Using Cladding-pumped Amplifiers

C. Castro, S. Jain, E. De Man, Y. Jung, J. Hayes, S. Calabrò, K. Pulverer, M. Bohn, S. Alam, D. J. Richardson, K. Takenaga, T. Mizuno, Y. Miyamoto, T. Morioka, and W. Rosenkranz

IEEE Photonics Technology Letters, Vol. 29, No. 14, pp. 1187–1190, July 2017.

A 10.5-Tb/s optical transmission (15×100 Gb/s QPSK channels per core) over 2520 km of multicore fiber is achieved using an integrated multicore transmission link consisting of directly spliced multicore components, such as fan-in/fan-out fiber couplers, a 60-km trench-assisted seven-core hexagonal fiber and cladding-pumped erbium-ytterbium-doped fiber amplifiers.
