

# External Awards

## DEWS2008 Excellent Paper Award

**Winner:** Takeshi Kurashima<sup>†1</sup>, Ko Fujimura<sup>†1</sup>, and Hidenori Okuda<sup>†1</sup>

<sup>†1</sup> NTT Cyber Solutions Laboratories

**Date:** April 7, 2008

**Organization:** IEICE 19th Data Engineering Workshop

For “Mining Experiences from Large-scale Blog Entries”.

In our definition, a person’s experience can be expressed using five attributes: time, location, activity, opinion and emotion. This paper proposes a method for discovering interesting association rules about peoples’ experiences as described in blog entries using several interestingness measures proposed in the area of data mining.

## 17th International World Wide Web Conference (WWW2008) Best Poster Awards

**Winner:** Ko Fujimura<sup>†1</sup>, Shigeru Fujimura<sup>†1</sup>, Tatsushi Matsubayashi<sup>†2</sup>, Takeshi Yamada<sup>†2</sup>, and Hidenori Okuda<sup>†1</sup>

<sup>†1</sup> NTT Cyber Solutions Laboratories

<sup>†2</sup> NTT Communication Science Laboratories

**Date:** April 25, 2008.

**Organization:** 17th International World Wide Web Conference

For “Topigraphy: Visualization for Large-scale Tag Clouds”.

This paper proposes a new method for displaying large-scale tag clouds. We use a topographical image that helps users to grasp the relationship among tags intuitively as a background to the tag clouds. We apply this interface to a blog navigation system and show that the proposed method enables users to find the desired tags easily even if the tag clouds are very large, 5,000 and above tags. Our approach is also effective for understanding the overall structure of a large amount of tagged documents.

# Papers Published in Technical Journals and Conferences

## Mid-infrared QPM laser sources for high-precision atmospheric trace gas measurements

D. Richter, P. Weibring, A. Fried, J. G. Walega, O. Tadanaga, M. Asobe, and H. Suzuki

Proc. SPIE, Vol. 6875, pp. 68750J-1–5, Feb. 2008.

Tunable, mid-infrared lasers based on quasi-phase-matched bulk PPLN crystals have successfully been implemented on airborne atmospheric research platforms. They enable a detectable fractional absorbance of about  $5 \times 10^{-7}$ , which equates to single digit part-per-trillion detectable concentrations for many atmospherically important trace gases. Ridge-waveguide-type PPLN crystals, which are currently being developed, show promising performance characteristics, including 100 times better conversion efficiency and good beam quality, which enable more compact system designs. In addition, the flexibility afforded by QPM structured materials to generate coherent mid-infrared radiation permits unique multi-wavelength operation and detection techniques.

## Heaviness Perception by Hand-held Object Vibrating with Asymmetric Acceleration

T. Amemiya and T. Maeda

Virtual Reality Society of Japan, Vol. 13, No. 1, pp. 59–68, 2008 (in Japanese).

When a hand-held object is accelerated in a pattern or a high acceleration peak followed by a low acceleration peak, the holder typically has the kinesthetic sensory illusion of being pushed or pulled continuously although the object has no connection to the ground. Using this effect in the gravity direction, we performed a heaviness

perception experiment that involved comparing the weight of hand-held objects vibrating vertically with symmetric and asymmetric acceleration patterns. The results show that the perceived weight of an object vibrating with asymmetric acceleration is higher than that of an object vibrating with symmetric acceleration when the high acceleration peak is generated in the gravity direction. On the other hand, a slight heaviness perception change was observed in the anti-gravity direction. We speculate that the nonlinearity between these results is caused by the perceptual broadening of pulse stimuli and the perceptual filling-in. The results also imply that the heaviness perception change increased with increases in the amplitude of vibration within the same frequency.

## INTERCHANNEL DEPENDENCY ANALYSIS OF BIOMEDICAL SIGNALS FOR EFFICIENT LOSSLESS COMPRESSION BY MPEG-4 ALS

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

ICASSP, IEEE, Vol. ICASSP2008, pp. 569–572, Las Vegas, USA, Mar. 2008.

This paper describes a new search algorithm that quickly finds interchannel relationships between a coding channel and a reference channel in the multichannel coding tool of the MPEG-4 Audio Lossless Coding (ALS) international standard. The algorithm has a tree structure and can reduce the data size with a significantly smaller computation load than that of the conventional one. The devised method is based on a restricted greedy algorithm. It chooses the most efficient branch which does not make any loops in the existing path. The results of comprehensive evaluations show that this method

maintains the compression performance (compression to around 1/3) and performs 1000 times as fast as the conventional method for 512-channel magnetoencephalography signals. This algorithm enables practical lossless compression of biomedical data by the ALS, and at the same time, opens the way to a new multichannel analysis tool that may be used for purposes other than compression. The continual maintenance of this standard will make it possible to perfectly reconstruct encoded files even 100 years from now.

---

#### **Simple phase offset monitoring technique for 43 Gbit/s optical DQPSK receiver**

H. Kawakami, E. Yoshida, Y. Miyamoto, M. Oguma, and T. Itoh  
 IEE Electron. Lett., Vol. 44, No. 6, pp. 437–438, 2008.

Proposed is a simple phase offset monitoring technique that uses a simple electric limiter amplifier circuit for an optical differential quadrature phase shift keying (DQPSK) receiver. Phase offset can be monitored even if the eye pattern of the waveform of the demodulated 43-Gbit/s DQPSK signal is completely closed due to chromatic dispersion exceeding 250 ps/nm.

---

#### **High-pressure and high-temperature annealing effects of boron-implanted diamond**

K. Ueda and M. Kasu

Diamond and Related Materials, Elsevier, Vol. 17, No. 4-5, pp. 502–505, 2008.

We show that high-pressure and high-temperature (HPHT) annealing of ion-implanted diamond is efficient as a doping technique. The HPHT annealing condition is located in the thermodynamically stable region for diamond. The HPHT annealing is highly effective for the recovery of damage induced by ion implantation. In the entire annealing temperature range, the HPHT annealing is more efficient than conventional thermal annealing methods such as vacuum annealing. At 1400°C, we obtained the highest boron doping efficiency of 7.1%, which is ten times higher than that by vacuum annealing.

#### **High-Performance InGaAs/InP Composite-Channel High Electron Mobility Transistors Grown by Metal-Organic Vapor-Phase Epitaxy**

H. Sugiyama, T. Kosugi, H. Yokoyama, K. Murata, Y. Yamane, M. Tokumitsu, and T. Enoki

Jpn. J. Appl. Phys., Vol. 47, No. 4, pp. 2828–2832, 2008.

This paper reports InGaAs/InP composite-channel (CC) high electron mobility transistors (HEMTs) grown by metal-organic vapor-phase epitaxy (MOVPE) with excellent breakdown and high-speed characteristics. Atomic force microscopy (AFM) reveals high-quality heterointerfaces between In(Ga, Al)As and In(Al)P. Fabricated 80-nm-gate CC HEMTs exhibit on- and off-state breakdown (burnout) voltages estimated at higher than 3 and 8 V. An excellent current-gain cutoff frequency ( $f_T$ ) of 186 GHz is also obtained in the CC HEMTs. The on-wafer uniformity of CC-HEMT characteristics is comparable to those of our mature 100-nm-gate InGaAs single-channel HEMTs. Bias-stress aging tests reveal that the lifetime of CC HEMTs is expected to be comparable to that of our conventional InGaAs single-channel HEMTs.

---

#### **A PVT Tolerant STM-16 Clock-and-Data Recovery LSI Using an On-Chip Loop-Gain Variation Compensation Architecture in 0.20- $\mu$ m CMOS/SOI**

Y. Ohtomo, H. Koizumi, K. Nishimura, and M. Nogawa

Trans. IEICE Jpn., Vol. E91-C, No. 4, pp. 655–661, 2008.

This paper proposes an on-chip loop gain variation compensation architecture for a clock and data recovery (CDR) LSI. The CDR LSI using the proposed architecture can meet the jitter specifications recommended in ITU-T G.958 under a wide variation of temperature and supply voltage. The relation between the jitter specifications and the loop gain is derived theoretically. Gain-variation characteristics of component circuits are studied by circuit simulation. The proposed architecture uses voltage controllers to reduce the gain variation of the LC voltage controlled oscillator (LC-VCO) circuit and charge-pump circuit. The voltage controllers are designed to have a first-order positive coefficient to temperature, which is found by an analysis of the gain variation characteristics. An STM-16 CDR with the proposed architecture is implemented in 0.20- $\mu$ m fully depleted CMOS/SOI. The CDR shows a wide capture range of  $\pm 140$  MHz and meets both the jitter transfer and the jitter tolerance specifications in the ambient temperature range from  $-40$  to  $85^\circ\text{C}$  and with the supply voltage variation of  $\pm 6\%$ .