External Awards

MNC 2006 Award for Most Impressive Presentation

Winner: Tomomi Sakata[†1], Kei Kuwabara[†1], Toshishige Shimamura[†1], Norio Sato[†1], Nobuhiro Shimoyama[†1], Masao Nagase[†2], Kazuhisa Kudou[†3], Katsuyuki Machida[†3], and Hiromu Ishii[†1]

†1 NTT Microsystem Integration Laboratories
†2 NTT Basic Research Laboratories
†3 NTT Advanced Technology Corporation

Date: November 6, 2007

Organization: International Microprocesses and Nanotechnology Conference (MNC)

For "Prevention of Release-Related Sticking in MEMS Devices by Electrodeposition of Water-Repellent Film".

We propose a technique of preventing both wet-release-related and in-use sticking of actuators in microelectromechanical system (MEMS) devices. The technique involves the electrodeposition of water-repellent organic dielectric film that renders the microstructure surface inactive.

Reference: T. Sakata, K. Kuwabara, T. Shimamura, N. Sato, M. Nagase, N. Shimoyama, K. Kudou, K. Machida, and H. Ishii, "Electrodeposition of Water-Repellent Organic Dielectric Film as an Anti-Sticking Coating on Microelectromechanical System Devices," Jpn. J. Appl. Phys., Vol. 46, No. 9B, pp. 6454–6457, 2007.

Papers Published in Technical Journals and Conferences

Quantitative Evaluation in Auditory Parception of Head-movement Delay for an Acoustical Telepresence Robot

I. Toshima and S. Aoki

Journal of the Robotics Society of Japan, Vol. 25, No. 6, pp. 990–996, 2007.

We built an acoustical telepresence robot, called *TeleHead*, which has a user-like dummy head (i.e., the shape of the dummy head and that of the user is very alike) and whose movement is synchronized with the user's head movement in real time. We are trying to clarify the effects of reproducing the user's head movement. In this article, we evaluate the sense of incongruity caused by the delay time of reproducing head movement by means a psychophysical approach. Discrimination tasks for head-movement delay clarified the users' perceptual thresholds against the dead time. The results indicate that head-movement control should have a dead time shorter than 28 ms. In addition, this dead time does not depend on the characteristics of the acoustical telepresence robot.

Haptic Interaction Based on Perceptual Attraction Force without Constraint of Location

T. Amemiya, T. Maeda, and H. Ando

TVRSJ, Virtual Reality Society of Japan, Vol. 12, No. 3, pp. 409–412, 2007.

In this paper, we discuss application possibilities of force perception technologies for hand-held devices in the field of entertainment. We developed an interactive system with the force perception technology called "Come Over Here, or Catch You!", which consists of a hand-held haptic interface and a position and posture identification system. Since the hand-held haptic interface does not require an external ground, it can be used outside the laboratories and does not interrupt human's behavior. We verified the feasibility of the system through results of questionnaires by the experienced.

Veridical perception of moving colors by trajectory integration of input signals

J. Watanabe and S. Nishida

Journal of Vision, Vol. 7, No. 11/3, pp. 1–16, 2007.

For rapid alternation of two colors (e.g., red and green), human observers see the mixed color (yellow). This chromatic flicker fusion has been considered to reflect neural integration of color signals presented successively at the same retinal location. If so, the retinal alternation rate should be a critical fusion parameter. However, here we show that temporal alternations of two colors on the retina are perceptually segregated mnore veridically when they are presented as moving patterns rather than as stationary alternations at the same rate. This finding is consistent with the hypothesis that the visual system integrates color signals along the motion trajectory, in addition to at the same retinal location, for reducing motion blur and seeing veridical colors of moving objects. This hypothesis is further supported by a covariation of perceived motion direction and perceived color in a multipath motion display.

Efficient 2.7-μm Difference Frequency Generation Using Direct-bonded Quasi-phase-matched $LiNbO_3$ Ridge Waveguide and Investigation of O–H Absorption Influence

O. Tadanaga, Y. Nishida, T. Yanagawa, H. Miyazawa, T. Umeki, K. Magari, M. Asobe, and H. Suzuki

Jpn. J. Appl. Phys, Vol. 46, No. 10A, pp. 6643–6646, 2007.

We fabricated direct-bonded quasi-phase matched (QPM) $LiNbO_3$ (LN) ridge waveguides for difference frequency generation (DFG) in the 2.7-μm wavelength range and obtained a conversion efficiency of 87%/W. We showed that dips in the DFG tuning curve originated from the absorption of H_2O in air and the O–H absorption in the LN crystal exhibited no influence on DFG when we used the type-0 phase-matching condition. We confirmed that the direct-bonded QPM-LN ridge waveguide is suitable for achieving high-efficiency DFG in the 2.7-μm range.

A Miniaturized In-phase Power Divider with a DC Block Function

H. Hayashi, T. Nakagawa, K. Uehara, and Y. Takigawa

Trans. IEICE. Jpn, Vol. E90-C, No. 10, pp. 2022–2029, 2007.

This paper describes a miniaturized in-phase power divider with a DC block function. We first propose three types of miniaturized in-phase power dividers composed of two distributed transmission lines, a resistor, and three capacitors to function as a DC block. Then, we use a simulation to compare the dividers. The simulation results show that, by properly selecting circuit configuration, we both achieve broadband frequency characteristics and miniaturize circuitry compared with the conventional Wilkinson power divider with two DC block capacitors. Finally, an experimental UHF power divider fabricated to test the design concept is presented. Over the frequency range from 0.44 to 0.66 GHz, the experimental power divider exhibits power splits of -3.2 ± 0.2 dB, return losses greater than 20 dB, and isolation between output ports greater than 20 dB.