Papers Published in Technical Journals and Conference Proceedings

An FPGA Based BMNoC Architecture Consisting of Hybrid Connections and Hierarchical Structures with a Router Soft-core

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Proc. of ITC-CSCC 2013, Vol. 1569754499, No. 1569754499, p. 1569754, Yeosu, Korea, 2013.

In this paper, we propose a busmesh network-on-chip (BMNoC) with parametric soft-core router architecture. The BMNoC adapts a hierarchical communication network consisting of clusters and mesh routers. The BMNoC is a scalable network based on a parametric router architecture to be used in the synthesis of customized low cost NoCs. The switch features allow the BMNoC to scale in several dimensions: node degree, channel width, and buffer depth. Such features allow the automatic customization of BMNoC in order to meet the application requirements.

Single-crystalline 4H-SiC Micro Cantilevers with a High Quality Factor

K. Adachi, N. Watanabe, H. Okamoto, H. Yamaguchi, T. Kimoto, and J. Suda

Sensors and Actuators, Vol. 197, pp. 122–125, 2013.

Single-crystalline 4H-SiC micro cantilevers were fabricated by doping-type selective electrochemical etching of 4H-SiC. With this method, n-type 4H-SiC cantilevers were fabricated on a p-type 4H-SiC substrate, and resonance characteristics of the fabricated 4H-SiC cantilevers were investigated under a vacuum condition. The resonant frequencies agreed very well with the results of numerical simulations. The maximum quality factor in first-mode resonance of the 4H-SiC cantilevers was 230,000. This is 10 times higher than the quality factor of conventional 3C-SiC cantilevers fabricated on an Si substrate.

High-reality Space Composition Using Stably-positioned Imaging and Acoustic Wave Field Synthesis

H. Takada, M. Date, S. Koyama, S. Ozawa, S. Mieda, and A. Kojima

Proc. of European Conference on Visual Perception 2013, Vol. 36, p. 224, Bremen, Germany.

We proposed a natural communication concept produced by high-reality space composition made by using the high fidelity position representation induced by a stably positioned imaging technology and acoustic wave field synthesis technology. It provides natural and comfortable communication by reproducing the distance and position of an image and sound without inconsistency.

We developed a high-reality space composition system using these technologies. We applied our system and reported on aspects concerning the perception and relationship between image and sound. The result indicated a synergistic effect of image and sound. This system can be applied to high-reality communication systems.

Digital Archiving of Tapestries of Kyoto Gion Festival Using a High-definition and Multispectral Image Capturing System

M. Tsuchida, A. Takayanagi, W. Wakita, K. Kashino, J. Yamato, and H. Tanaka

Proc. of the International Conference on Culture and Computing, Vol. 1, No. 1, pp. 204–205, Kyoto, Japan, 2013.

We report the archiving project of the Kyoto Gion Festival using a high-resolution multiband imaging camera. We have been developing a two-shot six-band image capturing system for recording the color and physical properties of early modern tapestries. In an experiment, an image of a tapestry whose image size was 2700 M pixels was synthesized. The resolution of the images was 0.02 mm/pixel. Accurate color under an arbitrary illumination and spectral reflectance can be reproduced from the six-band image using the Wiener estimation.

Bayesian Nonparametric Approach to Blind Separation of Infinitely Many Sparse Sources

H. Kameoka, M. Sato, T. Ono, N. Ono, and S. Sagayama

IEICE Trans. Fundamentals, Vol. E96-A, No. 10, pp. 1928–1937, 2013.

This paper deals with the problem of underdetermined blind source separation (BSS) where the number of sources is unknown. We propose a BSS approach that simultaneously estimates the number of sources, separates the sources based on the sparseness of speech, estimates the direction of arrival of each source, and performs permutation alignment. We confirmed experimentally that reasonably good separation was obtained with the present method without specifying the number of sources.

An Eleven-band Stereoscopic Camera System for Accurate Color and Spectral Reproduction

M. Tsuchida, K. Kashino, and J. Yamato

Proc. of Color and Imaging Conference, Vol. 21, No. 1, pp. 14–19, Albuquerque, USA, 2013.

For accurate color and spectral reflectance reproduction, we propose a novel eleven-band acquisition system using a nine-view stereo camera. The proposed system consists of eight monochrome cameras with eight different narrow band-pass filters and an RGB camera. To generate an eleven-band image, the shapes of the nine captured stereo images are transformed to correct registration displacement caused by stereo parallax. For the process of the correspondence search between stereo images, the POC (phase-only correlation) method is used. The most significant point of our method is that the captured RGB image is converted into narrow-band images for accurate correspondence search. The detected corresponding points are used to estimate the parameters of image transformation, and an eleven-band image is generated. A comparison of the experimental results with those of a conventional method showed that the accuracy of correspondence detection and spectral reflection estimation was improved.

Towards Modeling Ad Hoc Networks: Current Situation and Future Direction

J. Liu, H. Nishiyama, N. Kato, T. Kumagai, and A. Takahara

IEEE Wireless Communications Magazine, Vol. 20, No. 6, pp. 51–58, 2013.

The last decade has witnessed a tremendous increase in both the number of mobile devices and the consumer demand for mobile data communication. As a consequence, networking technologies are shifting from traditional highly centralized toward future organically distributed so as to meet such demand. As the most general networking architecture, the ad hoc network has long been regarded as the most challenging to design and quantify, due to the possible hybrid component settings and heterogeneous node behaviors there. Toward this end, we review the current state of the art of analytical models and techniques developed for performance analysis in ad hoc networks. Specifically, we discuss modeling techniques related to the fundamental topics in ad hoc network research: node mobility, wireless interference, node spatial distribution, and information delivery process. Besides discussions of advantages and limitations of available models, promising future research directions are also outlined.

A Fundamental Study of Efficiency of Information Processing in Emergency Operations Center

F. Ichinose, Y. Maeda, N. Kosaka, M. Higashida, M. Sugiyama, H. Takeda, T. Yamamoto, and H. Hayashi

Journal of Disaster Research, Vol. 9, No. 2, pp. 206–215, 2014.

Many of the emergency operations centers that take the initiative in commanding and controlling a disaster response still rely on inefficient manual information processing even though they have information and communications technology (ICT) systems at hand. This paper reports on three-year functional exercises in a local government using ICT to improve information processing.

Modal Crosstalk Measurement Based on Intensity Tone for Few-mode Fiber Transmission Systems

T. Mizuno, H. Takara, M. Oguma, T. Kobayashi, and Y. Miyamoto

Proc. of Optical Fiber Communication Conference (OFC) 2014, Vol. W3D. 5, pp. 1–3, San Francisco, USA.

We propose a novel method based on intensity tone for measuring modal crosstalk in few-mode fiber transmission systems. Our method can measure crosstalk for multiple modes simultaneously with a wide dynamic range of 40 dB.

12-core × 3-mode Dense Space Division Multiplexed Transmission over 40 km Employing Multi-carrier Signals with Parallel MIMO Equalization

T. Mizuno, T. Kobayashi, H. Takara, A. Sano, H. Kawakami, T. Nakagawa, Y. Miyamoto, Y. Abe, T. Goh, M. Oguma, T. Sakamoto, Y. Sasaki, I. Ishida, K. Takenaga, S. Matsuo, K. Saitoh, and T. Morioka

Proc. of OFC 2014, Vol. Th5B.2, pp. 1–3, San Francisco, USA.

We demonstrate dense SDM transmission of 20-WDM multi-carrier PDM-32QAM signals over a 40-km, 12-core, 3-mode fiber with 247.9-b/s/Hz spectral efficiency. Parallel MIMO (multiple-input and multiple-output) equalization enables 21-ns DMD compensation with 61 TDE taps per subcarrier.

A 204.8 Tbps Throughput 64×64 Optical Cross-connect Prototype that Allows C/D/C Add/drop

K. Takaha, Y. Mori, H. Hasegawa, K. Sato, and T. Watanabe

Proc. of OFC 2014, Vol. M2K.1, pp.1–3, San Francisco, USA.

We fabricate a subsystem modular 64×64 OXC with C/D/C add/drop capabilities. Its throughput reaches 204.8 Tbps at the channel speed of 40 Gbps. Transmission experiments verified the performance of the prototype.

Low Crosstalk Wavelength Tunable Filter that Utilizes Symmetric and Asymmetric Mach-Zehnder Interferometers

S. Takashina, Y. Mori, H. Hasegawa, K. Sato, and T. Watanabe

Proc. of OFC 2014, Vol. Th3F.6, pp.1–3, San Francisco, USA.

We propose a novel AWG-based wavelength tunable filter architecture that utilizes symmetric and asymmetric Mach-Zehnder interferometers for switching and filtering functions. A prototype was fabricated as a PLC and its good performance was experimentally confirmed.

Silica-based PLC 1 × N Switch for All Wavelength Bands

T. Watanabe, T. Mizuno, Y. Hashizume, and T. Takahashi

Proc. of OFC 2014, Vol. Th1I.5, pp. 1–3, San Francisco, USA.

We describe a silica-based PLC switch that operates over a wavelength range of 1260–1610 nm. The fabricated 1×15 switch exhibits a WDL of <1.1 dB and an isolation of >40 dB with a low power consumption of 0.51 W.
