

Papers Published in Technical Journals and Conference Proceedings

Power Reduction by Adaptively Optimizing Optical Power Using Actual BER for 10G-EPON Systems

N. Ikeda, H. Uzawa, K. Terada, S. Shigematsu, H. Koizumi, and M. Urano

Proc. of the 39th European Conference and Exhibition on Optical Communication (ECOC 2013), Vol. 2013, pp. 6.12, London, UK.

The optical line terminal calculates the pre-FEC BER using the number of corrected error bits and decides the optical power of the optical network unit (ONU) transmitter. The ONU adaptively adjusts the optical power according to the decision during the discovery window. The power consumption is reduced by 250 mW without any additional devices and without degrading throughput.

Interaction between Agency and Body-ownership in Terms of Schizophrenia and Schizotypy

T. Asai

Proc. of Tokyo Conference on Philosophy of Psychiatry 2013, Vol. 1, No. 1, p. 36, the University of Tokyo Komaba Campus, Tokyo, Japan.

Awareness of our own body (sense of body ownership) and action (sense of agency) is a fundamental component of self-consciousness. These sensory representations of the self are also important when we consider aberrant experiences such as delusions and hallucinations in patients with schizophrenia and also in the general population with schizotypal personality traits. I first introduce some empirical evidence that suggests their atypical representation in the sense of agency and body-ownership, respectively. On the other hand, these components of minimal self are closely related to each other and are integrated to form one agent with a unified awareness of the body and action. I propose that schizophrenia should not be regarded merely as a disorder of agency, but as a disorder of the hierarchic representation of the self where the sense of action, body, memory, and also identity must be integrated.

Wide-bandwidth Charge Sensitivity with a Radio-frequency Field-effect Transistor

K. Nishiguchi, H. Yamaguchi, A. Fujiwara, H. S. J. van der Zant, and G. A. Steele

Appl. Phys. Lett., Vol. 103, No. 143102, 2013.

We demonstrate high-speed charge detection at room temperature with single-electron resolution by using a radio-frequency field-effect transistor (RF-FET). The RF-FET combines a nanometer-scale silicon FET with an impedance-matching circuit composed of an inductor and capacitor. Driving the RF-FET with a carrier signal at its resonance frequency enables small signals at the transistor's gate to modulate the impedance of the resonant circuit, which is monitored at high speed using the reflected signal. The RF-FET driven by high-power carrier signals enables a charge sensitivity of 2×10^{-4} e/Hz^{0.5} at a readout bandwidth of 20 MHz.

Performance Evaluation of Short-range MIMO Using a Method for Controlling Phase Difference between Each Propagation Channel

K. Sakamoto, K. Hiraga, T. Seki, T. Nakagawa, and K. Uehara

IEICE Trans. on Communications, Vol. E96-B, No. 10, pp. 2513–2520, 2013.

A simple decoding method for short-range multiple-input multiple-output (SR-MIMO) transmission can reduce the power consumption for MIMO decoding, but the distance between the transceivers requires millimeter-order accuracy in order to satisfy the required transmission quality. In this paper, we propose a phase difference control method between each propagation channel to alleviate the requirements for the transmission distance accuracy. In the proposed method, the phase difference between each propagation channel is controlled by changing the transmission (or received) power ratio of each element of sub-array antennas. In millimeter-wave broadband transmission simulation, we clarified that when sub-array antenna spacing is set to 6.6 mm and element spacing of the sub-array antenna is set to 2.48 mm, the proposed method can extend the transmission distance range satisfying the required transmission quality, which is a bit error rate (BER) before error correction of less than 10⁻² from 9–29 mm to 0–50 mm in QPSK, from 15–19 mm to 0–30 mm in 16 QAM, and from only 15 mm to 4–22 mm in 64 QAM.

Hydrogen-enhanced Lattice Defect Formation and Hydrogen Embrittlement of Cyclically Prestressed Tempered Martensitic Steel

T. Doshida, M. Nakamura, H. Saito, T. Sawada, and K. Takai

Acta Materialia, Elsevier, Vol. 61, No. 1, pp. 7755–7766, 2013.

The number of lattice defects formed by applying cyclic prestress with/without hydrogen for various cycles and strain rates during cyclic prestress was compared for tempered martensitic steel. A tensile test was also carried out to evaluate hydrogen embrittlement susceptibility following the application of cyclic prestress. The results showed that when cyclic prestress was applied without hydrogen, the number of cycles and the strain rate had no apparent effect on mechanical properties or fracture morphology at the time of the subsequent tensile test. In contrast, when cyclic prestress was applied with hydrogen, the fracture strain and fracture stress decreased with an increasing number of prestress cycles and a decreasing strain rate, and the fracture morphology exhibited brittle fracture, signifying an increase in hydrogen embrittlement susceptibility at the time of the tensile test. The number of hydrogen-enhanced lattice defects also increased with an increasing number of cycles, and a decreasing strain rate was found when cyclic prestress was applied with hydrogen. These results indicate a correlation between hydrogen embrittlement susceptibility and the number of hydrogen-enhanced lattice defects. The increased hydrogen-enhanced lattice defects were probably vacancies and vacancy clusters formed by the interactions between hydrogen and dislocation movement during the application of cyclic prestress. The vacancies and vacancy clusters formed during the application of cyclic prestress with hydrogen presumably caused intergranular fracture and increased hydrogen embrittlement susceptibility.

Case Study of Model Adaptation: Transfer Learning and Online Learning

K. Imamura

Proc. of International Joint Conference on Natural Language Processing, pp. 1292–1298, Nagoya, Japan, 2013.

Many NLP tools are released as programs that include statistical models. Unfortunately, the models do not always match the documents that the tool users are interested in, which forces the user to update the models. In this paper, we investigate model adaptation under the condition that users cannot access the data used in creating the original model. Transfer learning and online learning are investigated as adaptation strategies. We test them on the category classification of Japanese newspaper articles. Experiments show that both transfer and online learning can appropriately adapt the original model if the dataset for adaptation contains all data, not just the data that cannot be well handled by the original model. In contrast, we confirmed that the adaptation fails if the dataset contains only erroneous data as indicated by the original model.

Highly Realistic 3D Display System for Space Composition Telecommunication

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

Proc. of IEEE IAS Annual Meeting, Vol. 2013-ILDC, No. 440, pp. 1–6, Orlando, FL, USA, 2013.

We describe a highly realistic 3D display system that generates a composition of local and remote locations for telecommunication purposes. It uses a 3D projector and head tracking to display a person in a remote location as a life-size stereoscopic image against background scenery. Since it generates displayed images that correspond to the observer's viewing position, it well reproduces the fidelity of existence and the feel of a material. We also describe a simple, fast, and high quality algorithm for background scenery generation, the development of which was inspired by the visual effects of DFD (depth-fused 3D) displays. Our system is a promising means of achieving real-time communication between two different locations in cases where a sense of reality is required.

Colorless Optical Add/drop Using Small Matrix Switch and Cyclic AWG

T. Watanabe, S. Sohma, and S. Kamei

Proc. of the 18th Microoptics Conference (MOC'13), Vol. 1, No. 1, F-1, Tokyo, Japan, 2013.

We describe a new wavelength routing switch architecture that uses small matrix switches and cyclic arrayed-waveguide gratings. This switch enables us to provide colorless add/drop ports in reconfigurable optical add/drop multiplexer nodes.