

# Papers Published in Technical Journals and Conferences

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## Optimal Guidance for Autonomous Underwater Vehicle Navigation within Undersea Areas of Current Disturbances

K. Kim and T. Ura

Advanced Robotics, Brill, Vol. 23, No. 5, pp. 601–628, 2009.

Simulated navigations of an autonomous underwater vehicle (AUV) achieved by the minimum time guidance within undersea areas of current disturbances are presented. When an AUV has to transit to a given destination within an area of current disturbance, ingenious guidance enables the minimum time navigation. In this study, a numerical solution procedure for an optimal heading guidance rule is developed. As the optimal heading reference, the solution of the optimal guidance rule is fed to the heading controller. Simulated optimal navigations are realized on the basis of the dynamics of an AUV 'r2D4'. The r2D4 is a deep-ocean-exploring AUV developed by the Institute of Industrial Science, University of Tokyo. The developed procedure never fails to derive the optimal heading sequence within a finite computational time, provided that the current velocity in the navigation region is known *a priori*. As a fail-safe strategy in achieving the optimal navigation, the concept of quasi-optimal navigation is presented. The quasi-optimal navigation is implemented by on-site updates of the optimal guidance followed by the heading tracking control.

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## Single-electron counting statistics of shot noise in nano-wire Si MOSFETs

K. Nishiguchi, Y. Ono, and A. Fujiwara

SSDM, JSAP, 2009, Proc., Vol. 1, No. 1, pp. 1140–1141, Sendai, Japan.

Shot noise in the transport of single electrons in a Si MOSFET is monitored with a real-time measurement using a high-charge-sensitivity electrometer. In the zepto- and atto-ampere current characteristics, the current characteristics are found to be divided into two regimes: a temperature-independent regime in the lower current range and a temperature-dependent one in the higher current range. A time-domain analysis reveals that, for both regimes, the single-electron transport obeys a pure Poisson process with the Fano factor being nearly unity, except around the boundary where it is reduced.

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## The NILFS2 Filesystem: Review and Challenges

R. Konishi

Japan Linux Symposium 2009, The Linux Foundation, Proc., Vol. 1, No. 1, pp. 1–26, Tokyo, Japan.

The Nilfs2 filesystem has finally been merged into the mainline kernel after a long refinement period since its debut. With the continuous snapshotting nilfs2 provides, versioning of the entire file system is easily applicable, and users can even restore files mistakenly overwritten or destroyed just a few seconds ago. This presentation first looks back on the motivation and adopted design of this filesystem and checks the achievement status of the project. Then, the remaining challenges and enhancement will be mentioned for discussing the future prospect and direction of development. In addition to making this filesystem fit for practical use, we are intending to keep trying to enhance it to exploit continuous snapshotting. The challenges include extended-attribute, posix-acls, checkpoint-based remote replication, fsck, nicer garbage collection, defrag, and better SSD support; the key lies in both user land and kernel code.

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## Random Telegraph Signal and Low-frequency Noise in Silicon Charge-sensitive Electrometers

N. Clement, K. Nishiguchi, A. Fujiwara, and D. Vuillaume

SSDM 2009, JSAP, Proc., Vol. 1, No. 1, pp. 1138–1139, Sendai, Japan.

We have studied the random telegraph signal (RTS) noise amplitude at room temperature in one of the simplest systems, i.e., a very low density of traps, Debye screening length > devices dimensions and traps depth  $\ll$  oxide thickness. Due to Coulomb repulsion, traps are active one by one. This allows us to confirm the validity of the correlated number/mobility fluctuation model and include the drain bias dependence. Finally we conclude that, for our devices, strong accumulation can be highly suitable for remote electron sensing because of the relative reduction in RTS amplitude owing to correlated mobility fluctuation.

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## Single-electron stochastic resonance using Si nano-wire transistors

K. Nishiguchi, S. Miyamoto, and A. Fujiwara

MNC 2009, JSAP, Proc., Vol. 1, No. 1, pp. 470–471, Sapporo, Japan.

We demonstrated single-electron-based stochastic resonance (SR) using nanoscale MOSFETs. The correlation between input and output signal is enhanced by adding noise. Moreover, it is confirmed that a parallel SR system allows further enhancement of the correlation. This is very useful for practical applications because optimization of added noise becomes easy and robustness to fluctuation of the electrical characteristics of nanoscale MOSFETs is guaranteed. single-electron-based SR would also be useful for the analysis of individual-electron behavior in an electrically defined quantum dot.

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## Sleep and Adaptive Link Rate Control for Power Saving in 10G-EPON Systems

R. Kubo, J. Kani, Y. Fujimoto, N. Yoshimoto, and K. Kumozaki

IEEE GLOBECOM 2009, Proc., Vol. 1, No. 2, pp. 1–6, Honolulu, USA.

This paper proposes a novel power-saving mechanism for the 10-Gbit/s Ethernet passive optical network (10G-EPON) systems that are currently being discussed in IEEE 802.3av. The proposed power-saving mechanism includes a sleep control function and an adaptive link rate (ALR) control function. The sleep control function switches the modes of optical network units (ONUs), i.e., active and sleep modes, depending on the presence or absence of traffic. The ALR control function switches the link rate between the optical line terminal (OLT) and an ONU, i.e., 1 Gbit/s or 10 Gbit/s, depending on the quantity of traffic. The proposed hybrid mechanism offers effective power management of ONUs on the basis of the traffic conditions. The proposed hybrid mechanism is validated by some numerical simulations.

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## A Sequence of Nearest Polynomials with Given Factors

H. Sekigawa

The Joint Conference of ASCM2009 and MACIS2009, Kyushu

Univ., Proc., Vol. 22, No. 1, pp. 187–190, Fukuoka, Japan.

Let  $p$  and  $f_0$  be given nonzero multivariate polynomials with real coefficients and  $\|f_0\|=1$ , where  $\|f_0\|$  is the Euclidean norm of  $f_0$ . For  $j=1, 2, \dots$ , let  $p_{2j-1}=f_{j-1}g_j$  be the nearest polynomial to  $p$  such that  $f_{j-1}$  is a factor of  $p_{2j-1}$  and  $\deg(p_{2j-1}) \leq \deg(p)$ , where  $\deg$  is the total

degree, and let  $p_{2j}=c_j f_j g_j$  be the nearest polynomial to  $p$  such that  $g_j$  is a factor of  $p_{2j}$ ,  $\deg(p_{2j}) \leq \deg(p)$ ,  $\|f_j\|=1$ , and  $c_j > 0$ . We investigate the behavior of the sequences  $\{p_j\}$ ,  $\{f_j\}$ ,  $\{g_j\}$ , and  $\{c_j\}$ .

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