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LAYMAN'S ABSTRACTS

Experiments and Pilot Study Evaluating the Performance of Reading Miscue Detector and Automated Reading Tutor for Filipino: A Children's Speech Technology for Improving Literacy

Ronald M. Pascual and Rowena Cristina L. Guevara

This work is about the performance evaluation of a children's speech technology which is known in the literature as automated reading tutors (ART). The ART is a computer-assisted learning system that provides oral reading fluency instruction, in order to improve the learner's reading literacy. However, the design of an ART system is language-specific, thus requiring the authors to specifically develop a system for the Filipino language. In the first part of the paper, the authors present the results of the experiments that evaluate the performance of the core technology of the ART called the reading miscue detector (RMD) which automatically spots reading errors. In the second part of the paper, the authors present the design and results of the pilot study that evaluates the effectiveness of the ART in improving the learner's oral reading fluency. Experimental results show that the RMD's performance is at par with those from state-of-the-art RMDs reported in literature. The results of the pilot study demonstrates that the students who used the ART for a month have generally improved in their oral reading fluency and comprehension by more than four times compared to the period when they were not using the ART yet.

On the Sum of Strictly *k*-zero Matrices

Little Hermie B. Monterde and Agnes T. Paras

k

A square matrix is said to be strictly k-zero if $A^k = 0$ for some positive integer k and $A^m \neq 0$ for all positive integers m with $m < k$. We characterize square matrices which can be expressed as a sum of strictly k-zero matrices.

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Effect of Spin Dimensionality in the Fidelity of Spin Chain

Art Graeson B. Dumigpe and Eric A. Galapon

We consider a linear chain of three spins (two qubits at the ends with one arbitrary spin between them), wherein we transfer an unknown quantum state from one end to another. We look at the effect of the spin quantum number of the arbitrary spin in the probability that the state transfer is successful. We also study the phenomenon in which we open the system to an environment/noise.

Geometric Study on Silicon Nanowires Fabricated via Silver-assisted Electroless Etching

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Nanostructured devices are highly promising due to their novel applications. Nanowires (NWs) are among the possible building blocks of future nanostructured devices. To mass-produce these NWs, the process to synthesize them should be simple, convenient, and economical. In this work, we study the geometry of the nanowires produced using a process called metal-assisted chemical etching. It involves immersing a crystalline silicon wafer (Si) in several solutions, which can either be a one-step or a two-step process. The one-step process involves immersion in a solution containing hydrofluoric acid (HF) and silver nitrate, while the two-step process involves an additional immersion into another solution containing HF and hydrogen peroxide. As such, this process meets the aforementioned requirements for the mass production of SiNWs, with the added benefit of Si being nontoxic. The effect of varying the synthesis parameters on the lengths, diameters, crystallinities, and NW densities of the produced SiNWs were examined. The optical properties of the SiNWs were checked and verified for optical or optoelectronic applications. The differences between the one-step and two-step processes were also noted. SiNWs produced from the one-step process may be more suited to certain applications over the other.

High-throughput Screening for Quorum Sensing-inhibitory Compounds from Selected Philippine Marine Algae and Surface-associated Marine Microorganisms for Potential Anti-biofilm/biofouling Applications

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Quorum sensing (QS) is a process of bacterial communication which senses signal molecules that induce the formation of matrices (or biofilms) that facilitate growth and contribute to virulence. The disruption of biofilm formation may provide an alternative pathway for the prevention of diseases and adverse environmental problems often attributed to biofilms and biofouling. In this study, we determine the presence of QS inhibitors in Philippine seaweeds and surface-associated microorganisms. A screening method utilizing a bacterial strain whose purple-colored pigmentation is inhibited in the presence of QS inhibitors was used. Agar well diffusion and liquid broth assays were conducted to test for the presence of QS inhibition in crude seaweed extracts, as well as surface-associated microorganisms. The decrease in pigmentation in the bacterial strain with a relatively constant cell density indicates that QS is disrupted without cell death. Over 7% of the seaweed fragments and 5% of microbial isolates tested positive in the preliminary screening, while almost 50% of the crude extracts were positive for QS inhibition. These findings provide relevant information for further isolation, purification, and characterization of QS inhibitory compounds from Philippine marine seaweeds and surface-associated microorganisms with potential anti-biofilm/biofouling applications.