

# I-FE05

## Sensors and Measurements 3

15:20-17:20  
Room : C204

Chair : Kyihwan Park ( KJIST )  
Co-Chair : Jiang Zhongwei ( Yamaguchi Univ. )

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15:20 – 15:40

I-FE05-1

### A Digital Signal Processing Circuit Design for Position Sensitive Detectors(PSD), using an FPGA

Bongsu Hahn, Changhwan Choi, Kyihwan Park  
(KJIST)

In this paper, a digital signal processing circuit for Position Sensitive Detectors(PSDs) is introduced to substitute the conventional analog signal processing circuit and to compensate disadvantages of the PSD. In general, the analog circuits have the problems such as noise accumulation, sensitivity for environmental changes, and high cost for manufacturing. Moreover, the intrinsic nonlinearity problem of the PSD makes it hard to measure the position accurately because it is difficult to be overcome the problem by using the conventional analog circuits, which can be solved by using the digital signal processing circuit. The circuit is implemented by using a Field Programmable Gate Array (FPGA). The Pulse Amplitude Modulation(PAM) method is used for reducing the environmental noise effect, and a linear interpolation logic is used to compensate the ...

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16:00 – 16:20

I-FE05-3

### Development of Digital Stethoscope Diagnosis System for Cardiac Disorders

Zhongwei Jiang, Kazuhiro Yamada, Takashi Fujii, Masunori Matsuzaki (Yamaguchi Univ.)

This paper is concerned with the development of a simple digital stethoscope system for diagnosis of cardiac disorders. This system consists of an electronic stethoscope, IC sound recorder and a notebook computer. The cardiac sound is easily acquired by the electronic stethoscope and then recorded in IC memory stick so that the digital cardiac signal can be simply transmitted to the computer for signal display, disease diagnosis, and personal history record. A software is built with functions displaying the sound graphically and replaying the sound clearly. Further, a neural network recognition system for automatic diagnosis of cardiac disorders is also added to the software.

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16:40 – 17:00

I-FE05-5

### Realization of High Precision Position Measurement System Using M-sequence Encoded Laser Beam Scanning

Jun-ya Takayama, Shinji Ohyama, Akira Kobayashi  
(Tokyo Institute of Technology)

In this report, as the active position measurement system, a new method for two-dimensional position measurement system using a concept of semi-open type signal field has proposed. The feature of this system is realizing a position measurement only by scanning the encoded laser beams from scanning points to a measurement field, and observed it. First, both system configuration and encoding method are considered concretely, and M-sequence signal is selected for encoding. Next system design is performed to realize the theoretical measurement accuracy, and applied to a position measurement experiments. Experimental results show that measurement precision is larger than theoretical values. Furthermore, method for improving the measurement ...

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15:40 – 16:00

I-FE05-2

### Development of a Measuring Instrument of Current and Voltage on Power-Transmission Lines for the Construction of Energy-Network

E. Nishiyama, K. Kuwanami, T. Matsuda, I. Oota, M. Kawano  
(Kumamoto National College of Technology)

We propose portable equipment that monitors a current and potential on high-potential power transmission lines. In the equipment, a current and voltage sensor are attached to a hollow insulator that supports a power transmission line: A current on a power line is detected by an air-core solenoidal coil clamped to the line and the detected current signal is transmitted to the ground station by using optical data link; A potential on a power transmission line is detected by a high resistance element, zinc oxide (ZnO) that acts as a potential divider between the power line and the ground. The equipment does not require high potential insulators and magnetic cores which. This leads to the following advantages of the equipment: (a) It is easily installed owing to its small size and its simple structure; (b) It operates in low ...

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16:20 – 16:40

I-FE05-4

### Guaranteed Stability Margins of the Discrete-Time LQ Optimal Regulator for a Performance Index with Cross-Product Terms

Tae Hyun Fang and Jae Weon Choi  
(Pusan National Univ.)

In this paper, the guaranteed stability margins of LQ optimal regulators for a performance index with cross-product terms are suggested in the discrete-time case. An example for the LQ optimal regulator of an inverted pendulum system is given to demonstrate the validity of the suggested stability margins.

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17:00 – 17:20

I-FE05-6

### A New Approach to System Identification Using Hybrid Genetic Algorithm

Jong-Wook Kim and Sang-Woo Kim  
(POSTECH)

Genetic algorithm(GA) is a well-known global optimization algorithm. However, as the searching bounds grow wider., performance of local optimization deteriorates. In this paper, we propose a hybrid algorithm which integrates the gradient algorithm and GA so as to reinforce the performance of local optimization. We apply this algorithm to the system identification of second order RLC circuit. Identification results show that the proposed algorithm gets the better and robust performance to find the exact values of RLC elements.

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