

15:20-17:20  
Room : C202

Chair : Soo Hyun Kim ( KAIST )  
Co-Chair : Ishikawa Seiji ( Kyushu Institute of Technology )

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15:20 – 15:40

I-FE03-1

### Spinal Deformity Detection Based on the Evaluation of Middle Line's Displacement on a Moiré Image of a Human Back

Hyoungeop Kim, Seiji Ishikawa(Kyushu Institute of Technology), Yoshinori Otsuka(National Sanatorium Chiba Higashi Hospital), Hisashi Shimizu(Chiba Health Care Association) and Takashi Shinomiya(Nicon Digital Technos Co.)

In this paper, a technique is described for classifying normal cases and abnormal cases in automatic spinal deformity detection by computer based on moiré topographic images of human backs. Displacement is evaluated statistically between the middle line extracted from the entire moiré image and the middle line obtained from a small rectangle area defined on the moiré image. The middle line is calculated employing a developed potential symmetry analysis technique. The displacement is calculated in several regions and the mean and the standard deviation of the displacement values are chosen as two features. A linear discriminant function (LDF) is defined on the 2-D feature space based on the Mahalanobis distance and the features are classified into two categories, i.e., normal and ...

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16:00 – 16:20

I-FE03-3

### Two-Input Max/Min Circuit for Fuzzy Inference System

P. Laipasu, A. Chaikla, A. Jaruwanawat, P. Pannil, T. Lee, V. Riewruja (King Mongkut's Institute of Technology Ladkrabang)

In this paper, a current mode two-input maximum (Max) and minimum (Min) operations scheme, which is a useful building block for analog fuzzy inference systems, is presented. The Max and Min operations are incorporated in the same scheme with parallel processing. The proposed scheme comprises a MOS class AB/B configuration and current mirrors. Its simple structure can provide a high efficiency. The performance of the scheme exhibits a very sharp transfer characteristic and high accuracy. The proposed scheme achieves a high-speed operation and is suitable for real-time systems. The simulation results verifying the performances of the scheme are agreed with the expected values.

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16:40 – 17:00

I-FE03-5

### Development of Fuzzy Steering Controller for Outdoor Autonomous Mobile Robot with MR sensor

Jeong-Heui Kim, Seok-Jun Son, Young-Cheol Lim, Tae-Gon Kim, Young-Jae Ryoo(Mokpo Univ.), Eui-Sun Kim(Seonam Univ.)

This paper describes a fuzzy steering controller for an autonomous mobile robot with MR sensor. Using the magnetic field( $B_x$ ,  $B_y$ ,  $B_z$ ) obtained from the MR sensor, we designed fuzzy controller for driving on the road center. Fuzzy rule base was built to magnetic field( $B_x$ ,  $B_y$ ,  $B_z$ ). To develop an autonomous mobile robot simulation program, we have done modeling MR sensor, dynamic model of mobile robot and coordinate transformation. A computer simulation of the robot (including mobile robot dynamics and steering) was used to verify the steering performance of the mobile robot controller using the fuzzy logic. Good results were obtained by computer simulation. So, we confirmed the robustness of the proposed fuzzy controller by computer...

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15:40 – 16:00

I-FE03-2

### Continuous Korean Sign Language Recognition using Automata-based Gesture Segmentation and Hidden Markov Model

Jung-Bae Kim, Kwang-Hyun Park, Won-Chul Bang, Z.Zenn Bien,(KAIST), Jong-Sung Kim(ETRI)

This paper studies continuous Korean Sign Language (KSL) recognition using color vision. In recognizing gesture words such as sign language, it is a very difficult to segment a continuous sign into individual sign words since the patterns are very complicated and diverse. To solve this problem, we disassemble the KSL into 18 hand motion classes according to their patterns and represent the sign words as some combination of hand motions. Observing the speed and the change of speed of hand motion and using state automata, we reject unintentional gesture motions such as preparatory motion and meaningless movement between sign words. To recognize 18 hand motion classes we adopt Hidden Markov Model (HMM). Using these methods, we recognize 5 KSL sentences and obtain 94% recognition ratio.

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16:20 – 16:40

I-FE03-4

### Multipoint Process Monitoring System Based on a Near Infrared Ray(NIR) Acousto-Optic Tunable Filter(AOTF)

Jang Woo You, Daesuk Kim, Soohyun Kim, Hong Jin Kong(KAIST), Yunwoo Lee(KRISS), Yoon Keun Kwak(KAIST)

This paper describes a newly designed multipoint process monitoring system based on a NIR acousto-optic tunable filter. The NIR multipoint process monitoring system consists of a NIR AOTF device for wavelength selection, an InGaAs array sensor, and a specially designed in-line type of optical fiber probe. Unlike a FTS(Fourier Transform Spectrometry) or grating based monitoring system, an AOTF has no moving parts, and it can be rapidly tuned to any wavelength in its operating range within microseconds. Thus, the AOTF is advantageous in terms of faster spectral imaging capability and rigidity required for industrial monitoring environment. In the current feasibility evaluation, an enhanced optical fiber probe with 3 monitoring points was used. However, ...

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17:00 – 17:20

I-FE03-6

### Fractal Analyses of Simulated Fish School Movements and Video-Recorded Sardine Movements

Masayoshi Tabuse, Tatsuro Shinchi, Tetsuro Kitazoe (Miyazaki Univ.), Haruhiko Nishimura(Hyogo Univ.), Nobuyuki Azuma(Hirosaki Univ.)

Fish schools behave like a single organism and offer a considerable survival advantage. In our simulations, the fish school is well organized and behaves like a single creature depending solely on the interactions among individuals without having any director fish. This kind of system can be said as the typical one of "Complex Systems". We make clear the validity of fractal analyses to evaluate fish school movements through evaluation of both the simulated movements and the real sardine movements taken by video tape. The analyses showed that we need two kinds of fractal dimensions ( $D_1$ ,  $D_2$ ) to fit to the observations; the one( $D_1$ ) corresponds to smaller coarsening levels and  $D_2$  does to larger coarsening levels. The double linear analyses in...

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