

# I-SMP 01

## International Poster Session

13:00-13:50

Chair : Kwon Oh-Kyu (Inha Univ.)

Room : Terrace(3F)

Co-Chair : Park Poo-Gyeon (POSTECH)

13:00 – 13:50

I-SMP-7

### An Adaptive Fuzzy Sliding Mode Controller for Robot Manipulators

SamJun Seo(Anyang Univ.), GwiTae Park(Korea Univ.), DongSik Kim(Soonchunhyang Univ.)

In this paper, the adaptive fuzzy system is used as an adaptive approximator for robot nonlinear dynamic. A theoretical justification for the adaptive approximator is proving that if the representative point(RP or switching function) and its derivative in sliding mode control are used as the inputs of the adaptive fuzzy system, the adaptive fuzzy system can approximate robot nonlinear dynamics in the neighborhood of the switching surface. Thus the fuzzy controller design is greatly simplified and at the same time, the fuzzy control rule can be obtained easily by the reaching condition. Based on this, a new method for designing an adaptive fuzzy control system based on sliding mode is proposed for the trajectory tracking control of a robot with unknown nonlinear dynamics.

13:00 – 13:50

I-SMP-8

### The Comparison of Postural Stability Analysis of Biped Robot IWR-III

S.B. Kim, S.H. Choi, J.T. Kim, Jin. G. Kim (Inha Univ.), B.H. Lee(Semyung Univ.)

This paper presents the stability analysis of a biped robot IWR-III. We use a foot-rotation indicator(FRI) concept to reveal the degree of stability. The foot rotation can be a barometer of postural instability, which should be carefully treated in implementing a dynamically stable walk and avoided altogether in performing a statically stable walk. The conventionally mentioned zero moment point(ZMP) criterion may not be sufficient to express the stability of a biped robot. ZMP equation needs an assumption that the supporting foot is fixed firmly to the ground during the walking. Therefore, applying the FRI concept is more desirable when a biped robot is falling down...

13:00 – 13:50

I-SMP-9

### Design of a Simulator and a Controller for ABS of Airplane

J.W. Jeon, J.H. Shin, K.C. Lee, D.H. Hwang, D.Y. Park, Y.J. Kim (Korea Electro-technology Research Institute)

The essence of ABS(Anti-skid Brake System) control is to continuously adjust brake pressure to maintain optimum brake torque. This optimum level should balance tire and runway friction its peak value, yielding maximum braking deceleration. It influences not only the deceleration and the taxing distance of an aircraft, but also the strength and the fatigue life of the landing gear. In this paper, an ABS control algorithm is developed with a dynamics model of 5-DOF(Degree of Freedom). The algorithm is verified by simulations and the simulation results are presented. The dynamics model is simulated by the computer...

13:00 – 13:50

I-SMP-10

### Skin Color Extraction in Varying Backgrounds and Illumination Conditions

Minsick Park, Chang-Woo Park(Yonsei Univ.), Won-ha Kim(Myongji Univ.), Mignon Park(Yonsei Univ.)

This paper presents a fuzzy-based method for classification skin color object in a complex background under varying illumination. Parameters of fuzzy rule base are generated using a genetic algorithm(GA). The color model is used in the YCbCr color space. We propose a unique fuzzy system in order to accommodate varying background color and illumination condition. This fuzzy system approach to skin color classification is discussed along with an overview of YCbCr color space.

13:00 – 13:50

I-SMP-11

### A Sensorless Vector Controller for Induction Motors using an Adaptive Fuzzy Logic

Sung-Hoe Huh, Jang-Hyun Park(Korea Univ.), Ick Choy(KIST), Gwi-Tae Park(Korea Univ.)

This paper presents a indirect vector control system for induction motors using an adaptive fuzzy logic(AFL) speed estimator. The proposed speed estimator is based on the MRAS(Mode Referece Adaptive System) scheme. In general, the MRAS speed estimation approaches are more simple than any other strategies. However, there are some difficulties in the scheme, which are strong sensitivity to the motor parameters variations and necessity to detune the estimator gains caused by different speed area. In this paper, the AFL speed estimator is proposed to solve the problems. The structre of the proposed AFL is very simple. The input of the AFL is the rotor flux error difference between reference and adjustable model, and the output is the estimated incremental rotor speed. Moreover, the back propagation algorithm is combined to adjust the parameters of the fuzzy logic to the most appropriate values during the operating the system. Finally, the validity of the ...

13:00 – 13:50

I-SMP-12

### Flexure hinge mechanism having amplified rectilinear motion for confocal scanning microscopy using optical section

J. W. Seo, D. K. Kang, J. Y. Shim, J. H. Jung, and D. G. Gweon (KAIST)

Confocal scanning microscopy (CSM) is an important instrument in a wide variety of imaging applications because of its ability to provide three-dimensional images of thick, volume specimens. The mechanism for two-dimensional beam scanning and optical sectioning has an important role in CSM as the three-dimensional profiler. This optical sectioning property arises from the use of a point detector, which serves to attenuate the signals from out-of-focus. The intensity profile for the open loop scanning should be matched with its response for the standard. The non-linearity can be minimized with the optical sectioning or the optical probe of the closed loop control. This paper shows the mathematical expression of the light such as the extinction curve in the optical fields of system using AO deflector, the axial/lateral response experimentally when the error sources change, and the methods of optical sectioning. Thorough design of optical sectioner is crucial to the success of CSM in the field. ...