Intelligent Control

13:00 – 15:00  Chair: Park Jaehyun (Inha Univ.)
Room: 4129  Co-Chair: Kang Chul Goo (Konkuk Univ.)

13:00 – 13:20  D-SP03-1
A Fuzzy Control of a 3-dimensional Inverted Pendulum
Using a 3-axis Cartesian Robot
Shin Ho Sun, Chu Jun Uk and Lee Yun Jung
(Kyungpook National University)

Conventional researches almost have been focused on the
one dimensional inverted pendulum. Recently, Sprenger et
al.[2] have researched a two dimensional inverted pendulum.
Observing human’s action to control an inverted pendulum,
one can recognize that human uses a three dimensional
motion including the up and down motion. In this paper, we
propose a fuzzy logic controller (FLC) of a new three
dimensional inverted pendulum system. We derive a
dynamic equation of the mechanism including a 3-axis
cartesian robot and a inverted pendulum. We propose a
design method of a fuzzy controller of the yaw and pitch
angles of a inverted pendulum. In the design, the redundant
degree-of-freedom (DOF) of the robot ...

13:20 – 13:40  D-SP03-2
Design of the Fuzzy Sliding Mode Controller and Neural
Network Interpolator for UFV Depth Control
Kim Hyun-Sik (Agency for Defense Development)
Park Jin-Hyun (Chinju National Univ.)
Chei Young-Kiu (Pusan National Univ.)

In Underwater Flight Vehicle depth control system, the
followings must be required. First, it needs robust performance
which can get over nonlinear characteristics. Second, it needs
accurate performance which have small overshoot
phenomenon and steady state error. Third, it needs
continuous control input. Finally, it needs interpolation method
which can solve the speed dependency problem of controller
parameters. To solve these problems, we propose depth
control method using Fuzzy Sliding Mode Controller and
Neural Network Interpolator. Simulation results show the
proposed method has robust and accurate control
performance by the continuous control input and has no
speed dependency problem.

13:40 – 14:00  D-SP03-3
A Consideration on Load Disturbance Characteristics of
Realtime Adaptive Learning Controller based on an
Evolutionary algorithms - Application to an Electro
Hydraulic Servo System
Sung-Ouk, Jin-Kul Lee
(Pusan National Univ.)

Hydraulic servo system has the characteristic of high power
in itself, as combining its characteristics with excellent
electro equipment that comes from the development of
electronics, electro-hydraulic servo system is widely used in
industry that are requested high precision and power.
Electro-hydraulic servo system is characteristic of very
strong non-linearity in itself and it is mainly applied the field
of the inner or outer fluctuating load or disturbance in
industry. Evolutionary computation based on the natural
evolutionary process may solve many engineering problems.
Algorithms can represent the natural selection in crossovers,
mutations, production of the offspring, selection, etc. Nature
has already shown is the superiorly through ...

14:00 – 14:20  D-SP03-4
Study on Iterative Learning Controller with a Delayed
Output Feedback
Hak-Sung Lee
(Sejong Univ.)

In this paper, a novel type of iterative learning controller is
studied. The proposed learning algorithm utilizes not only
the error signal of the previous iteration but also the delayed error
signal of the current iteration. The delayed error signal is
adopted to improve the convergence speed. The convergence
condition is examined and the result shows that the proposed
learning algorithm shows the fast convergence speed under
the same convergence condition of the traditional iterative
learning algorithm. The simulation examples are presented to
confirm the validity of the proposed ILC algorithm.

14:20 – 14:40  D-SP03-5
H∞ Fuzzy Dynamic Output Feedback Controller Design
with Pole Placement Constraints
Jongcheol Kim, Sangchul Won
(POSTECH)

This paper presents a fuzzy dynamic output feedback
controller design method for Parallel Distributed
Compensation (PDC)-type Takagi-Sugeno (T-S) model
based fuzzy dynamic system with H1 performance and
additional constraints on the closed pole placement. Design
condition for these controller is obtained in terms of the
linear matrix inequalities (LMIs). The proposed fuzzy
controller satisfies the disturbance rejection performance
and the desired transient response. The design method is
verified by this method for an inverted pendulum with a cart
using the proposed method.