

# I-TE03

## Adaptive Learning and Computer Control 2

15:20-17:20  
Room : C202

Chair : Ngamwiwit Jongkol (KMITL, Thailand)  
Co-Chair : Choi Byoung-Wook (Sunmoon Univ. )

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15:20 – 15:40

I-TE03-1

### Mamdani Fuzzy PID Controller for Processes with Small Dead Times

K. Saensawasd, O. Saingaroon, S. Panaudomsup, J. Ngamwiwit  
(King Mongkut's Institute of Technology Ladkrabang)  
and N. Komine(Tokai Univ.)

This paper proposes a Mamdani fuzzy PID controller for controlling a process with small dead time. The controller composes of a parallel structure of fuzzy PI controller and fuzzy PD controller. Each controller has two inputs, error and change of error. Hence, the control signal of the proposed controller is the average value of the output of the fuzzy PI and PD controllers. The Mamdani fuzzy PID controller is easily to be adjusted to meet the desired control system performances both in transient state and steady state. The simulation results of the proposed Mamdani fuzzy PID controller by using the same parameters (proportional gain, integral time and derivative time) as the conventional PID controller are shown. The response of the Mamdani fuzzy PID control system is faster than the conventional PID control system. Both system responses have ...

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15:40 – 16:00

I-TE03-2

### Experimental modeling and Robust Control of an Industrial Overhead Crane

B. S. Park, T.G. Song, J. Y. Lee, D. H. Hong, J. S. Yoon (KAERI)  
and E.S. Kang (Chungnam National Univ.)

In case that the perfect model following conditions are not satisfied in the system, a perfect model-following controller is difficult to apply to the system. To deal with this problem, in this paper, a robust imperfect stable model-following controller is designed by combining time delay controller and sliding mode controller based on the concept of two degrees of freedom(2-DOF) controller design method. The experimental dynamic modeling of the commercial overhead crane with capacity of two tons is carried out. To remove the noise of the measuring signals from the swing angle measurement device and estimate the state of the swing angles of the transported object at each time instant, real-time tracker is designed using Kalman filter. The performance of the designed robust controller is tested through the commercial overhead. The experimental results show that the designed controller is robust and applicable to real systems.

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16:00 – 16:20

I-TE03-3

### Fault Detection System for Front-wheel Steering Passenger Cars

Hwan-Seong KIM, Sam-Sang YOU(Maritime Univ.),  
Jin-Ho KIM(Doosan Heavy Industries), Ju-Sik HA

This paper deal with a fault detection algorithm for front-wheel passenger car systems by using robust  $H^\infty$  control theory. Firstly, we present a unified formulation of vehicle dynamics for front wheel car systems and transform this formulation into state space form. Also, by considering the cornering stiffness which depends on the tyre-road contact conditions, a multiplicative uncertainty for vehicle model is described. Next, the failures of sensor and actuator for vehicle system are defined in which the fault filter is considered. From the nominal vehicle model, an augmented system includes the multiplicative uncertainty and the model of fault filter is proposed. Lastly by using  $H^\infty$  norm property the fault detect conditions are defined, and the actuator and sensor failures are detected and isolated by designing the robust  $H^\infty$  controller, respectively.

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16:20 – 16:40

I-TE03-4

### Monitoring of Industrial Controller using Web Server On Embedded Linux Platform

ByungWook Choi and DukYun Cho  
(Sunmoon Univ.)

In this paper, we present the web-based monitoring system for industrial controller such as inverter controller for hydraulic elevators. The monitoring system is using an embedded web server on embedded Linux platform. The control board of system-On-Chip (SoC) is based on ARM7TDMI with Ethernet controller. Web-based monitoring system using embedded Linux platform can reduce the cost, and have flexibility both of technical issues and locations of the system to be monitored. The system shows the feasibility of remote monitoring system based on embedded Linux platform.

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