Adaptive Learning and Computer Control

08:30-10:30
Chair: Abe Kenichi (Tohoku Univ.)
Room: C105
Co-Chair: Park Jin Bae (Yonsei Univ.)

08:30 – 08:50 I-TA01-1 08:50 – 09:10 I-TA01-2

Multiple-Channel Active Noise Control by ANFIS and Independent Component Analysis without Secondary Path Modeling
Eung-Ju Kim, Sang-yup Lee, Beom-Soo Kim, Myo-Taeg Lim
(Korea Univ.)

In this paper, we present Multiple-Channel Active Noise Control (ANC) system by employing Independent Component Analysis (ICA) and Adaptive Network Fuzzy Inference System (ANFIS). ICA is widely used in signal processing and communication and it use prewhitening and appropriate choice of non-linearities. ICA can separate mixed signal. ANFIS controller is trained with the hybrid learning algorithm to optimize its parameters for adaptively canceling noise. This new method which minimizes a statistical dependency of mutual information (MI) in mixed low frequency noise signal and there is no need to secondary path modeling. The proposed implementations achieve more powerful and stable noise reduction than Filtered-X LMS algorithms which is needed for LTI assumption and precise secondary error channel path modeling.

09:10 – 09:30 I-TA01-3 09:30 – 09:50 I-TA01-4

Formation of Attention and Associative Memory based on Reinforcement Learning
Katsunari Shibata
(Oita University)

An attention task, in which context information should be extracted from the first presented pattern, and the recognition answer of the second presented pattern should be generated using the context information, is employed in this paper. An Elman-type recurrent neural network is utilized to extract and keep the context information. Reinforcement signal that indicates whether the answer is correct or not, is only a signal that the system can obtain for learning. Only by this learning, necessary context information became to be extracted and kept, and the system became to generate the correct answers. Furthermore, the function of an associative memory is observed in the feedback loop in the Elman-type neural network.

09:50 – 10:10 I-TA01-5

Vibration Control of an Intelligent Cantilevered Beam with a Distributed PVDF Sensor and PZT Actuator
Yeo-Hung Yun, Tae-Kyu Kwon, Seong-Cheol Lee, and Kee-Ho Yu
(Chonbuk National Univ.)

Robust control of a GFR composite beam with a distributed PVDF sensor and piezo-ceramic actuator is presented in this paper. Modal analysis method and modal coordinates are introduced to obtain the state equations of the structural system. 1st and 2nd natural frequencies are considered in the modeling, because robust control theory which is robustness to structured uncertainty is adopted to suppress the vibration. If the controllers designed by $H_\infty$ theory do not satisfy control performance, it is improved by $\mu$-synthesis method with $D-K$ iteration so that the $\mu$-controller based on the structured singular value satisfies the nominal performance and robust performance...