D-FA01 Control Device Smart Actuators

09:00 – 11:00 **Chair : Kim Il-Hwan (Kangwon National Univ.)**
Room : 4127 **Co-Chair : Song Jeong-Hoon (Inje Univ.)**

09:00 – 09:20 **D-FA01-1**

Robust Speed Control of PMSM with Fuzzy Gain Scheduling

Won Tae-Hyun, Kim Mun-Soo(Dongeui Institute of Technology),
Park-Han-Woong(Korea Naval Academy) and
Lee Man Hyung(Pusan National Univ.)

In this paper, a robust speed control is proposed for Permanent Magnet Synchronous Motor system. PMSM without reduction gear has been widely used in high performance application such as robots and machine tools. It is well known that the control performance of the PMSM is very sensitive to load disturbance and system parameter variation. The idea of the proposed speed controller based on combination of sliding mode control with fuzzy gain scheduling. The sliding mode controller leads to fast system dynamics of slight sensitivity to the load disturbance and system parameter variations, the fuzzy gain scheduling mechanism reduces the chattering phenomenon. The simulation results have proved that the proposed control scheme provides a robust control performance under load disturbance and system parameter variation.

09:20 – 09:40 **D-FA01-2**

Fine Gap Control System Design Using Pneumatics servo System

Kim Dong-Hwan, Kim Young-Jin(SNUT) and
Jeong Dae-Hwa (LGE Co.)

The research focuses on controlling a gap to measure the surface defect in semi-conductor fabrication device. The measurement is available accompanying a near field image gap control. In this article, a pneumatic servo system is adopted for the near field gap control. The advantage of the pneumatic servo system is on the preventing the possibility of contacting the device to the wapper surface, hence arising fatal damage. Furthermore, the air from the pneumatic system blows the some particle on the wapper during controlling. The target gap is less than 20 ㎛ and the gap should keep same amount while the device moves around the surface. The experiment by the pneumatic servo control system is done by employing a simple PID control, and the tracking performance is remarkably verified. The target gap is set from 10 ㎛ to 100 ㎛. ....

09:40 – 10:00 **D-FA01-3**

FPGA Based Micro Step Motor Driver

Cho Jung Uk and Jeon Jae Wook
(E.C.E., SungKyunKwan University)

Automative system and robot are operated by motor. Recently, automative system and robot need correct operation and control for precise task. Therefore they need precise motor control technology. In present, controller needs precise motor control technology in automative system and robot. Usual step motor driver that has 200 steps per revolution is not proper. So we need micro step motor driver that is more precise then usual step motor driver. In this paper, micro step motor driver is used for precise control of step motor. The goal is precise operation and location control. This micro step motor driver is A3972SB that is made in Alloegro Company. It has serial port that receives two 6-bits linear DAC value. Almost all systems generate DAC value with micro processer and ...

10:00 – 10:20 **D-FA01-4**

Adaptively tuned dynamic absorber

Kim Taehyun, Park Youngjin and Kim Heunggi
(KAIST)

In this paper, an adaptively tuned dynamic absorber is proposed. The adaptively tuned dynamic absorber is a dynamic absorber whose stiffness is tuned so that the natural frequency of the absorber coincides with the operating or natural frequency estimated by an adaptive algorithm. The feature of this absorber is as follows. It has an electrodynamic device for the stiffness control. Using Lorenz's force, it changes the stiffness by changing the applied current. The change of stiffness results in the natural frequency shift, because its mass and damping coefficient are fixed. We may reduce the vibration of the overall system by tuning the natural frequency of the dynamic absorber to the resonant frequency of the structure, when the dominant single tone oscillation occurs in the system...

10:20 – 11:40 **D-FA01-5**

Development of a high-perormance controller for Laser Marking system using Galvanometer

Bang Seoung Hyun, Hong Sun-Gi(Hoseo University) and Kang Tae-Sam(Konkuk Univ.)

This paper places great importance on performance improvement of Galvanometer system used for laser display, laser processing, marking system. Fundamentally, we implement control system, on that assumption that laser source exists, and design basic PID controller. Hardware is composed of DSP(TMS320C32) chip, and the position compensation of Galvanometer is performed by using 16-bit A/D and D/A converter. Through frequency response analysis and simulation, the attribute of plant and controller is captured and then, total system is analyzed. We deliberate noise problem that can be caused from analog signal as driving signal for Galvanometer.

10:40 – 11:00 **D-FA01-6**

A Study on The Vibration Attenuation of a Driver Seat Using an MR fluid Damper

Park Chanho, Ahn Byeongil and Jeon Doyoung
(Sogang University)

A seat suspension system with a controlled MR(Magneto Rheological) fluid damper is introduced to improve the ride quality and prevent the health risk of a driver compared to conventional seats. The system locates between a seat cushion and base, and is composed of a spring, MR fluid damper and controller. The MR fluid damper designed in valve mode is capable of producing a wide range of damping force according to applied currents. In experiments, a person was sitting on the controlled seat excited by a hydraulic system. The skyhook control, continuous skyhook control and relative displacement control were applied and the continuous skyhook control improved the vibration suppression by 36.6%.