## 1 July 2010, h.10:00 - Sala Riunioni DTG (Vi)


**Abstract:**

- *Part I (Prof. Hiroshi Fujimoto): Motion Control of Electric Vehicle*

Recently, electric vehicles (EVs) have attracted attention because they are a promising solution to energy and environmental problems. In addition, EVs have potential applications in control engineering. Since electric motors and inverters are utilized in drive systems, these systems are more advantages than internal combustion engine vehicles (ICVs). These advantages are as follows.

1. Quick torque response: An electric motors' torque response is 100-500 times faster than of ICVs.
2. Easy motor torque measurement: In ICVs, it is difficult to measure the output accurately. On the other hand, the output torque of an electric motor can be easily measured from the current.
3. Individual wheel control: Electric motors such as in-wheel motors are very small.

Therefore, a motor can be attached to each wheel. Then, all wheels can be controlled independently.
Because of these advantages, electric motors can be used for the control of EVs. Our research group has proposed a traction control system that prevents wheel slip on slippery roads and yaw-rate control that helps nominalize the yaw dynamics of EVs equipped with in-wheel motors. In part I, these results will be introduced.

- *Part II (Dr. Koichi Sakata): Nano-scale servo systems*

LCD production equipment (exposure system) is one of typical nano-scale servo system. This system has large-scale high-precision stages. Fast and precise positioning control is required in order to improve throughput and product quality.
Then, exposure system is classified into scanner type and stepper type. Especially, scanner type is required not only fast and precise positioning but also the attitude control of the stage and synchronous position control of the stages. In this part, these precise positioning techniques will be introduced.

- *Part III (Dr. Sehoon Oh): Human-friendly Robotics*

Assistive devices including humanoid robots are highlighted. Motion control should play a significant role in this assistive devices. This talk is about key technologies of motion control design for this assistive device application. First is force sensor less impedance control that will modify the mechanical characteristics of devices utilizing the quick response of motors. The second is the biarticular muscle robotics that is studied to exploit the musculoskeletal characteristics of human and animals. Experimental results and mathematical analysis based on simulation will be given.

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**Short Bios:**

**Hiroshi Fujimoto** received the Ph.D. degree in the Department of Electrical Engineering from the University of Tokyo in

2001. In 2001, he joined the Department of Electrical Engineering, Nagaoka University of Technology, Niigata, Japan, as a research associate. From 2002 to 2003, he was a visiting scholar in the School of Mechanical Engineering, Purdue University, U.S.A. In 2004, he joined the Department of Electrical and Computer Engineering, Yokohama National University, Yokohama, Japan, as a lecturer and he became an associate professor in 2005. He is currently an associate professor of the University of Tokyo since 2010. He received the Best Paper Award from the IEEE Transactions on Industrial Electronics in 2001. His interests are in control engineering, motion control, nano-scale servo systems, electric vehicle control, and motor drive. Dr. Fujimoto is a member of IEE of Japan, IEEE, the Society of Instrument and Control Engineers, the Robotics Society of Japan, and the Society of Automotive Engineers of Japan.

**Koichi Sakata** received the B.S. and M.S. degrees in electrical and computer engineering from Yokohama National University, Yokohama, Japan, in 2006 and 2008, respectively. He is currently working toward the Ph.D. degree at electrical and computer engineering, Yokohama National University, Yokohama, Japan. His current interests are in motion control, nanoscale servo control, and power electronics.

**Sehoon Oh** received the Ph.D. degree in the Department of Electrical Engineering from the University of Tokyo in 2005.

Now, he has been working as a project research associate in the University of Tokyo since 2008. His interests are in control engineering, motion control and its application to assistive devices, and robotics based on the musculoskeletal structure. Dr. Oh is a member of IEE of Japan, IEEE, the Society of Instrument and Control Engineers, the Robotics Society of Japan.

If you are interested in meeting with the speakers, please contact
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