융합기술원 Institute of Integrated Technology

School of Integrated Technology (SIT)

SIT SEMINAR

- □ Energy Technology(ET)
- □ Culture Technology(CT)
- ☑ Intelligent Robotics Technology(RT)
- □ Common Subject

Friday, October 13th, 2017, 4:00 PM.

Room No. 109, Dasan bldg. 1st Floor

(Host: Prof. Kim, Mun Sang/ Language: English)

Design and Control of Collaborative Robot Arms

Prof. Song Jae-Bok

Dept. of Mechanical Engineering, Univ. Korea

Conventional robot arms have maintained their shape and functions without a significant change since their first introduction in 1961. In recent years, however, several novel designs of robot arms have emerged into the market. These so-called "collaborative robots" are featured by the human-robot collaboration, safe physical human-robot interaction, easy teaching for non-experts, force control capability, modular & lightweight design and so on. Collision safety can be ensured by collision prediction and avoidance, collision detection and reaction based on sensing and motor control, and collision absorption based on purely mechanical devices. Force control capability for contact tasks such as precision assembly are also important in the future robotic applications and it is preferable that force/torque sensors should be an integral part of the robot. One promising solution is to install joint torque sensors for each joint. Such a system can detect collision all over the robot body and substitute for the expensive force/torque sensor mounted at the wrist. Intuitive teaching without complicated programming is also very important in future robots because these robot will be used by small and medium enterprises which do not have any robot engineer. Finally, the robot should be less expensive for extensive use and energy efficient for reduced operational costs. To this end, a novel counterbalance mechanism based on springs are proposed as part of the next-generation robot arm. This mechanism can effectively compensate for the gravitational torques required at each joint to support the robot arm mass for any robot configuration. Therefore, low-power actuators are sufficient to achieve high performance, thus significantly improving the safety and reducing the actuator costs. Furthermore, the use of low-power actuators for the same tasks can significantly reduce the energy to drive the actuators, thus leading to a reduction in operational costs. In addition, the back-drivability of the robot can be enhanced to enable control of the robot by hand for intuitive operation. In this talk, the several collaborative robots as well as the counterbalance robots developed in my lab will be presented.