I-SA02 Robot Systems 1

09:00-11:00 **Chair : Oya Mashiro (Kyushu Institute of Technology)**
Room : C106 **Co-Chair : Volker Graefe (Bundeswehr Univ.)**

09:00 – 09:20 **I-SA02-1**

Three Examples of Learning Robots

Volker Graefe and Rainer Bischoff
(Bundeswehr Univ.)

Future robots, especially service and personal robots, will need much more intelligence, robustness and user-friendliness. The ability to learn contributes to these characteristics and is, therefore, becoming more and more important. Three of the numerous varieties of learning are discussed together with results of real-world experiments with three autonomous robots: (1) the acquisition of map knowledge by a mobile robot, allowing it to navigate in a network of corridors, (2) the acquisition of motion control knowledge by a calibration-free manipulator, allowing it to gain task-related experience and improve its manipulation skills while it is working, and (3) the ability to learn how to perform service tasks ...

09:20 – 09:40 **I-SA02-2**

A Simple Robust Tracking Controller for Robot Manipulators Using Joint Position Measurements Contaminated by Noises

Makoto Wada, Masahiro Oya, Shinichi Sagara, Toshihiro Kobayashi
(Kyushu Institute of Technology)

In this paper we develop a new robust trajectory tracking control scheme without using joint velocity. The proposed controller doesn't employ adaptation, Therefore, the construction of the controller becomed very simple. Moreover, by using numerical simulation, we make sure the effectiveness of the proposed controller in the presence of quantization errors.

09:40 – 10:00 **I-SA02-3**

A Design of Velocity Type Digital Control Systems for Space Robots Using Transpose of GJM

Yuichiro Taira, Shinichi Sagara, and Ryozo Katoh
(Kyushu Institute of Technology)

We have proposed a digital control method, where the controlled variable is a joint angular velocity, of space robot manipulators using the transpose of Generalized Jacobian Matrix. The explicit relationship between the control law and the sampling period, however, is unknown because the controller gains include the sampling period implicitly. This paper presents a novel digital control method which explicitly describes the relation between the sampling period and the controller gains. Computer simulation of a 3-DOF planar space robot manipulator is performed. Simulation result demonstrates the effctiveness of the proposed method.

10:00 – 10:20 **I-SA02-4**

The Experiment of the Robust Multi-Variable Controller and the LQG/LTR Controller for the Stewart Platform

Heo Seong-Joon, Ko Dong-Woo, Han Myung-Chul
(Pusan National Univ.)

This work presents the robust controller and the LQG/LTR controller for the stewart platform. To simplify the dynamics we combine equation of the stewart platform and linearized one of hydraulic actuators not considered condensability of the fluid. Through the connection of two dynamic equations we can omit force feedback process of actuators and design controllers for the whole system. We applied two controllers on the stewart platform and show the adequacy controllers through the result of simulation and experiment.

10:20 – 10:40 **I-SA02-5**

Predictive Motion Control Method for Continuous Locomotion of Leg-Wheel Robot

Masatoshi Kumagai, Takayuki Takahashi, Zhi-Dong Wang, Michihiko Shoji, and Eiji Nakano (Tohoku Univ.)

This paper describes a gait algorithm and a velocity limitation method for a Leg-Wheel Robot. The gait algorithm enables the robot to preserve continuous locomotion even if the velocity command varies extensively. The velocity limitation method restricts the commanded velocity when it exceeds the mechanical limitation of the robot. Combined use of the velocity limitation method with the gait algorithm ensures the continuity of locomotion, and makes the gait pattern efficient with a long step length and low frequency of leg phase change. These methods can be applied to locomotion on unexplored rough terrain even if the range of roughness is unknown.