I-FA02 Legged Robot

09:00-11:00 **Chair : Honda Tsunehon (Tokyo Univ.)**
Room : C106 **Co-Chair : Kwon Dong-Soo (KAIST)**

09:00 – 09:20 **I-FA02-1**

Design and Control of a Dexterous Multi-fingered Robot Hand

Woo-Jin Chung, Hyung-Jin Lee, Mun-Sang Kim, Chong-Won Lee, Bong-Soo Kang (KIST)

This paper presents a three-fingered robot hand, called the KIST hand, Which have one active joint and one passive joint. The thumb is fixed on the palm, and the index and the middle take lateral motions symmetrically. A mechanical clutch and an embedded force sensor, attached on the distal link of the fingers, enable the KIST hand to perform human-like functions. A result of experiment shows reliable grasping performance of the hand which maintain stable grasp under disturbances

09:20 – 09:40 **I-FA02-2**

New Efficient Direct Kinematics for 6-dof Parallel-Serial Haptic Devices

Se-Kyong Song, and Dong-Soo Kwon
(KAIST)

This paper presents a new formulation approach to reduce computational burden of the direct kinematics of 6-dof haptic devices with three sets of a parallel-serial linkage. Their direct kinematics has been formulated through employing the Denavit-Hartenberg notation, which results in complicated formulation procedures and heavy computational burden. For reducing these problems, this paper reconfigures the haptic devices into an equivalent kinematic model of the 3-6 Stewart-Gough Platform that has three connecting joints on the moving platform. Moreover, the direct kinematics of the 3-6 Platform can be effectively formulated by using the proposed Tetrahedron Approach.

09:40 – 10:00 **I-FA02-3**

A Method of Adaptive Leg-end Trajectory Control for a Five-legged Walking Robot

Pornchai Weangsima, Fumito Nakahara, Yasuhiro Kushihashi, Tsunenori Honda (Tokyo Univ.)

A method to adaptively control leg-ends trajectories of a five-legged walking robot, Cepheus-2, has been developed in terms of a kind of a table look-up method. Cepheus-2 is a five-legged robot with a pentagonal body with two joints of each leg. The robot control system has a hierarchical autonomic-integrated architecture with a main computer (PC), a manager and servo modules. Being given the goals of walking by the main computer, the manager module assigns a type of leg -end trajectories of which data are described with the work space coordinates for the legs. Every servo module generates the joint angle data. In steady walking of the robot on flat floor without obstacle, two joints have to generate the assigned trajectory and five legs...

10:00 – 10:20 **I-FA02-4**

New Closed-Form Direct Kinematic Solution of the 3-6 Stewart-Gough Platform Using the Tetrahedron Approach

Se-Kyong Song, and Dong-Soo Kwon

(KAIST)

The paper presents a new closed-form, not a polynomial-form, solution of the direct kinematics of the 3-6 (Stewart-Gough) Platform. Many research works have presented a single high-order polynomial equation of the direct kinematics. However, the polynomial equation causes potential problems such as complicated formulation procedures and discrimination of the actual solution from all roots, which results in time-consuming task and heavy computational burden. Thus, to overcome these problems, we use a new formulation approach, based on the Tetrahedron Approach, to derive easily a closed-form nonlinear equation of the direct kinematics and use not the Newton-Raphson method, but the Secant method to obtain quickly the solution from...