D-SA03 Man-Machine Systems

09:00-11:00 **Chair : Kwon Dong Soo (KAIST)**
Room : 4129 **Co-Chair : Bang HyoChoong (KAIST)**

09:00 – 09:20 **D-SA03-1**

Haptic Experimentation for Single Degree of Freedom Force Output Joystick using Hybrid Motor/Brake Actuator

Jinung An and Dong-Soo Kwon
(KAIST)

This paper describes the design and implementation of a new type of a force reflective joystick. It has single degree of freedom that is actuated by motor and brake pair. The use of motor and brake allows various objects to be simulated without the stability problem and related safety issues involved with high torque motors only. The joystick performance is measured by its ability to simulate various test objects. Simple test objects are modeled as a benchmark test of the system's performance and to evaluate different control approaches for hybrid motor/brake actuator. The force output joystick is capable of simulating forces in a variety of virtual environments. This device demonstrates the effectiveness of a hybrid motor/brake haptic actuator.

09:20 – 09:40 **D-SA03-2**

Force Control of a Arm of Walking Training Robot

Shin Hocheol and Kim Seungho
(Korea Atomic Energy Research Institute)

This paper presents a force control of a arm of walking training robot. The current gait training apparatus in hospital are ineffective for the difficulty in keeping constant unloading level and constraining patients to walk freely. The proposed walking training robot is designed to unload body weight effectively during walking. The walking training robot consists of unloading manipulator and mobile platform. The manipulator driven with a electro-mechanical linear mechanism unloads body weight in various level. The mobile platform is wheel type, which allows to patients unconstrained walking. Unloading system with electro-mechanical linear mechanism has been developed, which has advantages such as low noise level, light weight, low manufacturing cost and low power consumption. A system model for the manipulator ...

09:40 – 10:00 **D-SA03-3**

The force feedback method for Master/Slave-Combined system

Ko Seong Young and Kwon Dong-Soo
(KAIST)

The master/slave-combined system has a simplified and miniaturized structure formed by combining the master and slave that are the teleoperation system. In a certain situation, the operator may want to feel the magnified/reduced admittance of the real environments. Or he may want to feel the specific predefined admittance of the virtual environments. This paper presents a force feedback control structure for the master/slave-combined system. Through the proposed control structure, the operator can feel the predefined admittance of the virtual environments in case of free motion, and the magnified/reduced admittance of real environments in case of contact situation. It is discussed how the elements of the admittance effect ...

10:00 – 10:20 **D-SA03-4**

Human Robot Interaction Using Face Direction Gestures

Joung Sanghyun and Moon Inhyuk
(Yonsei University)

This paper proposes a method of human- robot interaction (HRI) using face directional gesture. A single CCD color camera is used to input face region, and the robot recognizes the face directional gesture based on the facial feature's positions. One can give a command such as stop, go, left and right turn to the robot using the face directional gesture. Since the robot also has the ultra sonic sensors, it can detect obstacles and determine a safe direction at the current position. By combining the user's command with the sensed obstacle configuration, the robot selects the safe and efficient motion direction . From simulation results, we show that the robot with HRI is more reliable for the robot' s navigation.

10:20 – 10:40 **D-SA03-5**

Vision-Based Real-Time Motion Capture System

Kim Tae-Ho, Jo Kang-Hyun, Yoon Yeo-Hong, Kang Hyun-Duk, Kim Dae-Nyeon, Kim Se-Yoon(University of Ulsan), Lee In-Ho, Park Chang-Jun, Lee Nan-Hee, Kim Sung-Een(ETRI)

Information that is acquired by adhered sensors on a body has been commonly used for the three-dimensional real-time motion capture algorithm. This paper describes real-time motion capture algorithm using computer vision. In a real-time image sequence, human body silhouette is extracted use a background subtraction between background image and the reference image. Then a human standing posture whether forward or backward is estimated by extraction of skin region in the silhoutte. After then, the principal axis is calculated in the torso and the face region is estimated on the principal axis. Feature points, which are essential condition to track the human gesture, are obtained ...