I-TE02 Mobile Robot 2

15:20-17:20 **Chair : Watanabe Keigo (Saga Univ.)**
Room : C106 **Co-Chair : Lee Min Cheol (Pusan National Univ.)**

15:20 – 15:40 **I-TE02-1**

Interacting Mobile Robots for Tele-Operation System Using the Internet

Kwang Soo Park., Doo Sung Ahn
(Pukyong National Univ.)

This paper discusses the interacting mobile robots for tele-operation system using the world wide web. In multi-agent and web-based teleoperation environment the problem of communication delay must be solved for the efficient and robust control of the system. The standard graphic user interface(GUI)is implemented using Java Programing language. The web browser is used to integrate the virtual environment and the standard GUI(Java applet) in a single user interface. Users can access a dedicated WWW server and download the user interface. Reinforcement learning is applied to indirect control in order to autonomously operate without the need of human intervention. Java application has been developed to communicate and control multi robots using www. The effectiveness of our multi robots system is verified by simulation and experiments.....

15:40 – 16:00 **I-TE02-2**

Obstacle Avoidance of Underactuated Robot Manipulators Using Switching Computed Torque Method

Lanka Udawatta, Keigo Watanabe, Kiyotaka Izumi,
and Kazuo Kiguchi(Saga Univ.)

This paper presents a new concept for controlling of underactuated robot manipulators with avoiding obstacles using switching computed torque method (SCTM). One fundamental approach of this algorithm is to use the partly stable controllers (PSCs) in order to fulfill the ultimate control objective. Here, we use genetic algorithms (GA) in order to employ the optimum control action for a given time frame with the available set of elemental controllers, depending on which links/variables are controlled, i.e. the selection of optimum switching sequence of the control actions. The proposed approach models links of the robot using evolving ellipses and then introduces a penalty scheme for the objective function of GA when it detects collisions. An underactuated robot manipulator, which has three detrees-of-freedom is taken into consideration so as to illustrate the design procedure. Simulation results show the e.ectiveness of the proposed method.

16:00 – 16:20 **I-TE02-3**

An Elastic Joint Manipulator for a Human friendly robot

Takayuki TAKAHASHI, Yasushi MURAYAMA, Zhi-Dong WANG, and
Eiji NAKANO(Tohoku Univ.)

This articles describes a novel design elastic joint manipulator for a mobile robot, which works in an office environment with humans. The primary goal of this manipulator design is safeness on collision and contact. To achieve this, each joint is made of an elastic element and this is driven with a high ratio gear train. The performance was verified, however, it has a serious drawback. It produce vibration, due to the elastic joints and high ratio gear train. We found that a sliding mode controller has an excellent performance for reducing such vibration. Results of computer simulation and experiments are shown.

16:20 – 16:40 **I-TE02-4**

Using Evolutionnary algorithms to Design Mobile Manipulators

S. Sakka, O. Chocron
(Laboratoire de Robotique de Paris)

A new approach to design and control mobile manipulators is presented in this paper, associating genetic algorithm to multicriteria optimization to generate and value the robots according to the constraints and aims of the task. Then the first step of this approach is detailed, as topologies and configurations of manipulators that can assume position, trajectory, speed or force task are studied.

16:40 – 17:00 **I-TE02-5**

Object Tracking Algorithm for a Mobile Robot Using Ultrasonic Sensors

M. G. Park (Graduate School, PNU)
and M. C. Lee (PNU)

This paper proposes the algorithm which a mobile robot tracks the object captured by ultrasonic sensors of the robot and automatically generates a path according to the object. In the proposed algorithm, a robot detects movements of the object as using ultrasonic sensors and then the robot follows the moving object. This algorithm simplifies robot path planning. The eight ultrasonic sensors on the robot capture distances between the robot and objects. The robot detects the movements of the object by using the changes of the distances captured by ultrasonic sensors. The target position of the robot is determined as the position of the detected moving object. The robot follows the object according to this movement strategy. The effectiveness of the proposed algorithm is verified through experiments.