D-FP02 Mobile Robot 1

13:00-15:00 **Chair : Moon Inhyuk (Yonsei Univ.)**
Room : 4128 **Co-Chair : Kim Jeong-Do (Samchok National Univ.)**

13:00 – 13:20 **D-FP02-1**

Safe and Reliable Intelligent Wheelchair Robot with Human Robot Interaction

Moon In-Hyuk, Joung Sang-Hyun and Kum Young-Kwang
(Yonsei University)

This paper proposes a prototype of a safe and reliable wheelchair robot with Human Robot Interaction (HRI). Since the wheelchair users are usually the handicapped, the wheelchair robot must guarantee the safety and reliability for the motion while considering user's intention, A single color CCD camera is mounted for input user's command based on human-friendly gestures, and a ultra sonic sensor array is used for sensing external motion environment. We use face and hand directional gestures as the user's command. By combining the user's command with the sensed environment configuration, the planner of the wheelchair robot selects an optimal motion. We implement a prototype wheelchair robot, MR, HURI (Mobile Robot with Human Robot Interaction)...

13:20 – 13:40 **D-FP02-2**

Manipulability Ellipsoids of Wheeled Mobile Manipulators

Kim Sungbok and Lee Jaeyoun
(Hankuk University of Foreign Studies)

This paper presents the analysis on the manipulability of a wheeled mobile manipulator which consists of a wheeled mobile platform and a manipulator atop. It is assumed that the mobile platform is a deficient system and the manipulator is a nonredundant system, but the mobile manipulators as a whole is a redundant system. First, Yoshikawa's definition of the manipulability ellipsoid for a redundant/nonredundant system is extended to a deficient system. Second, the effects of the nonholonomic constraint of the mobile platform and the location the mobile platform and the manipulator is analyzed.

13:40 – 14:00 **D-FP02-3**

Path Planning for Cleaning Robots: A Graph Model Approach

Yun Sanghoon, Park Sehun, Choi Byungjun and Lee Yun-Jung
(Kyungpook National Univ.)

We propose a new method of path planning for cleaning robots. Path planning problem for cleaning robots is different from conventional path planning problems in which finding a collision-free trajectory from a start point to a goal point is focused. In the case of cleaning robots, however, a planned path should cover all area to be cleaned. To resolve this problem in a systematic way, we propose a method based on a graph model as follows: at first, partition a given map into proper regions, then transform a divided region to a vertex and a connectivity between regions to an edge of a graph. Finally, a region is divided into sub-regions so that the graph has a unary tree which is the simplest Hamilton path. The effectiveness of the proposed method is shown by computer simulation results.

14:00 – 14:20 **D-FP02-4**

Real time trajectory control for two wheeled mobile robot under dynamic environments

Lee Jin-Woo
(Samsung Heavy Industries)

In this paper, a method of generating trajectories in real time for a mobile robot in a dynamic environment is proposed. Specifically, this method is focused on soccer-playing robots that need to calculate trajectories in real time, which are constantly subject to rapidly change as targets and obstacles move. The robots also should move at the fastest available speed, while tracking the generated trajectories. The method proposed in this paper solves the geometric problem of finding a smooth curve that joins two endpoints. To have this solved, we assign five constraints to each endpoint, which are the usual x, y, theta, and curvature as well as the influence of the initial robot velocity on the path. With these five constraints, the path generated can always be physically followed by robot. Through this method, the travel time of the robot over the entire path can be optimized. Therefore it can ...

14:20 – 14:40 **D-FP02-5**

Obstacle Avoidance and Trap Recovery of Mobile Robot.

Hwang Kyung-hun, Lim Kyung-su and Kuc Tae-yong
(SungKyunKwan University)

This paper introduces an Adapative Goal Pertubation Method(AGPM) for mobile robots which can move safely without being locked in a trap situation. AGPM is a modified method of VFH(Vector Field Histrogram) that Borenstein has proposed. AGPM consists of Avoid-Trap-Mode, Escape-Trap-Mode and Check-Trap-Mode. Some results of the mobile robot that have 8 ultrasonic sensors are shown through simulations.