

# I-TP04

## Man-Machine Systems 2

13:00-15:00  
Room : C203

Chair : Kiyotaka Izumi(Saga Univ.)  
Co-Chair : Lim Young Cheol (Chungnam National Univ.)

13:00 – 13:20

I-TP04-1

### Analysis of Ambiguous Adverbial Expression Used for Instruction of Positioning Control

Shigeyoshi HIRATSUKA, Hikaru INOOKA(Tohoku Univ.) Shinya KAJIKAWA(Akita Prefectural Univ.)

Up to now, many studies on human-machine interface with voice systems have been reported. However, in these systems, precise instructions are necessary for a robot to execute given tasks successfully. In order to make a robot friendly, more ambiguous instructions with some kinds of degree adverbs (, e.g., "move it a little", "lift it more" and so on, ) will be preferable. Therefore, we analyze the relationship between ambiguous instructions and the characteristics of instructed human motion in positioning task to design human friendly interface systems. Several experimental results show that adverbial expressions are mainly divided into three clusters corresponding to the displacement, and that instructors and operators have several differences in distance sense each other.

13:40 – 14:00

I-TP04-3

### Modular Fuzzy Neural Controller Driven by Voice Commands

Koliya Pulasinghe(Graduate School of Science and Engineering,) Keigo Watanabe, Kazuo Kiguchi, Kiyotaka Izumi (Graduate School of Science and Engineering, Saga Univ.)

This paper proposes a layered protocol to interpret voice commands of the user's own language to a machine, to control it in real time. The layers consist of speech signal capturing layer, lexical analysis layer, interpretation layer and finally activation layer, where each layer tries to mimic the human counterparts in command following. The contents of a continuous voice command are captured by using Hidden Markov Model based speech recognizer. Then the concepts of Artificial Neural Network are devised to classify the contents of the recognized voice command...

14:20 – 14:40

I-TP04-5

### Passivity Problem of Micro-Teleoperation Handling a Insignificant Inertial Object.

Kyongho Park, W. K. Chung, Y. Youm (POSTECH)

There has been many teleoperation systems handling the micro object. However, the stability problem for these systems has not been mentioned yet. Historically, Lawrence[1] proposed the Transparency-Optimized Architecture and passivity theorem for stability analysis of bilateral teleoperation. He claimed that unless the task(or environment) impedance contains significance inertial behavior, Passivity condition for Transparency-optimized architecture is not satisfied. In this paper we propose one method which satisfies passivity condition for the micro-teleoperation system handling a insignificant inertial object and is based on the structure of Lawrence and Hashtrudi-Zaad[2] and velocity-force scaling.

13:20 – 13:40

I-TP04-2

### EMG-based Hybrid Assistive Leg for Walking Aid using Feedforward Controller

Hiroaki KAWAMOTO, Yoshiyuki SANKAI (Tsukuba Univ.)

We have developed the power assistive leg called HAL (Hybrid Assistive Leg) which provide the walking aid for walking disorder persons or aged persons without nursing person. We developed HAL-3 by considering some problems of HAL-1,2 which had developed previously. The mechanism of HAL-3 actuator could be simplified and sophisticated by using the harmonic drive. As the control signal of HAL-3 EMG signal was used. We proposed a calibration method to identify parameters which relates the EMG to joint torque by using HAL-3. We could obtain suitable torque estimated by EMG and realize power assist in walking according to the intention of the operator. To the remove discomfort for quick motion power assist, the feedforward controller was installed at the beginning of motion...

14:00 – 14:20

I-TP04-4

### Evaluation of Human Localization using Color Model in Intelligent Space

Takashi Akiyama, Joo-Ho Lee, Zhimin Lin, Hideki Hashimoto (Tokyo Univ.)

The Intelligent Space is a space where we can easily interact with computers and robots, and get useful service from them. In such a space, location information is very important, since the agents cannot provide proper service to a proper person at a proper location without location information. Our positioning system uses CCD cameras. It is important to decide where to arrange the cameras for the best localization depending on the tasks in the space. How to arrange cameras for the best localization is discussed in this paper.

14:40 – 15:00

I-TP04-6

### Steering Controller of the Outdoor Autonomous Mobile Robot using MR Sensors

Seok-Jun Son, Tae-Gon Kim, Jeong-Heui Kim, Jin-Kyu Park, YoungCheol Lim(Chonnam Nat'l Univ.) Eui-Sun Kim(Seonam Univ.)

This paper describes the steering control and geomagnetism cancellation for an autonomous mobile robot using MR sensors. The magneto-resistive (MR) sensor obtains the vector summation of the magnetic fields from embedded magnets and the Earth. The robot is controlled by the magnetic fields from embedded magnets. So, geomagnetism is the disturbance in the steering control system. In this paper, we propose a new method of the sensor arrangement in order to remove the geomagnetism and robotbody interference. The proposed method uses two MR sensors located in a level plane and the steering controller has been developed. The controller has three input variables (dBx, dBy, dBz) using the measured magnetic field difference, and an output variable (the steering angle) ...