**Development of a Power Assist Arm for Handling Heavy Loads Using Large Pneumatic Muscles**

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We have developed a new power assist arm for handling heavy loads using large pneumatic muscles. Large actuators were required for heavy loads. As a result, it was expected that control becomes difficult due to the increased air flow requirement. We developed an original pneumatic muscle model and the torque control based on it. Furthermore, we developed an impedance control system and successfully implemented it as part of a working power assist arm for handling heavy loads.

**Development of human coordination system using EEG**

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This paper aims at development of the brain computer interface. We used Emotiv of Epoc for the electroencephalograph and investigated about the change of the power spectrum value to rise-and-fall movement operation of an arm. As a result, we guessed that it was related with a primary motor cortex.

**Development of Collision force suppression mechanism**

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This paper presents a collision force suppression mechanism that can be installed in the joints of the manipulator of a human-friendly robot. The collision suppression mechanism can reduce collision forces without using any sensors. If the manipulator with the suppression mechanism collides with an object, it disconnects from its joints, and it moves in the direction of the collision force depending on the spring reaction force.

**A Study on Robot System Cooperating for Gesture Instructions**

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The robot system which follows the human hand is suggested. In the system, the movement of the human hand is obtained using the Kinect sensor, and the position of the human hand is sent to the robot. The robot generates the reference trajectory based on the position which has been sent from the Kinect sensor. The position of the human hand is converted into the smooth motion using KANSEI transfer function as the reference position, and the robot follows the smooth reference position.

**One-wheel Drive Type Personal Mobility Characterized by Parking Space-saving**

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Recently, the personal mobility have been developed to reduce an environmental impact as a measure against global warming. The purpose of this research is to develop a standing personal mobility for increasing space efficiency of bicycle parking lot by miniaturizing a body using a driving wheel. Oteller treads at three point using two assistant wheels to suppress the instability of the body without the sensors for self-standing control. Turning is performed with moving weight balance.

**Development of Collision Force Suppression Mechanism**

島本和彦, 相馬正典, 増田宣之, 林泰男 (神奈川大)
Kazuya Shimamoto, Fuminori Souma, Hiroyuki Masuta, Hun-Ok Lim(Kanagawa Univ.)

This paper presents a collision force suppression mechanism that is installed in the joints of the manipulator of a human-friendly robot. If the manipulator collides with an object, the suppression mechanism disconnects the manipulator from its joint, and it moves in the direction of the collision force. Through collision experiments, the effectiveness of the mechanism is verified.