37TH ASIA-PACIFIC

Nursing and Medicare Summit

OCTOBER 20-21, 2017 OSAKA, JAPAN

Evaluation of nursing care robot through relative phase

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Numerous studies have developed self-reliance support robots, such as those assisting the Sit-To-Stand (STS) movement, which requires coordination between the upper body and the lower limbs. However, few studies have quantitatively evaluated the service quality of such robots. This study proposes a method to evaluate the service quality of STS-assistance robots through the Relative Phase (RP), which contains information on the coordinating relationship between the upper body and the lower limbs. STS experiments were performed under three conditions, namely unassisted STS movement and robot-supported STS movements lasting 2 and 5 seconds. The results showed that the quality of robot assistance during STS movement could be quantitatively evaluated through RP. Furthermore, three features-minimum RP, mean absolute RP (MARP) and deviation phase that contained information on the user's response to the robot could be extracted for data mining. Moreover, electromyography performed to verify the experimental results confirmed the relationship between coordinated performance and muscle activities during STS movements. Thus, evaluating STS movements through the RP is an effective method of evaluating the service quality of robots and features extracted from RP theory could distinguish classes of movements with a high probability.

Biography

Hieyong Jeong has received his PhD degree in Mechanical Engineering from Osaka University, Japan. He was the Senior Research Engineer at Samsung Heavy Industrial Co., Ltd., Republic of Korea. Later, he became an Assistant Professor at Osaka University, Japan. Presently, he is an Associate Professor at Department of Robotics and Design for Innovative Health, Graduate School of Medicine, Osaka University, Japan. His research interests include human posture, machine learning and physiology.

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Adv Practice Nurs 2017
ISSN: 2573-0347 APN, an open access journal

Asia Nursing 2017
October 20-21, 2017

Volume 2, Issue 4 (Suppl)

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