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Author: Dr. Caizhi Fan

National University of Defense Technology, China

Prof. Dongxu Li

National University of Defense Technology, China

Prof. Jian Zhang

National University of Defense Technology, China

EXPERIMENT RESEARCH ON HUMAN-IN-LOOP SPACE TELEOPERATION WITH
MULTIFUNCTIONAL STRUCTURE

Abstract

Complicated space missions are becoming more and more difficult to be fulfilled because of insufficient intelligence of space robots and limited extravehicular operating ability of astronauts. In this paper, a concept of space operation system based on human-in-the-loop is presented. This system combines intelligence of human and robots and guides space robots to accomplish tasks with operator's performing behavior. And the system consists of two key techniques: behavior sensing and behavior reproducing. To guarantee the operation convenience and the behavior sensing veracity the hand motion features, which are used to drive the space robot, are extracted from the surface electromyographic (sEMG) signal. To reducing the vibration in operating procedure and reducing the mass of the space robot the multifunctional structure which integrate structure, power and vibration reduction function etc. is applied in the space robot design. And a learning search method based on the hybrid feature library is adopted to map the robot behavior. The experimental results on the ground demonstrate this method helpful for space robots to improve operating efficiency and to promote the ability of completing the complicated space missions.