

Accepted Manuscript

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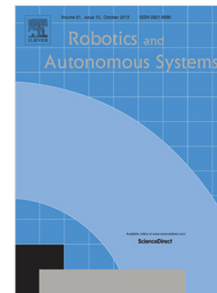
PII: S0921-8890(16)30606-6
DOI: <http://dx.doi.org/10.1016/j.robot.2017.05.017>
Reference: ROBOT 2858

To appear in: *Robotics and Autonomous Systems*

Received date: 30 September 2016
Revised date: 8 May 2017
Accepted date: 30 May 2017

Please cite this article as: Z. Zhao, P. Huang, Z. Lu, Z. Liu, Augmented reality for enhancing tele-robotic system with force feedback, *Robotics and Autonomous Systems* (2017), <http://dx.doi.org/10.1016/j.robot.2017.05.017>

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Augmented Reality for Enhancing Tele-robotic System with Force Feedback

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Abstract: In the teleoperation, the force feedback is indispensable, which can enhance the sense of presence of the operator and help the operator accomplish tasks comfortably. The time delay is one of the main challenges that influence the stability of the teleoperation systems, which leads to the discontinuous operation. Thus building a local virtual model in the master side is an effective way to solve this problem. In this paper, a new method is presented to reconstruct the virtual model of the remote object. The virtual model can estimate the real-time force feedback to the operator and eliminate the effects of the time delay. Then the tele-robotic system based on augmented reality technology is set up in our laboratory. In the tele-robotic system, the dynamic parameters including damping and stiffness of the virtual model are constantly updated by utilizing the positions and forces information from sensors of the remote robot site. Finally, the effectiveness of the proposed method and the correctness of the visual model parameters are verified by two experiments.

Keywords: Augmented reality; Teleoperation; Robot; Force feedback; Haptic

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