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THE 3D HAPTIC DEVICE SYSTEM WORKSPACE EXPLORATION WITHOUT INVERSE KINEMATIC

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Teams

Abstract

The haptic device can provide a force feedback, which produces a real touch feeling for the surgeons to perform remote operation in virtual environment. There are two conditions required for placing the device. The haptic device needs to be fixed on the operating table and the surgery tools are connected to the haptic device. When surgeons manipulate the haptic device to perform the suturing, the motion of hands will be restricted due to these conditions. This work explores the workspace of the 3D haptic device system and find out the best location on the operating table for placing the device. The hands' motion could be tracked by the Electromagnetic Field Tracking System. The theoretical workspace could be visualized based on the range of each joint. A dynamic model of haptic device was built, and the operational space control was used to simulate the motion of the haptic device while both hands are manipulating the devices separately. The Gilbert-Johnson-Keerthi algorithm was used to check collision between left-hand and right-hand devices. Simulation result shows the motion of the haptic device can reach most of data points with very few collisions. Therefore, the optimized location of haptic device can be used for the future work.