

Pose Tracking of Supermicrosurgical Robot Towards Multi-User Teleoperation

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This paper presents pose tracking experiments using a supermicrosurgical robot designed to consider teleoperation with multiple surgeons. Currently, existing supermicrosurgical robots assist only the primary surgeon. However, both primary and assistant surgeons need a high-precision motion for critical tasks that can easily damage microtissue. To assist multiple surgeons in supermicrosurgery with a surgical robot, dynamic collision avoidance becomes a critical issue due to the operation in a narrow surgical site. As a milestone to overcome this issue, we first developed a pose tracking algorithm by analyzing the inverse kinematics based on null-space control and a weighting matrix. Moreover, we also developed a control framework based on fully open-source software to run the pose tracking algorithm. Finally, we validated the proposed pose tracking algorithm by performing line tracing and rubber ring transferring experiments.