This system incorporates two visual subsystems. The endomicroscope system generates a high-resolution, large-area 2D mosaic by integrating multiple microscopic images. The stereo laparoscope system captures 3D spatial information through stereoscopic imaging. These two visual systems enable high-resolution 3D imaging and precise pose estimation. Initially, the system feasibility is verified using a marker-based method for pose estimation, followed by the implementation of a marker-less approach to generate accurate 3D coordinates. Trajectory planning is performed by combining the 3D coordinate information with the stereoscopic data from the Stereo Laparoscope System, ultimately achieving visual control to adjust the probe’s pose dynamically. The dVRK-ROS bridge establishes a connection between the dVRK system and the ROS (Robot Operating System). The CISST/SAW controller then operates the dVRK controller, enabling continuous control of the da Vinci robot.[ 7989412]

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