Arbitrary viewpoint robotic manipulation

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Publication(s)

External Link(s)

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Value Proposition

Real-time 3D imaging via tools such as OCT, 3D Ultrasound, and fast MRI/CT allow a surgeon to view the subject of interest from multiple perspectives, including those that are otherwise physically impossible. The effectiveness of such visualizations has been demonstrated through ophthalmic surgery with OCT guidance. The ability to view the surgical field from arbitrary perspectives, however, brings the risk of disorienting the surgeon and complicating the surgical process.

Technology

Inventors at Duke University propose a view compensation system that can allow an operator to manipulate a tool from an arbitrary perspective. This is accomplished by interposing a robot between the operator and the tool. The robot can apply the necessary transformations to translate the surgeon's actions from their perspective to the surgical field, thus ensuring that the intended actions of the surgeon are accurately reflected on the subject of interest. The system allows the surgeon to operate a virtual tool in their arbitrary 3D viewpoint while maintaining necessary constraints on the surgical tool. It can thus prevent the surgeon from being disoriented when operating from a different viewpoint in 3D space, and ensure the safety of the patient.

Other applications

The technology is applicable in all scenarios where a robot is controlled remotely and multiple viewpoints of the subject are possible. These may include bomb disposal robots, marine excavation robots or Mars exploration robots.

Advantages

• Allow the surgeon multiple perspectives/views of the subject
• Seamlessly translate surgeon's intended motions from the surgeon's viewpoint to the tools work field
• Prevent surgeon from being disoriented when performing surgery from multiple 3D viewpoints
• Ensure safety of patient