MR Surgery: Mixed reality prostate surgery from patient derived MRI scans

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Prostate cancer affects millions of Americans, and often requires a radical prostatectomy to remove both the prostate and the tumor to treat the cancer. Following the surgery, an anastomosis must be performed to replace the bladder and the urethra. Surgeons often have difficulty identifying where the prostate and surrounding anatomy are, and must take extreme caution not to damage other organs, including the neurovascular bundle. Our goal is to leverage recent developments in mixed reality to create surgical guidance and training data for surgeons to more effectively complete surgery. Our models use virtual reality to simulate the mechanical stresses that cause deformation of the prostate and other organs during surgery. This data can be used to generate data for augmented reality simulations that allow automated tracking and labeling of the prostate, as well as an interactive display of a patient-derived 3D model of the prostate. Our simulations can reduce the cost of this vital surgery and increase the quality of patient care by providing surgical guidance during prostatectomy.