“SNRcalculation.png”  
MR T2 image of a water phantom

“mricompatibilitytro.png”

SNR test of laser manipulator in T1-GRE and T2-FSE. (a) MR images (T1-GRE) of an MRI phantom placed aside the robot under four operating conditions. (b) Normalized deviation in artifact percentage calculated by SNR.

“mricompatibilityscirob.png”

SNR test of transoral robotic system in T1-GRE and T2-FSE. (a) MR images of a water phantom placed beside the robot, showing the normalized SNR loss during different states of robot operation. The robot is not present in the control case. (b) Normalized deviation in artifact percentage calculated by SNR.

“mriexvivotrosetup.png”

(a) Experimental setup of the soft laser manipulator in a 1.5T MRI scanner. (b) Image captured by an MR-conditional camera.

“mrthermometrycali.png”

(a) Map of temperature change measured from MR thermometry. (b) Calibration of MR thermometry with a fiber-optic temperature sensor.

“mriexvivoscirob.png”

MRI-based ex-vivo laser ablation test. (a) Robot setup in the MRI scanner, with an 8-channel transmit/receive head coil for image acquisition. (b) Observable ablation depth found in MR T2 images of swine tissue before and after ablation, with the laser spot controlled to follow a near-circular path. (c) MR thermometry applied to monitor thermal diffusion and accumulated temperature increments in tissue due to laser ablation.

“cadaversetup.png”

MRI-based cadaver trial setup. (a) Experimental setup in the 3T MRI scanner (Philips Achieva). (b) Image acquired by an MRI-compatible camera, with robot moved to the isocenter. (c) Cadaveric head fixed in an acrylic tube mount. A fiberscope and lighting guide were inserted through the additional channel of the dental guard.

“cadaverregistration.png”

MRI-based cadaver trial setup and registration. (a) Dental guard registered based on scanned MR tracking markers. (b) Corresponding z-axis 1-D projection scan for localizing the three MR tracking markers.

“cadavervisualservo.png”

MRI-based cadaver trial ablation result. (a) Laser spot controlled to follow a trajectory defined in the fiberscope view. (b) Tracking errors of laser spot path following over two initial cycles.

“cadaverthermometry.png”

MRI-based cadaver trial ablation result and MR thermometry. (a) Imaging slice prescribed for intra-op MR thermometry superimposed on the cadaver pre-operative 3D model. (b) Temperature increments map overlaid on the anatomical MR image after 1 and 3 minutes of ablation. (c) Post-ablation image of the tissue.