**Robot Simulation and Control Framework Using 3D Slicer and a Collaborative Robot**

Joint use of image-guided surgery systems and medical robots is becoming increasingly common. Applications range from robot-assisted knee replacement (e.g. Stryker Mako) to microscope-guided brain surgery (Synaptive ModusV). For future advancements in research and education, the thesis project will combine a collaborative robot (Franka) with image-guidance software (3D Slicer) and Artificial Intelligence methods. Open-source codebases 3D Slicer and robot operating system (ROS, ROS2) will serve as foundation for the software development. ROS includes features for robot kinematics, simulation, and motion planning. 3D Slicer has been proven to work with ROS through the Image-guided Therapy Link (ROS-IGTL-Bridge). After the initial development of combining 3D Slicer with the Franka robot, an AI related research component will be implemented. Possible ideas include camera-based detection of anatomical or artificial landmarks for elastic registration, a reinforcement learning based method to control the movements of the robot, and decision making for robot-based surgical procedure.