Prototyping image-guided therapy applications using the SlicerIGT platform

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Purpose: Interventional navigation systems require high quality and reusable software for rapid incremental development. Development of such software demands significant expertise from research teams. Our goal was to provide an open-source, configurable software toolkit.

Methods: The SlicerIGT software platform is based on the PLUS library [1] and the 3D Slicer application framework (www.slicer.org). SlicerIGT provides all components of a typical image-guided navigation system (Figure 1). The following main functions are implemented in the SlicerIGT toolkit: (1) Calibration of tracked tools using arbitrary tracked reference coordinate system. (2) Registration and fusion of images, including tracked ultrasound. (3) Various visualization options for all components of the navigation system in 2D and 3D (Figure 2). (4) Recording of tracked tool trajectories.

Results: SlicerIGT enabled rapid prototyping of multiple translational applications for navigated interventions, including regional anaesthesia [2], musculoskeletal injections, orthopaedic surgery, and urology. SlicerIGT is accessible to users from the 3D Slicer extension manager. Most applications do not require programming. If the functionality of the SlicerIGT extension needs to be changed, the source code is available with BSD-style license that allows modifications without restrictions on use from www.slicerigt.org.

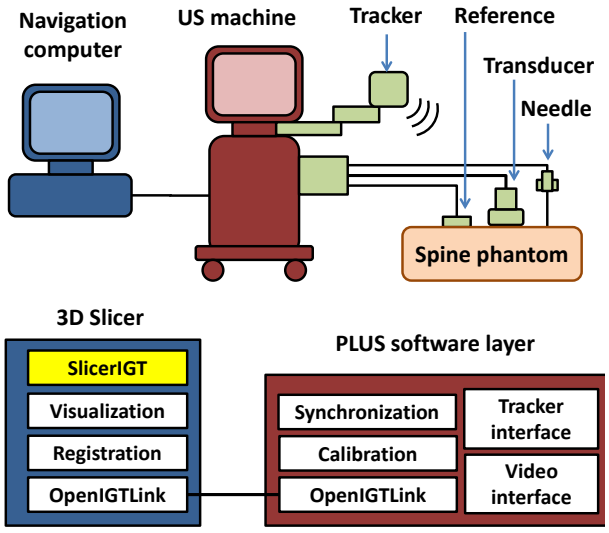

Fig. 1: Hardware and software components of a typical SlicerIGT system configuration

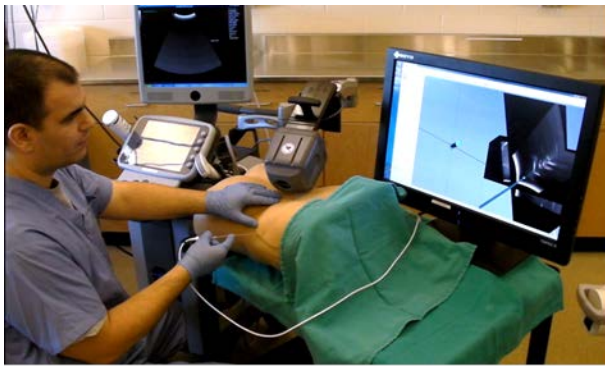

Fig. 2: Ultrasound-guided nephrostomy navigation system built from SlicerIGT platform components.

Conclusions: SlicerIGT enables rapid prototyping of translational applications for image-guided navigated interventions and can be easily adapted to new clinical scenarios and workflows.

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