Towards augmented reality in breast cancer surgery: development of a pipe-line compiling object tracking, multimodality registration, 3D rendering and augmented reality.

Themes: computer science, computer graphics, medical imaging, augmented reality
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Location: Toulouse, France
Research groups: MINDS and STORM
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The internship will take place in the IRIT laboratory located on the campus of the University Paul Sabatier Toulouse 3. The recruited intern will be a full member of the research group, working with other team members, PhD students and permanent researchers. He/she will participate to working groups, scientific seminars and other activities of the groups.
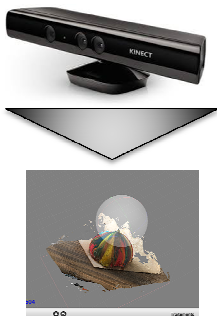
Context
Due to effective screening, breast cancer is frequently diagnosed at early stage with non palpable lesions. Hence a precise localization of the tumor is required to accurately remove the cancer at the time of surgery. Current standard involves a preoperative localization process based on invasive procedures prior tumor removal. Such approach is associated with several drawbacks, including patients' discomfort, invasiveness and the requirement for dedicated facilities. In contrast, peroperative localization based on an augmented reality procedure may overcome most limitations depicted above.
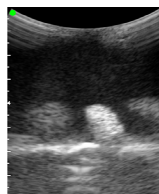
Objectives
This project aims at proposing an innovative assistance procedure for non palpable breast cancer surgery based on augmented reality. The main goal of the internship is to develop and implement a complete framework (see figure hereafter) allowing the real-time visualization of the tumor. It will concern:
- an object-tracking algorithm;
- a registration/fusion process between medical images of cancer and 3D optical scans;
- the implementation of these fused images on a augmented reality interface.
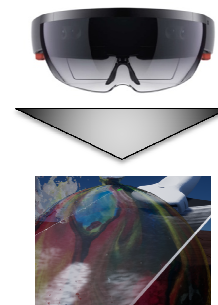

3D optical scanning   Acquisition ultrasonore   Tracking 3D sonde   Réalité augmentée

Student profile
Master student in Computer Science or Electrical Engineering
Strong programming skills
Fluent English or French Spoken

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