Master's internship – 2026

Interactive virtual reality interface for thermal ablation planning

Supervision:

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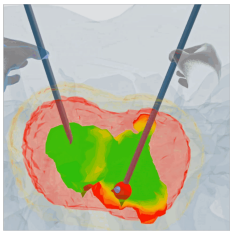
Context:

Thermal ablation is a minimally invasive technique used to destroy tumors from the inside using a needle with a heating tip. For the treatment to be effective and safe, clinicians need to plan precisely where to insert the needle and how much tissue will be destroyed. To support this planning step, our team has developed a fast simulation method based on AI that can instantly predict the ablation zone, based on the patient's anatomy and the ablation parameters. The next challenge is to design interactive visualization methods that make these simulations easier to explore, particularly in complex anatomical regions.



Work description:

This internship will address the research challenges of integrating 2D and 3D visual information for trajectory planning in percutaneous thermal ablation. The goal is to understand how different representations of patient anatomy, volumetric image slices and 3D surface models, can be combined in a coherent and cognitively efficient way. A key question is how to ensure that each view enhances, rather than competes with, the other: the 2D image data should support depth perception and precision in 3D space without overloading the user's visual or cognitive capacity.

The student will investigate novel multimodal visualization and interaction strategies to achieve this balance, exploring how spatial organization, visual abstraction, and interaction design affect understanding, usability, and decision-making. This research aims to derive design principles for immersive medical visualization, contributing to broader questions in human–computer interaction, perception, and cognitive ergonomics in image-guided therapy. This internship may be pursued in a subsequent PhD thesis.

References:

1. J. Mehtali, J. Verde , C. Essert. *C-NCA : Chained Neural Cellular Automata for Fast and Accurate Thermal Ablation Estimation*, In proceedings of MICCAI 2025, Daejeon, Republic of Korea, page 67–77, Springer, LNCS, Volume 15963, septembre 2025, *doi:10.1007/978-3-032-04965-0_7*. https://papers.miccai.org/miccai-2025/0156-Paper4370.html

Team and environment:

The internship will be part of a collaboration between multiple disciplines and co-supervised by experienced researchers and clinicians in Strasbourg and Montreal.

The intern will be hosted in an office at the ICube Institute, Illkirch Campus of Strasbourg, France, and have access to all the necessary hardware and IT resources. The intern will also have access to the clinical experimental facility for translational research and the network of the IHU to collect expert feedback and validation. Depending on funding opportunities, the intern may spend part of the internship in Montreal, Canada.

The development will be done in C++ and python.

Internship duration: 5-6 months, starting January, February or March 2026.

Profile: MSc with a major in computer science, computer graphics, or related fields. Proficiency in C++ is required, python recommended. Proficiency in English (oral and written) is required.

For further information and application, please contact the supervisors.