University
of Strasbourg

Master's internship – 2026

Medial Axis Discretization in Airway Trees from Chest CT

Supervision:

Caroline Essert (essert@unistra.fr), Pierre Kraemer (kraemer@unistra), Qijia Huang (qijia.huang@unistra.fr), and Juan Verde (juan.verde@ihu-strasbourg.eu)

Context:

Accurate extraction of airway centerlines from chest CT scans is essential for applications such as virtual bronchoscopy, navigation planning, and quantitative lung analysis. This internship focuses on developing and evaluating methods for medial axis discretization in order to obtain robust and anatomically consistent representations of the bronchial tree. The work lies at the intersection of medical image processing, computational geometry, and algorithmic modeling.

Work description:

A recent method to discretize the medial axis of objects defined by their surface (3D meshes) has been recently proposed [1]. The objective of this internship is to explore how this approach could be extended to extract a discrete medial axis directly from grayscale CT images using this approach.

After a bibliographic study, the candidate will propose an extension of the method to grayscale CT volumes and compare the results and performance against state-of-the-art methods (segmentation + skeletonization, graph / fast marching, U-Nets). For this experimental validation, a public dataset will be used. The candidate will define comparison metrics. This internship may be pursued in a subsequent PhD thesis.
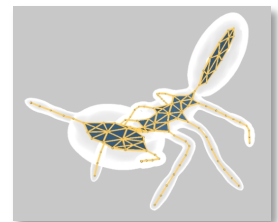
References:

[1] Qijia Huang, Pierre Kraemer, Sylvain Thery, and Dominique Bechmann. 2024. *Dynamic Skeletonization via Variational Medial Axis Sampling*. In SIGGRAPH Asia 2024 Conference Papers (SA '24). Association for Computing Machinery, New York, NY, USA, Article 66, 1–11. https://doi.org/10.1145/3680528.3687678
GitHub: https://huang46u.github.io/VMAS/

Team and environment:

The internship will be part of a collaboration between multiple disciplines (image processing, geometric modeling, computational geometry, medicine) and co-supervised by experienced researchers and clinicians.

The intern will be hosted in an office at the ICube Institute, Illkirch Campus of Strasbourg, and have access to all the necessary hardware and IT resources. The intern will occasionally go to the IHU Strasbourg.

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, image processing, or related fields. Proficiency in C++ is required, python recommended.

For further information and application, please contact the supervisors.