

# **Master's Thesis (6 months) + Research Engineer Position (18 months)**

## **Medical Imaging, AI Deep Learning, and Clinical Translation**

### **Project: PROSIT AI (ANR-funded)**

**Field:** Medical Imaging, AI, Computational Anatomy

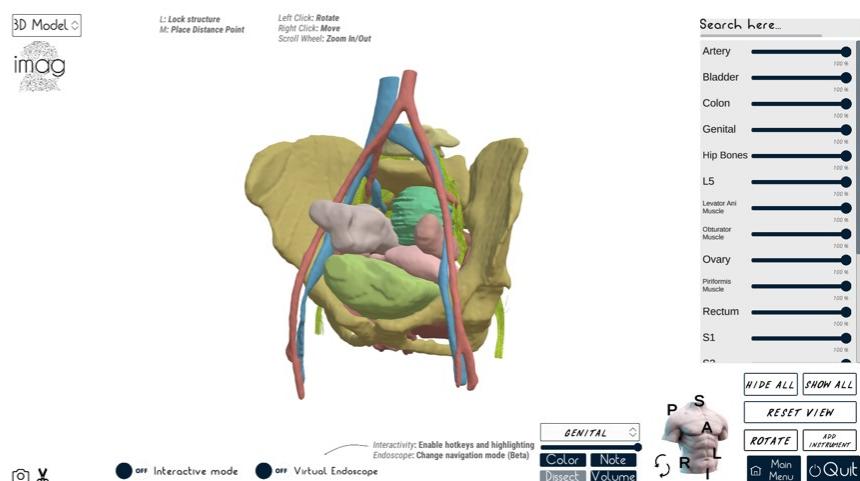
**Start date:** Flexible (2026) - Ideally March-April 2026

**Location:** Paris, France (academic–clinical environment)

[IMAG2, Institut Imagine, APHP - LTCI, Télécom Paris, IP Paris]

### **Project context**

We are seeking a highly motivated Master's student for a **6-month internship (equivalent to a Master's thesis)**, with the possibility to continue as a **Research Engineer on an 18-month contract**, within the ANR-funded **PROSIT AI** project (Axis H.14: Interfaces between mathematics, digital sciences, and health). The project develops **advanced segmentation, 3D modeling, and nerve tract reconstruction from pelvic MRI (DWI and T2-weighted)**, with emphasis on **clinical usability, reproducibility, and integration into routine practice**, focusing on **paediatric oncology and gynaecological pathologies**.



The work is conducted in collaboration with **radiologists, surgeons, clinical research teams of Paris Hospitals Group and Institut Imagine**, and the start-up **Replico** (IMAG2 spin-off). The team leaders are:

- **Pietro Gori**, Professor at LTCI, Télécom Paris, IP Paris – Expert in medical imaging, computational anatomy, deep learning, tractography, and software development.
- **Isabelle Bloch**, Professor at LIP6, Sorbonne Université, CNRS – Expert in medical imaging, symbolic and hybrid AI, knowledge representation, spatial reasoning.

This position offers hands-on experience in **AI, deep learning, 3D visualization, nerve tract analysis, and translational research**, in a high-impact, multi-disciplinary clinical and computational environment.



## Scientific and clinical data

The recruited candidate will work with a **large, multi-centre and multi-vendor MRI dataset**, including:

- Two prospective clinical studies:
  - **3D-PERSURGE** (paediatric pelvic and retroperitoneal tumours)
  - **TENDANSE** (endometriosis in adult women)
- More than **200 patients** with paired DWI and T2-weighted pelvic MRI from previous studies
- Additional internal and public datasets for training deep learning models

All data are **pseudonymized** and acquired in a regulated clinical research framework.

## Main missions

### Task 1 – Data acquisition, curation, and annotation

- Organisation and preprocessing of pelvic MRI datasets (DWI and T2-w) and CT datasets
- Quality control and harmonisation of multi-centre data
- Manual and semi-manual segmentation of dense anatomical structures via Slicer3D
- Dataset categorisation (age, sex, pathology, scanner)

### Task 2 – Segmentation of anatomical structures

- Training and improvements of in-house 3D multi-labels segmentation deep learning models
- Testing of small and domain-specific models as well as large foundation models
- Training and improvements of interactive 3D MedSAM deep learning models
- Evaluation of robustness, generalisation, and inference speed in a clinical context

### Task 3 - Multi-resolution visualization of nerve tracts

- Improve the rendering of anatomically realistic tube representations of nerve fibers.
- Enable dynamic switching between coarse and fine fiber nerve resolutions in real-time.
- Project fiber tube representations directly onto MRI/DTI slices for clinical interpretation.
- Evaluate the framework's visualization usability and performance across datasets.

### Task 4 – Clinical integration and assessment - IMAG2App

- Adapt and extend IMAG2app to incorporate newly developed methods.
- Allow simultaneous visualization of multiple subjects or scans for comparative analysis.
- Implement tools to navigate inside the 3D model and simulate surgical resections.
- Enabling advanced exploration of fibers and anatomical structures, including morphological, topological, and diffusion analyses.

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## Candidate profile

- Master's level student (M2 or equivalent) in:
  - Biomedical engineering
  - Medical imaging
  - Computer science / AI
  - Applied mathematics or data science
- Strong interest in **medical imaging and clinical applications**
- Skills in at least some of the following:
  - Python
  - Deep learning frameworks (PyTorch, TensorFlow)
  - Medical image processing (DICOM, NIfTI)
  - Slicer 3D
- Ability to work in a **multidisciplinary clinical-technical environment**
- Autonomy, rigor, and strong communication skills

Experience with MRI, segmentation, or clinical data is a strong advantage but not mandatory.

## What we offer

- A **6-month Master's thesis**, followed by an **18-month Research Engineer contract**
- Work within a **high-impact, clinically driven ANR project**
- Access to **unique paediatric and gynaecological MRI datasets**
- Close supervision by experienced researchers and clinicians
- Contribution to a **future clinical AI-based software tool for 3D modeling and surgical planning**

## Application

Interested candidates should send:

- CV
- Transcripts of exam grades from the last 2 years
- (Optional) A letter of recommendation from a teacher or previous supervisors
- (Optional) references or GitHub/portfolio

to:

- [pietro.gori@telecom-paris.fr](mailto:pietro.gori@telecom-paris.fr)
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