



# Loïc Tetrel

LEAD DATA SCIENTIST · MEDICAL IMAGING

France (Isere) / Remote

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With **8+ years** of experience building **data science** projects in medical imaging for both **industry and academia**, my main goal is always to deliver high quality work. I define myself as **curious and autonomous**.

## Professional profile

MRI, ultrasound, open source, machine learning, distributed training, statistics, GPU computing, image/volume registration, 3D reconstruction and rendering, tracking, camera optics, computer science.

## Education

### ÉTS (École de technologie supérieure) Montréal / McGill

M. A. SC. IN ELECTRICAL ENGINEERING, GRADUATED WITH HONORS

Montréal, CANADA

Sept. 2014 - Aug. 2016

### Lyon INSA (National Institute of Applied Sciences of Lyon)

M. ENG. IN ELECTRICAL ENGINEERING

Lyon, FRANCE

Sept. 2012 - Aug. 2016

### IUT (University Institutes of Technology) Lyon 1

TECHNICAL DEGREE IN INDUSTRIAL ENGINEERING AND MAINTENANCE, GRADUATED WITH HONORS

Lyon, FRANCE

Sept. 2010 - Jun. 2012

## Skills

|                               |  |
|-------------------------------|--|
| <b>Low-level programming</b>  | Bash, C++20 (OpenCV, ONNXruntime, ITK/VTK, Eigen, Ceres), CUDA, Assembly                             |
| <b>High-level programming</b> | Python3 (NumPy, Matplotlib, MONAI, PyTorch), MATLAB (statistical and ML toolbox)                     |
| <b>Softwares</b>              | CMake, 3D Slicer, ParaView, NVIDIA Omniverse, Blender, SLURM, Git, Jupyter, FFmpeg, Docker, $\LaTeX$ |
| <b>Operating systems</b>      | Ubuntu 18, Windows 10  |
| <b>Languages</b>              | French (mother tongue), English (professional, TOEIC 925), Polish (fluent)                           |

## Work Experience

### Kitware SAS, Computer Vision and Software Solutions team

Lyon, FRANCE

LEAD DATA SCIENTIST\*: OPEN-SOURCE MEDICAL AI AND COMPUTER VISION

Nov. 2022 - Present

- Medical AI.
  - Low Intensity Focused Ultrasound with OpenWater <https://github.com/OpenwaterHealth/OpenLIFU-python> (3DSlicer)
  - CT/PET whole body segmentation with MedUni Wien <https://github.com/ENHANCE-PET> [paper to come] (Pytorch, MONAI)
  - Digital twin for endoscopy (NVIDIA Omniverse)
- 3D Computer Vision. <https://gitlab.kitware.com/keu-computervision>
  - Leading ParaLabel: a scalable 3D detection annotation platform. [paper to come] (ONNXruntime, VTK, CMake)
  - Low-powered underwater object detection with IFREMER (ONNXruntime, PyTorch, CMake)
  - CT 3D registration for geology (ITK, CMake)
- Business development and marketing.
  - Conference attendance with stand exhibitions (MICCAI24, ICCV23) and industry/academics grant collaborations
  - Writing technical blogs <https://www.kitware.com/blog/>
  - Trainings for industry and teaching ML at EPITA Lyon

### SIMEXP lab, CRIUGM - University of Montreal

Remote / Montréal (QC), CANADA

DATA SCIENCE ENGINEER\*: NEUROIMAGING RESEARCH

Nov. 2018 - May 2022

- Software tools for neuroimaging. <https://github.com/SIMEXP>
  - HPC scalable fMRI preprocessing and quality-control on BIDS datasets [3] (fMRIPrep, Datalad, SLURM)
  - fMRIPrep Long-Term Support and reproducibility testing [1] (Datalad, SLURM)
- Machine learning. <https://github.com/courtois-neuromod>
  - Graph convolution for brain-state annotation with Intel [5] (Nilearn, SLURM, PyTorch)
  - Fast and accurate fMRI registration with quaternions using convolutional neural network [4] (TensorFlow)
- Research data platforms. <https://github.com/neurolibre>
  - NeuroLibre [2] administrator: Compute cluster and backend APIs to build/publish submissions (Openstack, Kubernetes/Binderhub)
  - Data organization, user documentation and maintenance for SIMEXP (bash)
- Upstream contributions (TensorFlow, Nilearn, Binderhub), oral presentations and hackaton trainer (MAIN, OHBM)

## Straumann Group, Digital Business Unit

Montréal (QC), CANADA

COMPUTER VISION DEVELOPER\*: 3D SOLUTIONS FOR DIGITAL DENTISTRY

Dec. 2016 - Oct. 2018

- 3D reconstruction algorithms
  - State of the art research on stereoscopy using phase-shift model (**C++**, **Ceres**, **Eigen**)
  - Optical calibration and distortion correction (**OpenCV**, **Ceres**, **NumPy**)
  - Metrology reports and software documentation
  - Conception of a virtual scanner for software experimentation and hardware validation (**Blender**)
- Conferences attendance (CVPR 2018, Agile Tour 2017), open days for recruiting interns (Concordia, Polytechnique, McGill)

## LATIS, ÉTS Montréal

Montréal (QC), CANADA

RESEARCH ASSISTANT\*: GRAPH-BASED ESTIMATION OF PROBE TRAJECTORY FOR SENSORLESS FREEHAND 3D US

Jan. 2015 - Nov. 2016

- Calibration of optical and electromagnetic probes for freehand 3D US (**C++**, **3D slicer/PLUS**, **Make**)
- Master thesis [6]: Sensorless image reconstruction for ultrasound
  - Image registration from echographic sequence using speckle-decorrelation (**C**, **Make**)
  - Trajectory estimation by a directed graph with gaussian process uncertainty and Lie Algebra [7] (**Matlab**, **C++**, **Boost**)
- Conferences attendance (REPARTI 2016, MICCAI/MLMI 2016)

## Thales Group, Thales Air Systems

Limours, FRANCE

INTERN\*: FAST INITIALIZATION OF CARTESIAN TRACK USING FM BAND

Feb. 2014 - Aug. 2014

- Track initialization in cartesian coordinates with range measurements, using a custom non-linear filter and statistical methods (**MATLAB**)
- Validation on aircraft records (**MATLAB**, **C++**, **Eigen**)

## Relevant Projects

- Computer science blog (**Jupyter**, **HTML**) <https://ltetrel.github.io/>
- Co-funder of bitprobe \*, bitcoin price forecasting using blockchain features (**TensorFlow**)
- Kodi/Jellyfin media server with custom tool for subtitle synchronization (**Bash**, **FFmpeg**, **TensorFlow**)
- Video games tools and bots (**Python**, **Golang**)
- PCB design of a detection system for an autonomous robot (**C**, **Altium**)

## McGill, ÉTS Montréal

Montréal (QC), CANADA

- Registration of MRI and CT images using Gaussian Process interpolation with uncertainty (**Matlab**)
- GPU implementation of sobel filtering on Nvidia GTX (**C**, **CUDA**)
- Automatic classification and prediction models for early Parkinson disease from SPECT imaging (**Matlab**)

2014 - 2016

## Publications

- [1] Yohan Chatelain, **Loïc Tetrel**, Christopher J. Markiewicz, Gregory Kiar, Oscar Esteban, et al. “Testing the long-term reproducibility of fMRIprep results”. In: 2022. Poster presented at OHBM 2022, Glasgow, Scotland.
- [2] Agah Karakuzu, Elizabeth DuPre, **Loïc Tetrel**, Patrick Bermudez, Mathieu Boudreau, et al. “NeuroLibre : A preprint server for full-fledged reproducible neuroscience”. 2022. Poster presented at OHBM 2020, Online.
- [3] Désirée Lussier, Natasha Clarke, Hao-Ting Wang, Arnaud Boré, **Loïc Tetrel**, et al. “Standardized preprocessed derivatives for the Comprehensive Assessment of Neurodegeneration and Dementia (COMPASS-ND) Study”. In: *Alzheimer’s & Dementia* None.None, Supplement (2022). Alzheimer’s Association International Conference 2022, None. Poster presented at AAIC 2022, San Diego, CA.
- [4] **Loïc Tetrel** and Pierre Bellec. “Fast and accurate EPI spatial normalization using convolutional neural network”. In: 2021. Poster presented at OHBM 2021, Online.
- [5] Yu Zhang, **Loïc Tetrel**, Bertrand Thirion, and Pierre Bellec. “Functional annotation of human cognitive states using deep graph convolution”. In: *NeuroImage* 231 (2021), p. 117847.
- [6] **Loïc Tetrel**. “Estimation de la trajectoire d’une sonde ultrasonore pour l’échographie 3D main-libre sans capteur de position”. MA thesis. École de technologie supérieure, 2016.
- [7] **Loïc Tetrel**, Hacène Chebrek, and Catherine Laporte. “Learning for Graph-Based Sensorless Freehand 3D Ultrasound”. In: *Machine Learning in Medical Imaging*. Ed. by Li Wang, Ehsan Adeli, Qian Wang, Yinghuan Shi, and Heung-Il Suk. Springer. Cham: Springer International Publishing, 2016, pp. 205–212.

## Interests

**Travels** Europe, USA, Canada, Thailand, Morocco

**Hobbies** Video games, IT, politics, reading books (fantasy, science-fiction), playing music (rock, jazz)