

# Adrien KRÄHENBÜHL

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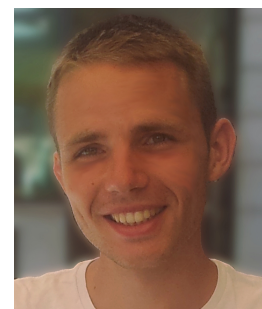
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## Assistant professor in Computer Science

*Image analysis & processing – medical imaging – digital geometry*

### 🖋 ACADEMIC BACKGROUND

- From september 2017** | **Assistant professor in computer sciences.**  
Fix position.  
→ ICube & IUT Robert Schuman, University of Strasbourg, France
- 2015-2017** | **Postdoctoral position in medical imaging.**  
2 years position.  
→ LaBRI & Université de Bordeaux, Talence, France
- 2014-2015** | **Assistant professor**  
Full-time position.  
→ Université de Lorraine, UFR Mathématiques et Informatique, Nancy, France
- 2011-2014** | **PhD candidate in Computer Science**  
Teaching assistant, with governmental fellowship.  
→ LORIA & Université de Lorraine, ADAGIo team, Nancy, France
- 2009-2011** | **Master's Degree in Computer Science**  
Specialty: Recognition, Learning and Reasoning  
→ Université Henry Poincaré, Nancy, France

### ⚙ RESEARCH

- From September 2015** | **Analysis of MRI lung images.**  
Postdoctoral position supervised by Fabien Baldacci.  
✓ Segmentation of pleural plaques in CT images,  
✓ Filtering and segmentation of bronchi from MRI images,  
✓ Design and development of a filtering/segmentation software dedicated to medical images.  
In the context of “Labex TRAIL” (Translational Research and Advanced Imaging Laboratory).  
Collaboration with Haut-Lévêque hospital of Pessac.  
A 6-month contract with “Aquitaine Sciences Transfert” to promote research works.  
→ Image and Sound team, LaBRI, Bordeaux, France  
*Bronchi, tubular segmentation, filtering, Qt/C++, ITK*
- 2011-2014 (3 years)** | **Segmentation and geometric analysis: application to CT images of wood**  
PhD thesis in image segmentation and digital geometry.  
Supervised by Isabelle Debled-Rennesson and Bertrand Kerautret.  
✓ Analysis of 3D scanned images from X-Ray CT scanners,  
✓ Segmentation of wood knots in presence of wet sapwood,  
✓ Study of active contours, curvature estimators, blurred segments, etc.  
✓ Development of TKDetection, open-source software in Qt/C++.  
Collaboration with INRA (LERFoB laboratory, Champenoux).  
→ ADAGIo team, LORIA, Nancy, France  
*Image analysis, segmentation, X-Ray CT scanner, wood*

## Search by fine visual similarity in digitized photographic collections

Master's degree internship (2nd year).

2011  
(6 month)

- ✓ Exhaustive state-of-the-art about detectors and descriptors of interest points,
- ✓ Classification of interest points based on K-Means,
- ✓ Image bank indexing helped by inverted index,
- ✓ Querying optimized in computing and access times from a query image.

With CEDRIC team from CNAM (Paris) and the Nicéphore Niépce museum (Chalon-sur-Saône).

→ Nicéphore Cité, Chalon-sur-Saône, France

*Content Based Image Retrieval, interest points, bag of words, inverted index*

## Detection and geometrical measurements of wood knots in spruce logs

Master's degree internship (1st year)

2010  
(7 months)

- ✓ Implementation of an algorithm for the 3D connected component extraction,
- ✓ Extension of distance transform algorithm from Saito and Toriwaki to non orthonormal 3D coordinate systems,
- ✓ Morphological skeleton and linear regression for branch inclination measurements.

In collaboration with INRA (Champenoux).

→ ADAGIO team, LORIA, Nancy, France

*C++, Qt, OpenGL, Design Patterns*

## Development of MoProViewer, crystallography software for molecular visualization

BSs internship (3rd year).

2009  
(4 months)

- ✓ Object modeling for molecular hierarchy (atom, molecule, amino acid...)
- ✓ Computing of atom's distances, angles, strength, bonds...
- ✓ XML serialization and 3D visualization with OpenGL.

→ EMQC team, CRM2 laboratory, CNRS, Nancy, France

*C++, Qt, OpenGL, crystallography*

## PUBLICATIONS

International  
journals  
peer-reviewed

[1] *Knot segmentation in 3D CT images of wet wood*

A. Krähenbühl, B. Kerautret, I. Debled-Rennesson, F. Mothe and F. Longuetaud.

**Pattern Recognition**, vol. 47, p. 3852-3869 (18), 2014.

[2] *Automatic knot segmentation in CT images of wet softwood logs using a tangential approach*

J.-R. Roussel, F. Mothe, A. Krähenbühl, B. Kerautret, I. Debled-Rennesson and F. Longuetaud.

**Computer and Electronics in Agriculture**, vol. 104, p.46-56 (11), 2014.

[3] *Automatic knot detection and measurements from X-ray CT images of wood: A review and validation of an improved algorithm on softwood samples*

F. Longuetaud, F. Mothe, B. Kerautret, A. Krähenbühl, L. Hory, J.-M. Leban and I. Debled-Rennesson.

**Computer and Electronics in Agriculture**, vol. 85, p. 77-89 (13), 2012.

[4] *MAELab: a framework to automatize landmark estimation*

V. L. Le, M. Beurton-Aimar, A. Krähenbühl, N. Parisey

**WSCG 2017**, Plzen, Czech Republic, May 29 - June 2nd

**Accepted.**

[5] *Centerline Detection on Partial Mesh Scans by Confidence Vote in Accumulation Map*

B. Kerautret, A. Krähenbühl, I. Debled-Rennesson and J.-O. Lachaud.

**ICPR 2016**, Cancùn, Mexico, December 4-8, 2016.

**References coming.**

International  
conferences  
peer-reviewed

[6] *On the Implementation of Centerline Extraction by Confidence Vote in Accumulation Map*

B. Kerautret, A. Krähenbühl, J.-O. Lachaud and I. Debled-Rennesson.

**RRPR Workshop 2016**, Cancùn, Mexico, December 4, 2016.

**RRPR proceedings**, LNCS series, vol. 10214, p. 116-130 (15), 2016.

[7] *Robust Knot Segmentation by Knot Pith Tracking in 3D Tangential Images*

A. Krähenbühl, J.-R. Roussel, B. Kerautret, I. Debled-Rennesson, F. Mothe and F. Longuetaud.

**ICCVG 2016**, Warsaw, Poland, September 19-21, 2016.

**Computer Vision and Graphics**, LNCS series, vol. 9972, p. 581-593 (13), 2016.

International  
conferences  
peer-reviewed

- [8] *Knot detection from accumulation map by polar scan*  
A. Krähenbühl, B. Kerautret and F. Feschet.  
**IWCIA 2015**, Kolkata, India, November 24-27, 2015.  
**Combinatorial Image Analysis**, LNCS series, vol. 9448, p. 352-362 (11), 2015.
- [9] *3D geometric analysis of tubular objects based on surface normal accumulation*  
B. Kerautret, A. Krähenbühl, I. Debled-Rennesson and J.-O. Lachaud.  
**ICIAP 2015**, Genova, Italy, September 7-11, 2015.  
**Image Analysis and Processing**, LNCS series, vol. 9279, p. 319-331 (13), 2015.
- [10] *Knot segmentation in noisy 3D images of wood*  
A. Krähenbühl, B. Kerautret and I. Debled-Rennesson.  
**DGCI 2013**, Sevilla, Spain, March 20-22, 2013.  
**Discrete Geometry for Computer Imagery**, LNCS series, vol. 7749, p. 383-394 (12), 2013.
- [11] *Knot detection in X-ray CT images of wood*  
A. Krähenbühl, B. Kerautret, I. Debled-Rennesson, F. Longuetaud and F. Mothe.  
**ISVC 2012**, Rethymno, Crete, July 16-18, 2012.  
**Advances in Visual Computing**, LNCS series, vol. 7432, p. 209-218 (10), 2012.

International  
conferences  
without review

- [12] *Knot shape assessment on various species through X-ray CT scanning.*  
A. Krähenbühl, F. Longuetaud, J.-B. Morisset, F. Colin, I. Debled-Rennesson, B. Kerautret and F. Mothe.  
**IUFRO 2012**, Lisbon, Portugal, July 8-13, 2012.

National  
conferences  
peer-reviewed

- [13] *Analyse géométrique d'objets tubulaires 3D basée sur l'accumulation de normales*  
B. Kerautret, A. Krähenbühl, I. Debled-Rennesson and J.-O. Lachaud.  
**RFIA 2016**, Clermont-Ferrand, France, June 27 - July 1st, 2016.
- [14] *Segmentation de nœuds de bois à partir d'images tomodensitométriques : approches transversales et tangentielles*  
A. Krähenbühl, B. Kerautret and I. Debled-Rennesson.  
**Reims Image 2014 - GT GeoDis**, Reims, France, November 25-28, 2014.
- [15] *Segmentation robuste de nœuds à partir de coupes tangentielles issues d'images tomographiques de bois*  
A. Krähenbühl, J.-R. Roussel, B. Kerautret, I. Debled-Rennesson, F. Mothe and F. Longuetaud.  
**RFIA 2014**, Rouen, France, June 30 - July 4, 2014.

## SEMINARS, TALKS AND POSTERS

March, 2016

- Segmentation et analyse géométrique pour l'étude du bois et des objets tubulaires.**  
Invited seminar.  
→ XLIM laboratory, Poitiers, France

January, 2016

- Local accumulation for geometric tubular analysis**  
Poster at GDR IM days.  
→ Université Paris 13, Villetaneuse, France

June, 2015

- Segmentation and geometric analysis: application to CT images of wood**  
Seminar about thesis works and perspectives for the Forest Research.  
→ LERFoB laboratory, INRA, Champenoux, France
- Un algorithme robuste de segmentation des nœuds du bois sur des images obtenues par tomographie X**  
Talk and poster at Regefor conference.  
→ LERFoB laboratory, INRA, Champenoux, France

July, 2014

- Segmentation de nœuds de bois dans des images tomographiques**  
Talk for members of 1st Department - Algorithmic, computing, image and geometry.  
→ LORIA, Nancy, France

October, 2013

- Knot segmentation on 3D images**  
Talk at EJCIM (Young Researcher School in Computer Science and Mathematics).  
→ UPVD, Perpignan, France

April, 2013

- Segmentation of wood knots on X-Ray images**  
Poster at Annual PhD students conference of IAEM Lorraine.  
→ Université de Lorraine, Nancy, France

Academic year  
2016/2017

#### Assistant professor

- **M1 - Operating Systems (head of module)**  
Lectures 21h (in English) – Tutorials 39h (conception)  
*Processes, scheduling, concurrency, paging, file system*

Total: 21h

→ PUF (Pôle Universitaire Français), Hô-Chí-Minh-Ville, Vietnam

Academic year  
2015/2016

#### Assistant professor

- **M1 - Motion estimation in videos**  
TDs 2×6h  
*Block matching, Cafforio-Rocca, gradient descent, C++*
- **L2 - Introduction to digital images**  
TDs 2×12h  
*Color representations, histograms, convolutions, filters, ImageJ*

Total: 36h

→ Université de Bordeaux, Talence, France

Academic year  
2014/2015

#### Assistant professor

- **1st year - Computer architecture (head of module)**  
Lectures 10h – Tutorials/Practices works 2×10h  
*Turing machine, logical and arithmetical circuits, processor structure, assembly language*
- **2nd year - File algorithmic (head of module)**  
Lectures 10h – TDs 15h  
*Read/write on solid disk, data encoding, logical organization, pagination, indexing*
- **1st year - Algorithmic and Programming (semesters 1 and 2)**  
Tutorials/Practices works 40h S1 + 33h S2  
*Variables, conditions, loops, arrays, recursivity, unplugged algorithmic*
- **1st year - C2I (Computer science and Internet Certificate)**  
Tutorials 64h (Faculty of Literature, Faculty of Law)  
*Text editor, spreadsheet, computer assisted presentation, computer assisted presentation*

Total: 200h

→ UFR Mathématiques et Informatique, Nancy, France

Academic years  
2011 to 2013

#### Teaching assistant

- **1st year (bachelor +3) - Data structures**  
Lectures 14h – Tutorials 40h – Practices works 42h – Project 12h  
*Arrays, Lists, Trees, Graphs, Maps – Algebraic specification, coding in JAVA*
- **1st year (bachelor +3) - C & Shell**  
Lectures/Tutorials 12h – Practices works 30h  
*Operating system, Grep, Sed, regular expressions – advanced use of Bash*
- **2nd year (bachelor +4) Design and development project**  
Project monitoring 45h  
*Combination of data base, web administration and development with MVC and design patterns*

Total: 220h

→ Telecom Nancy (engineering school), France

Thesis Prize

#### Regional Thesis Award 2015

Awarded by the “Région Lorraine” in the scientific field.

→ <http://www.loria.fr/news/prix-regional-de-these-pour-adrien-krahenbuhl>

Best  
demonstration

#### Awarded for TKDetection software

At the 17th International Conference on DGCI, 2013 (published in Imagen-A, vol. 3, n.5).

→ <http://dgci2013.us.es/bestDemo.php>

→ <https://github.com/akrah/TKDetection>

## SCIENTIFIC INVOLVEMENTS

### Animation and development

#### Member of the Organization Committee of the RRPR workshop at ICPR 2016

1<sup>st</sup> workshop about Reproducible Research in Pattern Recognition.

Head of the *Reproducible Label* (RLPR), guaranteeing for a paper the experiment reproducibility.

→ <https://wrrpr2016.sciencesconf.org/>

*Reproducible research, pattern recognition, algorithms*

#### Co-organizer of IPOL workshop (Image Processing On Line) at RFIA 2014

Online scientific journal about image analysis and processing.

Objective: create an online demonstration with its own code.

→ <http://ipol-rfia2014.sciencesconf.org>

*Reproducible research, online journal, algorithm publication*

#### Contributor to the DGtal library (Digital Geometry Tools and Algorithms library)

Collaborative project to manipulate 2D and 3D digital objects.

Development of new tools (DICOM reader, graph viewer) and bug tracking.

→ <http://dgtal.org>

*C++ library, discrete geometry, development*

### Mediation

#### Designer and leader of the “Paper Turing machine” workshop at ISN day 2015

Day dedicated to highschool teachers about computer and numeric sciences.

Concept: introduce the computer architecture from a paper Turing machine.

→ <http://idees.loria.fr/index.php?n=Main.ProgrammeJourneeISN-EPI2015>

*ISN specialty, Turing, computer architecture*

#### Designer and leader of a workshop at the Sciences Village

Day dedicated to licence and master student to discover computer science research domain.

Involvement: Presentation of ADAGIo works through TKDetection.

→ <https://iww.inria.fr/NanSciNum/un-village-des-sciences-du-numerique-au-coeur-dinria-nancy>

## REFERENCES

### PhD supervisors

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