Adrien Besson

| CONTACT INFORMATION | Signal Processing Laboratory (LTS 5)
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RESEARCH INTERESTS

Ultrasound imaging, compressed sensing, convex optimization, inverse problems, deep learning

EDUCATION

Ecole Polytechnique Fédérale de Lausanne, Lausanne, Switzerland

Ph.D., Ultrasound imaging, *Expected:* Mar 2019
- Thesis Topic: *Model-based Ultrasound Imaging*
- Advisors: Prof. Jean-Philippe Thiran and Prof. Yves Wiaux

M.Sc., Electrical Engineering, Aug 2013
- Thesis: *Development of an anti-fraud module for a fingerprint sensor*
- Advisors: Prof. Pascal Frossard and Jérôme Lorenzi (Morpho)

Supélec, Gif-sur-Yvette, France

Engineering Diploma, Electrical Engineering, Aug 2013

RESEARCH AND PROFESSIONAL EXPERIENCE

Research Assistant   January 2015 to present
Signal Processing Laboratory (LTS 5),
Ecole Polytechnique Fédérale de Lausanne

R&D engineer   June 2013 to Jan 2015
Center for Excellence of Terminals,
Morpho S.A.
Mission: Operational research for the design of the checkpoint of the future

Engineering intern   January 2013 to June 2013
Center for Excellence of Terminals,
Morpho S.A.
Mission: Development of an anti-fraud module for a fingerprint sensor

Research Intern   January 2012 to June 2012
Multimedia Signal Processing Group (MMSPG),
Ecole Polytechnique Fédérale de Lausanne
Mission: Objective quality metrics for scalable video coding

HONORS AND AWARDS

• First prize at the PICMUS challenge	Sep 2016
• LEM prize for student excellence	Sep 2013
• Anna Barbara Reinhard prize for student excellence	Sep 2013

PRESENTATIONS

International Conferences

• International Conference on Image Processing, Phoenix, USA	Sep 2016
• International Ultrasonics Symposium, Tours, France	Sep 2016
• European Signal Processing Conference, Budapest, Hungary	Aug 2016
• International Ultrasonics Symposium, Taipei, Taiwan	Sep 2015

Workshops

• International BASP Frontiers workshop, Villars sur Ollon, Switzerland	Jan 2017
• 2nd Swiss Medical Image Computing Day, Bern, Switzerland	Nov 2016

TEACHING EXPERIENCE

Students supervised at EPFL (co-supervised with Prof. Jean-Philipe Thiran)

Lucas Mayrhofer (with LIS at ETHZ)	Fall 2017

- Compressed Sensing Algorithms for Hand-held Ultrasound Medical Imaging Devices

Malo Grisard	Fall 2017

- Deep Learning for Enhanced Ultrasound Image Reconstruction

Yuliang Zheng	Fall 2017

- Image Reconstruction with Generative Models

Julie Delacroix   Spring 2017
- Extension of the Experimental Demonstrator With a Doppler Ultrasound Method

Saleh Bagher   Spring 2017
- Deep Learning for Block Compressed Sensing of Images

Philippe Rossinelli   Fall 2016
- Learning Optimal Thresholding Parameters

Marc Beusch (with TIK at ETHZ)   Fall 2016
- Parallelization of Compressed Sensing Based Ultrasound Imaging

Benjamin Beck   Fall 2016
- Extension of the Compressed-Sensing based Demonstrator to Diverging Wave Imaging

Florian Martinez   Spring 2016
- Methods for Accelerated Reconstruction of Ultrasound Images Based on Compressed Sensing on GPU

Eric F. Bezzam   Spring 2016
- Development of a Compressive Sensing Based Demonstrator for 2D Ultrasound Plane Wave Imaging

Louis Sarazin   Fall 2015
- Optimization of Compressed Sensing Based Ultrafast Ultrasound Imaging Algorithms

Teaching Assistant

EE-350 - Signal Processing   Falls 2015–16
Instructors: Prof. Frossard and Prof. Thiran
Electrical and Electronics Engineering,
Ecole Polytechnique Fédérale de Lausanne

EE-451 - Image Analysis and Pattern Recognition   Spring 2015
Instructor: Prof. Thiran
Electrical and Electronics Engineering,
Ecole Polytechnique Fédérale de Lausanne

PROFESSIONAL ACTIVITIES AND SERVICE

Professional societies
- Institute of Electrical and Electronic Engineers (IEEE)
  Student Member (2015-present)

Reviewing Activities
- Journals
  - IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control
  - Ultrasonics
- International Conferences
  - EUSIPCO 2016
  - IEEE ICASSP 2017, IEEE ICASSP 2018

PUBLICATIONS

Journal

1. **A. Besson**, L. Roquette, D. Perdios, M. Simeoni, M. Arditi, P. Hurle¡, Y. Wiaux and J.-Phi. Thiran "Fast Non-stationary Deconvolution in Ultrasound Imaging," submitted to *IEEE Transactions on Computational Imaging*.

2. **A. Besson**, D. Perdios, F. Martinez, Z. Chen, R. E. Carrillo, M. Arditi, Y. Wiaux and J.-Phi. Thiran "Ultrafast Ultrasound Imaging as an Inverse Problem: Matrix-free Sparse Image Reconstruction," *IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control*, vol. 65, no. 3, pp. 339-355, mar 2018.

3. **A. Besson**, M. Zhang, F. Varray, H. Liebgott, D. Friboulet, Y. Wiaux, J.-Phi. Thiran, R. E. Carrillo and O. Bernard "A Sparse Reconstruction Framework for Fourier-Based Plane-Wave Imaging," *IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control*, vol. 63, no. 12, pp. 2092-2106, dec 2016.

4. M. Zhang, F. Varray, **A. Besson**, R. E. Carrillo, M. Viallon, D. Garcia, J.-Phi. Thiran, D. Friboulet, H. Liebgott and O. Bernard "Extension of Fourier-Based Techniques for Ultrafast Imaging in Ultrasound With Diverging Waves," *IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control*, vol. 63, no. 12, pp. 2125-2137, dec 2016.

Conference, symposium and workshop

1. **A. Besson**, D. Perdios, Y. Wiaux and J.-Phi. Thiran "Pulse-stream Models in Time-of-flight imaging," *2018 IEEE International Conference on Acoustics, Speech and Signal Processing*, apr 2018.

2. L. Roquette, M. Simeoni, P. Hurley and **A. Besson** "On an Analytical, Spatially-varying, Point-spread-function," *2017 IEEE International Ultrasonics Symposium (IUS)*, sep 2017.

3. D. Perdios, **A. Besson**, M. Arditi and J.-Phi. Thiran "A Deep Learning Approach to Ultrasound Image Recovery," *2017 IEEE International Ultrasonics Symposium (IUS)*, sep 2017.

4. **A. Besson**, D. Perdios, F. Martinez, M. Arditi, Y. Wiaux and J.-Phi. Thiran "USSR: An Ultrasound Sparse Regularization Framework," *2017 IEEE International Ultrasonics Symposium (IUS)*, sep 2017.

5. D. Perdios, **A. Besson**, P. Rossinelli and J.-Phi. Thiran "Learning the Weight Matrix for Sparsity Averaging in Compressive Imaging," *2017 IEEE International Conference on Image Processing (ICIP)*, sep 2017.

6. **A. Besson**, R. E. Carrillo, D. Perdios, M. Arditi, Y. Wiaux and J.-Phi. Thiran "A compressed-sensing approach for ultrasound imaging", *2017 Signal Processing with Adaptive Sparse Structured Representations (SPARS) workshop*, jun 2017.

7. Z. Chen, **A. Besson**, J.-Phi. Thiran and Y. Wiaux "Beamforming-deconvolution: A novel concept of deconvolution for ultrasound imaging," *International Biomedical and Astronomical Signal Processing Frontiers workshop (BASP)*, jan 2017.

8. **A. Besson**, R. E. Carrillo, O. Bernard, Y. Wiaux and J.-Phi. Thiran "Compressed delay-and-sum beamforming for ultrafast ultrasound imaging," *2016 IEEE International Conference on Image Processing (ICIP)*, sep 2016.

9. **A. Besson**, R. E. Carrillo, D. Perdios, M. Arditi, O. Bernard, Y. Wiaux and J.-Phi. Thiran "A compressed beamforming framework for ultrafast ultrasound imaging," *2016 IEEE International Ultrasonics Symposium (IUS)*, sep 2016.

10. **A. Besson**, R. E. Carrillo, D. Perdios, E. F. Bezzam, M. Arditi, Y. Wiaux and J.-Phi. Thiran "Morphological component analysis for sparse regularization in plane wave imaging," *2016 IEEE International Ultrasonics Symposium (IUS)*, sep 2016.

11. **A. Besson**, R. E. Carrillo, M. Zhang, D. Friboulet, O. Bernard, Y. Wiaux and J.-Phi. Thiran "Sparse regularization methods in ultrafast ultrasound imaging," *2016 24th European Signal Processing Conference (EUSIPCO)*, aug 2016.

12. M Zhang, **A. Besson**, R. E. Carrillo, F. Varray, M. Viallon, H. Liebgott, J.-Phi. Thiran, D. Friboulet and O. Bernard "Extension of Ultrasound Fourier Slice Imaging theory to sectorial acquisition," *2015 IEEE International Ultrasonics Symposium (IUS)*, oct 2015.

13. R. E. Carrillo, **A. Besson**, M. Zhang, D. Friboulet, Y. Wiaux, J.-Phi. Thiran and O. Bernard "A Sparse regularization approach for ultrafast ultrasound imaging" *2015 IEEE International Ultrasonics Symposium (IUS)*, oct 2015.

14. **A. Besson**, F. De Simone and T. Ebrahimi "Objective quality metrics for video scalability," *2013 IEEE International Conference on Image Processing*, sep 2013.

Patent

1. **A. Besson**, A. Thiebot, D. Dumont and J. Lorenzi "Method of validation intended to validate that an element is covered by a true skin," *WO 2015091701 A1*, 2015.

LANGUAGE SKILLS   French (native), English (advanced), and Spanish (basic)

PROGRAMMING   MATLAB, Python (scipy, numpy, sklearn, Tensorflow, Jupyter), Linux (Ubuntu), Windows,
SKILLS   LaTeX