MATHIEU LEONARDON

Associate Professor

Algorithm-Architecture Adequation
Deep Learning Compression

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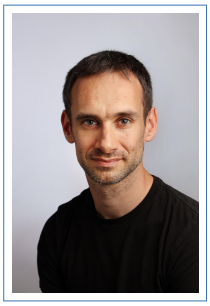

Education

2015–2018 **PhD, Electrical Engineering**, *Polytechnique Montréal and Université de Bordeaux*, codirec, Polar Decoding on programmable architectures, *defended on 2018-12-13*.
Forward Error Correction, Polar Codes, Software Implementations, Hardware Implementations, ASIP

2012–2015 : **Master of Engineering, Embedded Electronics**, *Bordeaux INP, ENSEIRB-Matmeca*, Bordeaux.

Publications

Journal Articles

2022 Hugo Tessier, Vincent Gripon, **Léonardon, Mathieu**, Matthieu Arzel, Thomas Hannagan, and David Bertrand. Rethinking Weight Decay for Efficient Neural Network Pruning. *Journal of Imaging*, volume 8, page 64. MDPI, March 2022.

2022 Khaled Alhaj Ali, Amer Baghdadi, Elsa Dupraz, **Léonardon, Mathieu**, Mostafa Rizk, and Jean-Philippe Diguet. MOL-based In-Memory Computing of Binary Neural Networks. *IEEE Transactions on Very Large Scale Integration (VLSI) Systems*, volume 30. IEEE, July 2022.

2019 **Léonardon, Mathieu**, Adrien Cassagne, Camille Leroux, Christophe Jego, Louis-Philippe Hamelin, and Yvon Savaria. Fast and Flexible Software Polar List Decoders. *Journal of Signal Processing Systems*. Springer, January 2019.

2019 Alireza Ghaffari, **Léonardon, Mathieu**, Adrien Cassagne, Camille Leroux, and Yvon Savaria. Toward High-Performance Implementation of 5G SCMA Algorithms. *IEEE Access*, volume 7, pages 10402–10414. IEEE, January 2019.

2019 Adrien Cassagne, Olivier Hartmann, **Léonardon, Mathieu**, Kun He, Camille Leroux, Romain Tajan, Olivier Aumage, Denis Barthou, Thibaud Tonnellier, Vincent Pignoly, Bertrand Le Gal, and Christophe Jego. AFF3CT: A Fast Forward Error Correction Toolbox! *SoftwareX*, volume 10, page 100345. Elsevier, July 2019.

In Conference Proceedings

2022 Hamoud Younes, Hugo Le Blevec, **Léonardon, Mathieu**, and Vincent Gripon. Inter-Operability of Compression Techniques for Efficient Deployment of CNNs on Microcontrollers. In *SYSINT 2022: International Conference on System-Integrated Intelligence*, volume 546 of *Lecture Notes in Networks and Systems book series (LNNS)*, pages 543–552, Genova, Italy, September 2022. Springer International Publishing.

2022 Hugo Tessier, Vincent Gripon, **Léonardon, Mathieu**, Matthieu Arzel, Thomas Hannagan, and David Bertrand. Élagage de réseaux profond de neurones par dégradation sélective des pondérations. In *GRETSI 2022*, Nancy, France, September 2022.

2022 Hugo Tessier, Vincent Gripon, **Léonardon, Mathieu**, Matthieu Arzel, David Bertrand, and Thomas Hannagan. Leveraging Structured Pruning of Convolutional Neural Networks. In *IEEE SiPS 2022*, pages 1–6, Rennes, France, November 2022.

2022 Hugo Tessier, Vincent Gripon, **Léonardon, Mathieu**, Matthieu Arzel, David Bertrand, and Thomas Hannagan. Investigating the Not-So-Obvious Effects of Structured Pruning. In *ICML 2022 - Hardware-aware efficient training (HAET)*, Baltimore, United States, July 2022.

2022 Hugo Tessier, Vincent Gripon, **Léonardon, Mathieu**, Matthieu Arzel, David Bertrand, and Thomas Hannagan. Energy Consumption Analysis of pruned Semantic Segmentation Networks on an Embedded GPU. In *SYSINT 2022: International Conference on System-Integrated Intelligence*, volume 546 of *International Conference on System-Integrated Intelligence*, pages 553–563, Genova, Italy, September 2022. Springer.

2021 **Léonardon, Mathieu** and Vincent Gripon. Using Deep Neural Networks to Predict and Improve the Performance of Polar Codes. In *ISTC 2021: 11th IEEE International Symposium on Topics in Coding*, Montréal, Canada, August 2021.

2021 Adrien Cassagne, **Léonardon, Mathieu**, Romain Tajan, Camille Leroux, Christophe Jégo, Olivier Aumage, and Denis Barthou. A Flexible and Portable Real-time DVB-S2 Transceiver using Multicore and SIMD CPUs. In *The 11th IEEE International Symposium on Topics in Coding (ISTC 2021)*, Montréal, Canada, August 2021.

2018 **Léonardon, Mathieu**, Camille Leroux, Pekka Jaaskelainen, Christophe Jego, and Yvon Savaria. Transport Triggered Polar Decoders. In *2018 IEEE 10th International Symposium on Turbo Codes & Iterative Information Processing (ISTC)*, pages 1–5, Hong Kong, Hong Kong SAR China, December 2018. IEEE.

2018 **Léonardon, Mathieu**, Camille Leroux, David Binet, J. M Pierre Langlois, Christophe Jego, and Yvon Savaria. Custom Low Power Processor for Polar Decoding. In *IEEE International Symposium on Circuits & Systems (ISCAS)*, 2018 IEEE International Symposium on Circuits and Systems (ISCAS), Florence, Italy, May 2018.

2017 Alireza Ghaffari, **Léonardon, Mathieu**, Yvon Savaria, Christophe Jego, and Camille Leroux. Improving performance of SCMA MPA decoders using estimation of conditional probabilities. In *2017 15th IEEE International New Circuits and Systems Conference (NEWCAS)*, pages 21–24, Strasbourg, France, June 2017. IEEE.

2017 Adrien Cassagne, Olivier Hartmann, **Léonardon, Mathieu**, Thibaud Tonnellier, Guillaume Delbergue, Camille Leroux, Romain Tajan, Bertrand Le Gal, Christophe Jego, Olivier Aumage, and Denis Barthou. Fast Simulation and Prototyping with AFF3CT. In *The 20th International Workshop on Signal Processing Systems (SiPS 2017)*, Lorient, France, October 2017.

Work Experience

ENSEIRB-Matmeca, France

Sep,2018 – Dec, 2019 ***A Flexible and Portable Real-time DVB-S2 Transceiver using Multicore and SIMD CPUs***. Developing a full Software Defined Radio communication chain for real-time processing for satellite communications with Airbus Defense & Space.

Advisor : **Pr. Christophe Jégo**, *Full Professor, Electrical Engineering Department*, Bordeaux INP (*LinkedIn*)

Worldcast Systems, France

Sep,2012 – Aug,2015 ***Design and Test of FM transmitters***. Participated in the design of Ecreso FM transmitters, created a Human-Machine Interface for production and customers.

Advisor : **Hervé Garat**, *R&D Engineer*,(*LinkedIn*)

Reviewer

IEEE SIPS, IEEE ISTC, GRETSI, IEEE NEWCAS, IEEE SysInt, MDPI Entropy

Computer skills

Programming Languages	C, C++, Python, PyTorch
HDL	VHDL, Vivado HLS
Software	Git, Gitlab CI, Linux, Inkscape

Research Supervising

Ph.D. students

2020-2023	**Hugo Tessier**, IMT Atlantique, Stellantis.
2021-present	**Hugo Le Blevec**, IMT Atlantique.
2021-present	**Lucas Grativol**, IMT Atlantique.

Post-doctoral researchers

2022-present	**Hamoud Younes**, IMT Atlantique, GoodFloow.

Teaching

2018-2019	**EN112: Digital Electronics Design**, ENSEIRB-Matmeca.
2018-2019	**EN102: Combinatorial and Sequential Logic**, ENSEIRB-Matmeca.
2018-2019	**EN103: Micro-controller project**, ENSEIRB-Matmeca.
2018-2019	**EN114: Computer Architecture**, ENSEIRB-Matmeca.
2018-2019	**MI202: Micro-controller project**, ENSEIRB-Matmeca.
2018-2019	**PG208: Object-Oriented Programmation with C++**, ENSEIRB-Matmeca.
2020-present	**EFFDL: Efficient Deep Learning**, IMT Atlantique.
2020-present	**SEIML: Embedded Systems - Software Hardware Interaction**, IMT Atlantique.
2020-present	**ParPIng: Parallel Computing for Engineers**, IMT Atlantique.

Fundings Obtained

2023-2026	**ANR JCJC**, *250k€*, ProPruNN: Profitable Pruning of Neural Networks, Project Lead. ANR
2022-2024	**Labex CominLabs**, *325k€*, Leasard: Low Energy deep neural networks for Autonomous Search-And-Rescue Drones, Member.
2022-2024	**AI@IMT**, *120k€*, Leasard: Low Energy deep neural networks for Autonomous Search-And-Rescue Drones, Member. IMT
2022-2024	**GDR ISIS**, *7k€*, Furnitures. CNRS
2022	**Maupertuis visit program**, *1k€*. Institut Français Finland
2021-2024	**Futur et Ruptures**, *120k€*, FLCNNFPGA: Towards an efficient and privacy-protecting IoT through the use of federated learning and FPGA technologies, Member. IMT Atlantique

Visiting Researcher

As Guest

2022	**Tampere University**, *Finland*.